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Bibliometric Networks and financing in Brazilian Physical Education Research

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Abstract

In this paper, we looked at citations, major institutions, research themes and funding in physical education and sports studies from Brazilian authors to evaluate their impact and insertion worldwide. A bibliometric analysis using data from international (Web of Science and Scopus) and national (Sucupira) databases followed by visualization of similarities. Data was downloaded from Scopus and SciVal (Elsevier) and Web of Science (Clarivate Analytics) databases as well as Sucupira in the area of Physical Education as defined by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior in Brazil. Data were analysed using Visualisation of Similarities (Vosviewer), correlation, regression and variance analyses to examine the relationship between quantity and quality indicators. Major topics researched include obesity, exercise, joints, cartilage, tendons and muscles (ankle, knee, hip, shoulder) as well as factors linked to age (child, adolescent and ageing), in line with those researched worldwide. The correlation between the number of publications per topic worldwide and in Brazil is 0.79. There was a concentration of publishing in the area of physical education in Brazil with 80% of papers being published by only 12% of the institutions that publish on this subject. Brazilian authors in physical education cooperate with, and receive financing from, institutions and funding agencies worldwide, but papers funded by Brazilian agencies have lower impact. Brazilian researchers are researching similar topics to international researchers, but citation analysis shows relatively closed clusters of researchers with little interaction between them.

Keywords: bibliographic coupling; cluster; co-citation; impact; technical production;

Introduction

34 Human society is facing enormous challenges and profound changes (Tian et al., 2019).
35 Along with this, science and technology are also developing rapidly and innovation has
36 become a hot topic in the contemporary era. The competition of overall national strength
37 of countries around the world is increasingly reflected in the competition of high-quality
38 talents. Postgraduate education should therefore reflect the development of students'
39 knowledge and skills education to confront the challenges in a changing world. The
40 modern world requires a set of new qualities, skills, abilities, and personal features in the
41 preparation of postgraduate students. The main challenges of this system are changes in
42 political, economic and social contexts, different from those in which postgraduate
43 studies have been organized to date in Brazil. Velho (2007) points out that the acceleration
44 of the globalization process boosted the idea that complete, multi-institutional innovation
45 systems should link science, technology, government and industry. In this context, human
46 resource training has become even more critical to increase the country's competitiveness,
47 training highly qualified researchers from universities and the graduate system to work in
48 scientific production and new cutting-edge technologies. Thus, the concern with the
49 environmental, social, economic, and political impacts of science and technology must
50 be part of human resource training for research in today's society (McManus & Baeta
51 Neves, 2020). The principles that guide the organization and evaluation of postgraduate
52 courses (PG) in Brazil still retain typical features of a simplistic design.

53 Publishing is considered a baseline science and research activity (Blind et al., 2018).
54 Funding for this activity comes from government (federal, state, local), nonprofit
55 foundations, and industry (McManus & Baeta Neves, 2021). When a government shows
56 support for R&D activities, this indicates a guarantee for public benefits (Giebe et al.,
57 2006). Nevertheless, recent budget restrictions may cause the need for researchers to
58 acquire funds from other sources (Coccia et al., 2015). Increased research funding can
59 cause a subsequent increase in quality (Quan et al., 2017) and the number of international
60 publications.

61 Bibliometric analyses are useful for identifying interconnections between
62 research articles, topics, gaps and resources (Xu et al., 2022), understanding citations. As
63 such, we propose to evaluate citation networks and financing for Brazilian publications
64 in national and international databases.

65 **Material and Methods**

66 Data were collected from three databases:

- 67 i) Technical Production from post-graduate courses was taken from Sucupira
68 (Coordenação de Aperfeiçoamento de Pessoal do Nível Superior (CAPES –
69 Brazilian Ministry of Education) area of knowledge 21 – Physical Education
70 (2017 -2020);
- 71 ii) Scopus from Elsevier database from 2012-2021 (years available), and their
72 SciVal® platform. Here data was available from lecturers within this area in
73 the Brazilian postgraduate system with a Scopus or ORCID. Scopus® (see
74 Annex I) was also used to conduct a literature search on physical education
75 documents to build publishing networks. These were then evaluated by
76 visualisation of similarities in Vosviewer® (van Eck & Waltman, 2010)
77 Version 1.6.18 (July 2021). Documents with more than 25 authors were not
78 included. Five types of bibliometric mapping analysis can be used: named
79 as coauthor, co-occurrence of keywords, citation, bibliographic coupling and
80 co-citation. Different clusters represent closely associated items. The larger
81 the item, the greater its significance and popularity (Perianes-Rodriguez et
82 al., 2016). The proximity between nodes determines the frequency at which
83 these occur together. Centrality and density analysis was carried out
84 (Swanson & Santamaria, 2021).
- 85 iii) Data on individual researchers and research institutions was taken from
86 InCites ® based on Web of Science (Clarivate Analytics). The data was
87 classified by the system in the area of physical education.

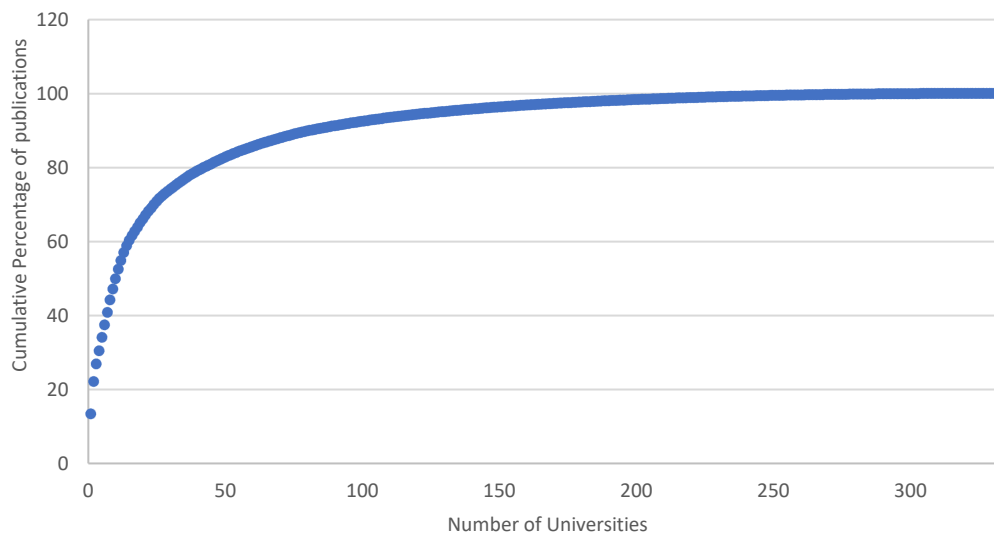
88 Quantitative, structural and performance information was collected (see Glossary for
89 definitions).

90 Statistical analyses included correlation (PROC CORR) and regression (PROC REG) to
91 assess the relationship between quantity and performance indicators. A MANOVA test
92 (PROC GLM) was carried out followed by a Dunnett test to compare other countries
93 with Brazil. All analyses were carried out in SAS® v.9.4 (Statistical Analysis System
94 Institute, Cary, NC). World Clouds were formed with the frequency of Topics from
95 SciVal using Word Art (<https://wordart.com/>).

96

98 Results

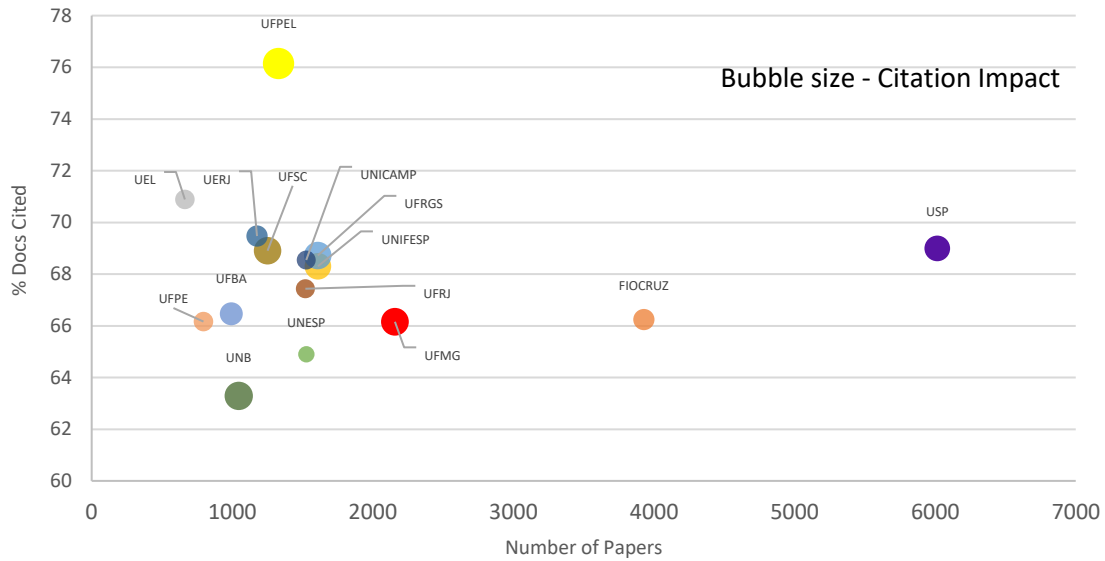
99 This area of knowledge is responsible for 1.2% of all Brazilian publications during the
100 period (2012-2021). Forty-two Brazilian institutions were responsible for 80% of
101 publications (Figure 1) indicating a concentration of publishing in the area of physical
102 education in Brazil in only 12% of the institutions.



103 Figure 1. Cumulative percentage of number of papers published by Brazilian
104 universities

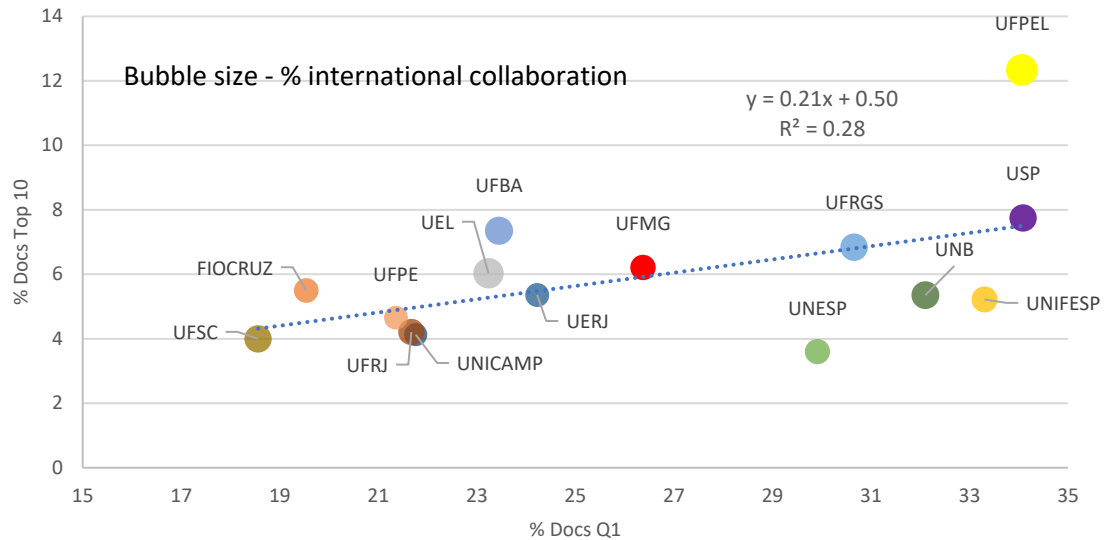
105

106 Although USP published more papers, UFPEL was seen to have higher impact (Figure
107 2). As seen internationally ($P < 0.01$), a higher percentage of papers in Q1 journals led to
108 a higher % of top 10% documents ($R^2 = 0.28$).



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110

A



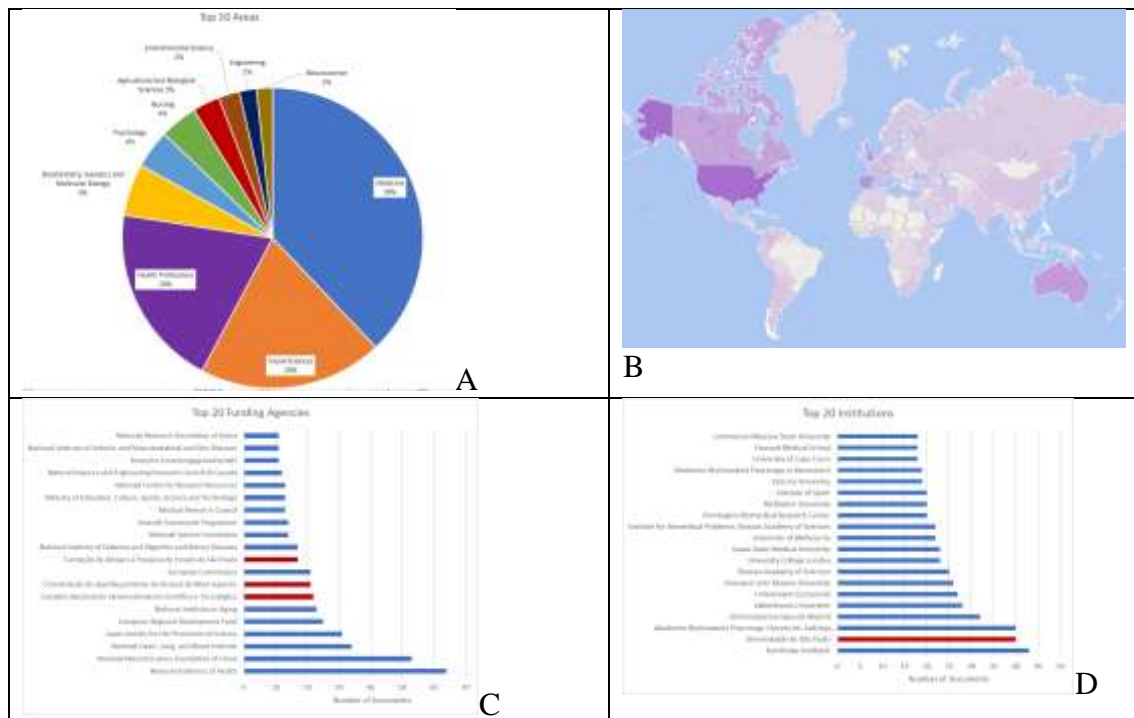
111
112

B

113 Figure 2. Quantity and performance indicators of Brazilian publishing by University in
114 Physical Education (A) Number of papers, % documents cited and citation impact; B)
115 % Documents in Q1 journals, % Documents in Top 10% citations and % international
116 collaboration (InCites®)

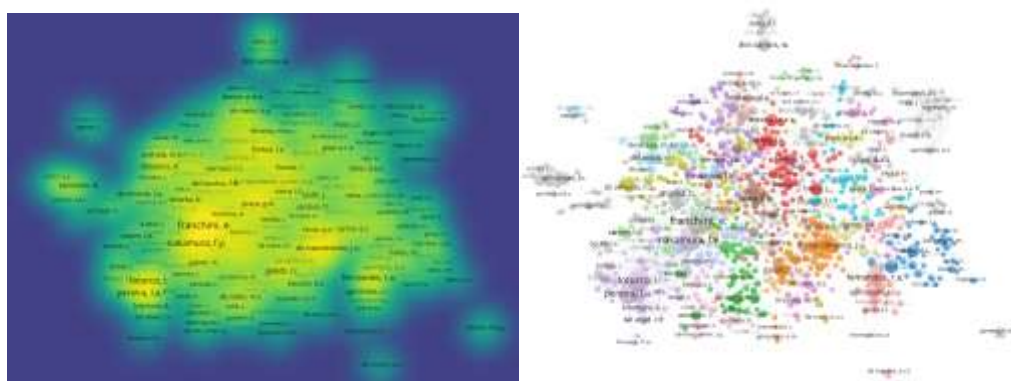
117

118 While major topics are the same in both groups (Figure 3), lesser topics differ.
119 Supplementary Table 1 shows the most frequent topics in Brazil and their impact and
120 prominence. The correlation between number of publications per topic worldwide and
121 Brazil is 0.79. Major topics include obesity, exercise, joints, cartilage, tendons and
122 muscles (ankle, knee, hip, shoulder) as well as factors linked to age (child, adolescent
123 and aging). Significant growth has been seen in areas such as Moderate-intensity,



140 Figure 4. Distribution of Worldwide and Brazilian Publications in Physical Education
 141 (A: knowledge areas; B: International Collaborations; C: Worldwide Funding Agencies;
 142 D: Worldwide top universities)

143 Documents are centred on the areas of Medicine, Biochemistry, Genetics &
 144 Molecular Biology and Health professions as expected (Figure 4). When visualising the
 145 scientific landscapes in VosViewer®, we initially looked at all publications (Figure 5).
 146 Documents with more than 25 authors were not included. Initially there were 20056
 147 authors of which 837 had at least five documents, leading to 27 clusters.



148
 149 Figure 5. Networks of all Brazilian authors in Physical Education

150 To simplify the analysis, data was limited to publications from 2012 to 2021 (last 10
 151 years) and authors with at least 5 papers (Table 1). There were 14 clusters of authors
 152 and four country clusters in co-authorship with Brazilian researchers. Major units of
 153 analyses were authors, countries, keywords and publishing sources, with a mean

154 number of 8.6 clusters (mainly for authors, thereby showing a wider diversity in
 155 publishing networks). As there were fewer clusters by keywords and countries this may
 156 indicate collaboration possibilities.

157 **Table 1. Vosviewer Analysis for Brazilian Physical Education publications**

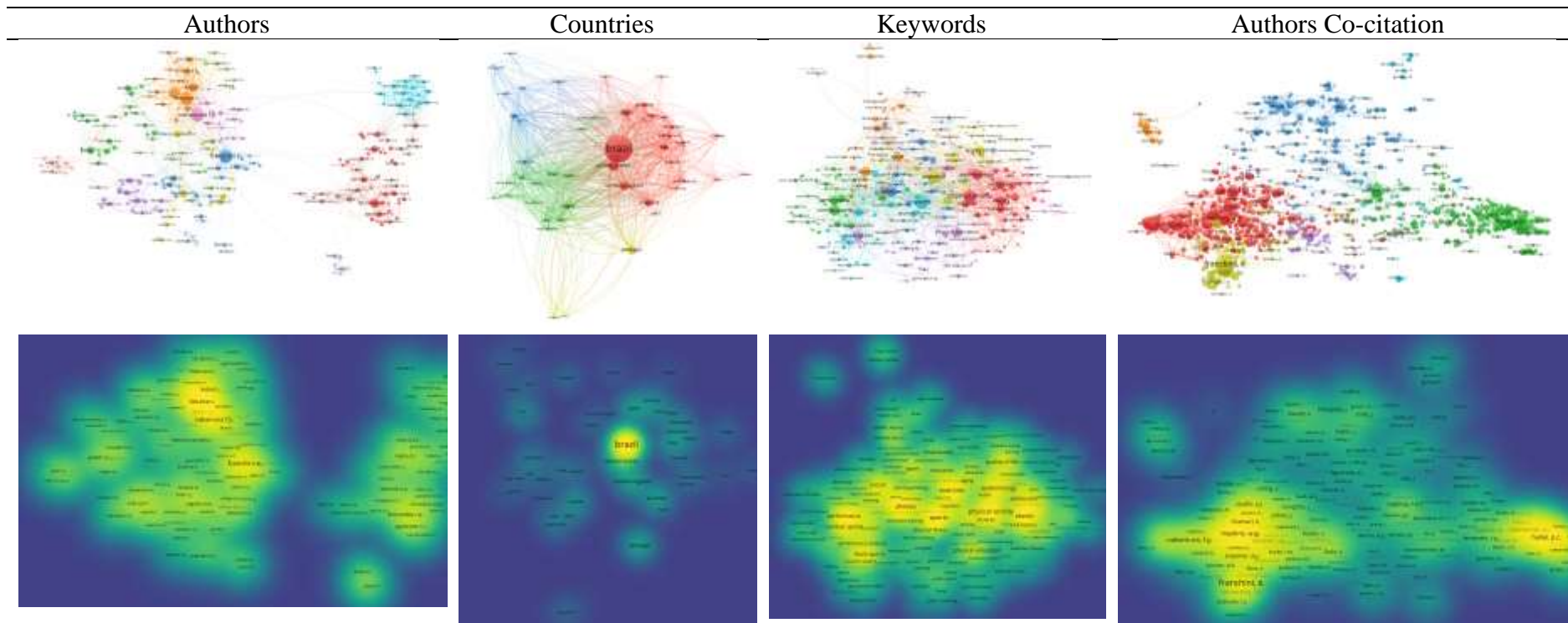
Type of Analysis	Unit of Analysis	Initial	5 or more papers	Clusters
Co-authorship	Authors	8272	252	14
	Countries	104	54	4
Co-occurrence	Keywords ¹	4146	269	12
			100 ²	6
Citation	Sources	691	82	5
	Countries	104	51	6
Bibliographic coupling	Sources	691	94	7
	Authors	8272	247	19
	Countries	104	54	5
Co-citations	Authors	118947	996	8

158 ¹Author keywords; ² increased co-occurrences to 10 times

159

160 The networks produced (Figure 6) show the main authors, collaboration countries,
 161 keywords used and co-citations for Brazilian papers in physical education. The
 162 institutions of these authors include USP, UEL and UFPB. Nevertheless, authors form
 163 distinct groups, with few interactions. When looking at publishing country clusters, we
 164 can identify: i) Europe; ii) Global-South cooperation (India, Malaysia, China and Latina
 165 America; iii) North America and iv) a group with Japan and Scandinavian countries.
 166 This pattern repeats itself in the co-citation analysis (Figure 8), with the inclusion of a
 167 group from Oceania.

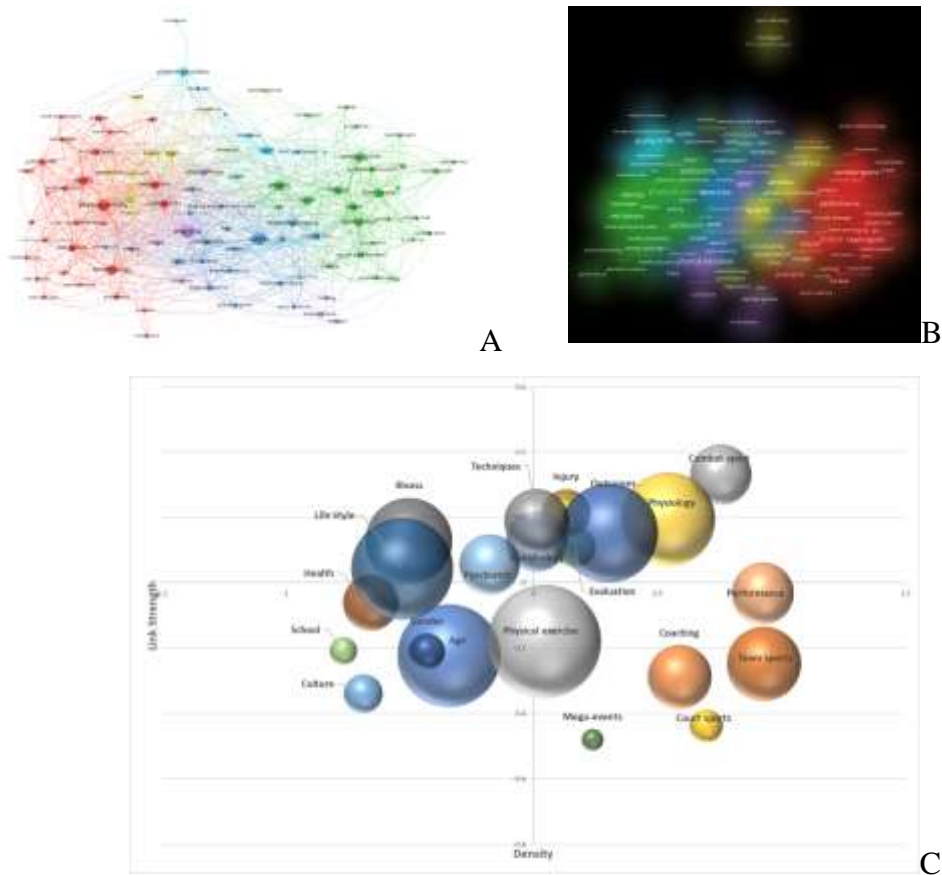
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169 Figure 6. Network analyses for Brazilian publications on sports and exercise in Scopus (Vosviewer®)

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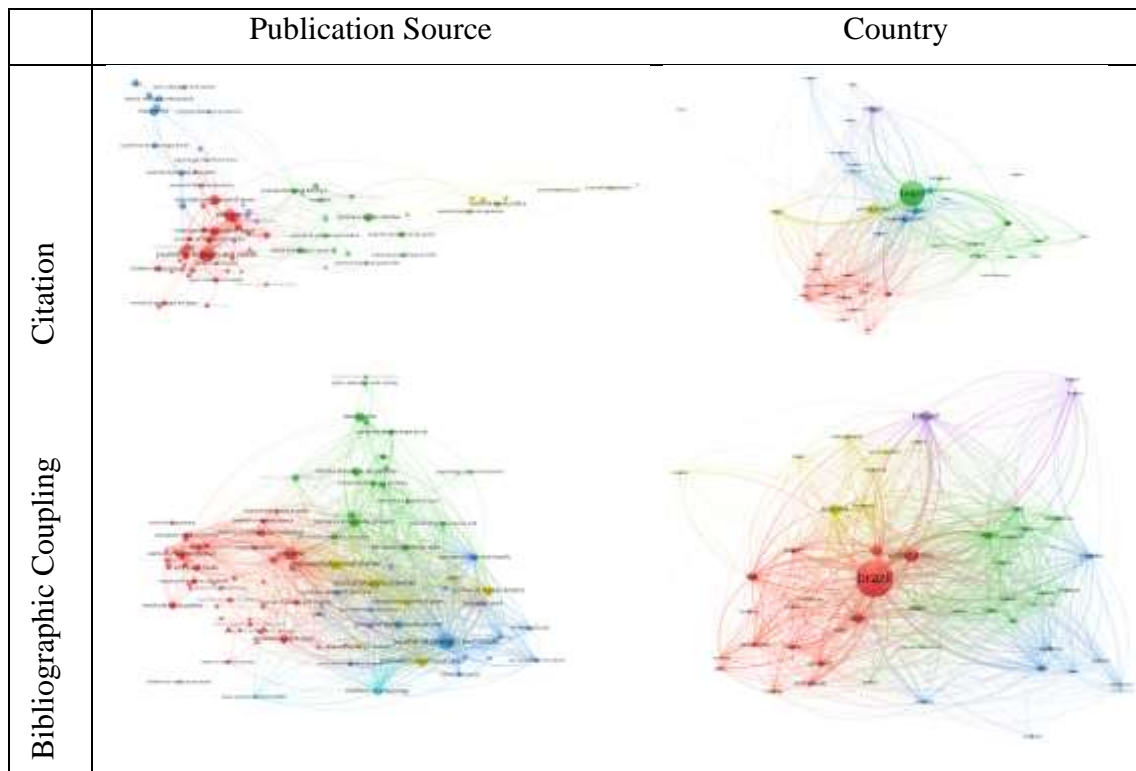
172 Figure 7. Keyword analysis for Brazilian publications in physical education (Scopus,
 173 2012-2021) and (C) Centrality and Density analysis

174

175 Keyword clusters (Figure 7) showed those based on lifestyle, health/illness; sports and
 176 performance related which is upheld in the centrality and density analysis.

177 In terms of the Citation & Bibliographic Coupling (Figure 8), there are journal clusters
 178 related to medicine and sport; psychology health and kinetics, education and public
 179 health. In bibliographic coupling, Portugal and the USA are major partners. In terms of
 180 citations, there are clusters showing i) Brazilian citing Brazilian journals; ii) Brazilian
 181 citing journals in Portuguese and Spanish; iii) Martial Arts journals and iv) Physiological
 182 journals.

183

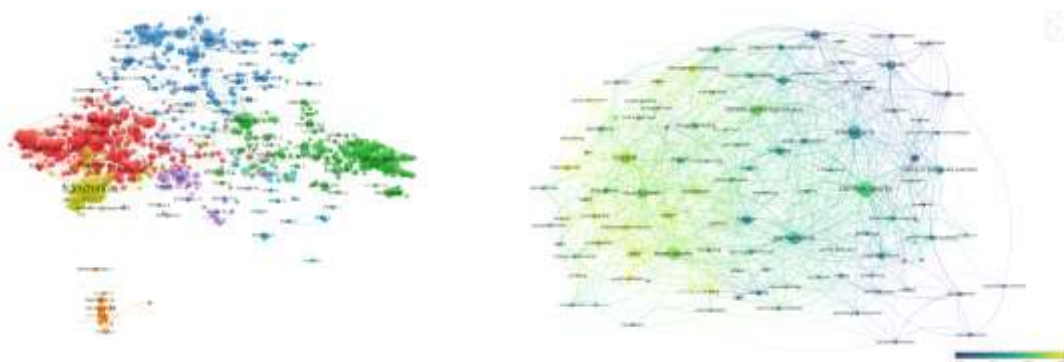


184 Figure 8. Citation & Bibliographic Coupling by source and country

185

186 Co-citation networks show three major groups, and three smaller ones, one being
 187 separated from the rest (Figure 9). Keywords changed over time, moving from
 188 physiological aspects, martial arts, resistance and strength training, to team sports and
 189 performance.

190

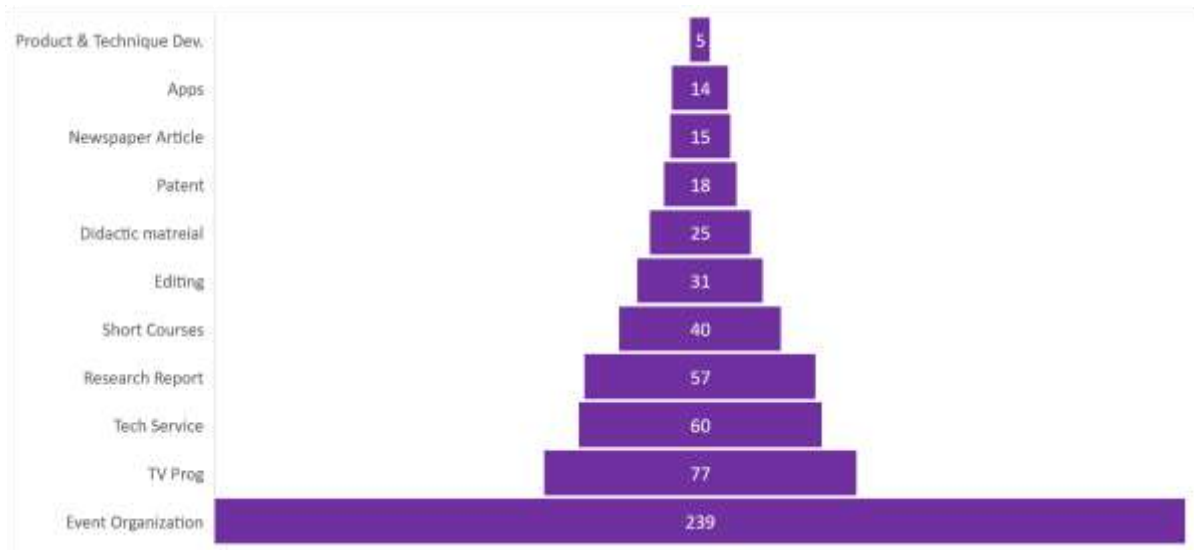


191 Figure 9. Co-citation by author and over time

192

193 There were 581 technical products seen from 2017 to 2020, including Short Courses,
 194 Apps, Development of Techniques and products, Didactic material, Editing, event

195 Organization, Patent, TV Programs, Research Reports, Technical Services and
 196 Newspaper Articles (Figure 10).



197

198 Figure 10. Number of technical products from Brazilian physical educations courses
 199 (Sucupira Platform, 2017-2020)

200

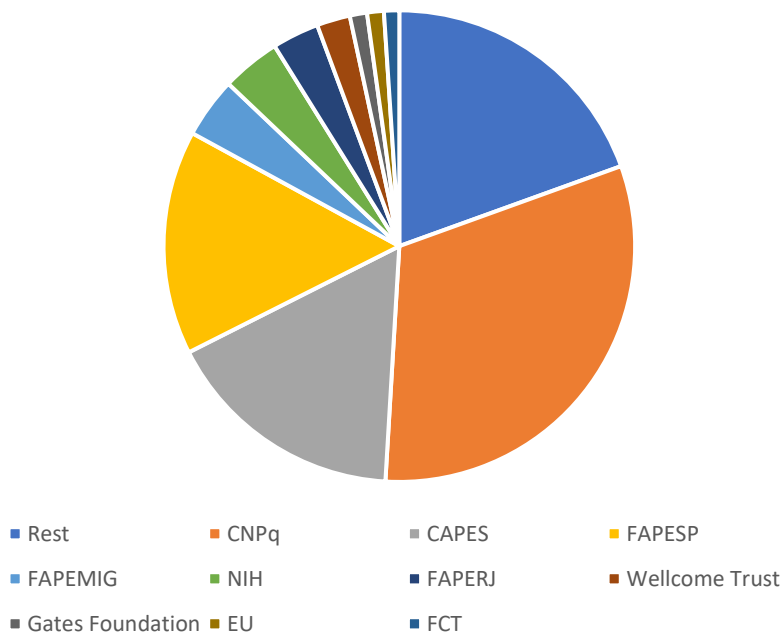
201 In Scival, 239 patents cite 68 publications of lecturers in Physical education, leading to
 202 19.1 patent citations per 1000 scholarly outputs.

203

204 **Funding Agencies in relation to publication in Physical Education: Brazil and**
 205 **Worldwide**

206 Top 10 funders of research in physical education in Brazil contribute to 80% of
 207 publications (Figure 11). The major financers are Brazilian (Federal agencies such as
 208 Capes, CNPq, and state financing agencies (FAPs such as FAPESP, FAPERJ,
 209 FAPEMIG). The largest international agency is the NIH from the USA, and there are
 210 also private foundations such as the Wellcome trust and the Gates Foundation (Both of
 211 which focus on health issues).

212



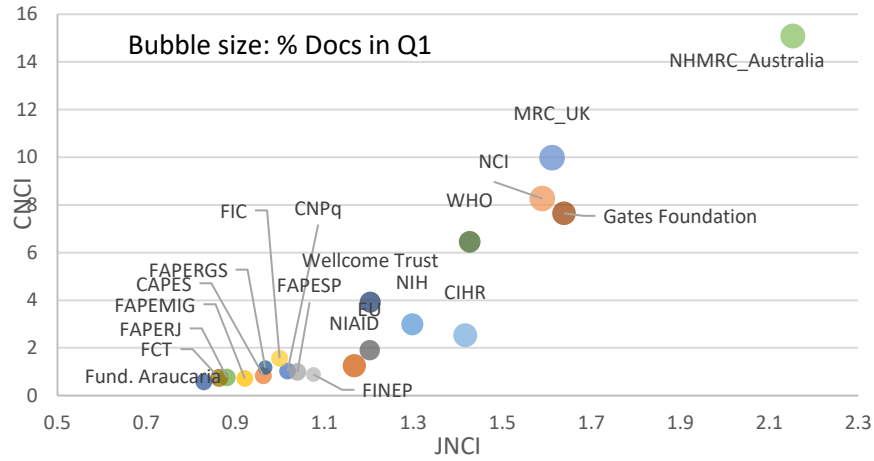
213

214 Figure 11. Major Funders of Research in Physical Education in Brazil

215 When in collaboration with foreign financing agencies, Brazilian papers tend to be
 216 published in journals of higher impact and therefore have higher CNCI in comparison
 217 with national collaborations (Figure 12A). CNPq is amongst the world's largest
 218 financing agencies, but has lower JNCI and CNCI when compared to the top 20
 219 financers (Figure 12 B). Brazilian documents financed by national agencies show a
 220 clear trend to be published less in open access and have lower % of international and
 221 industrial collaboration (Figure 12 C). Many of the international financing agencies are
 222 the National Health institutes in the USA which tend not to show high collaboration
 223 with foreign countries (Figure 12D) but these tend to publish open access. Private
 224 foundations such as the Gates Foundation and Wellcome Trust show high international
 225 collaboration.

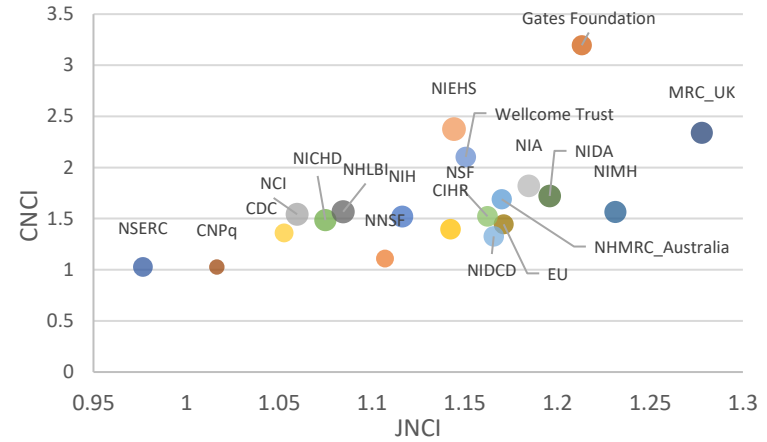
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Brazil

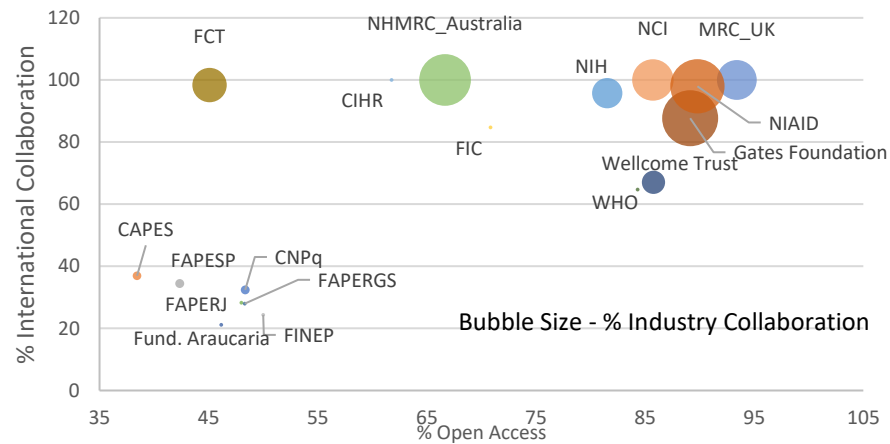


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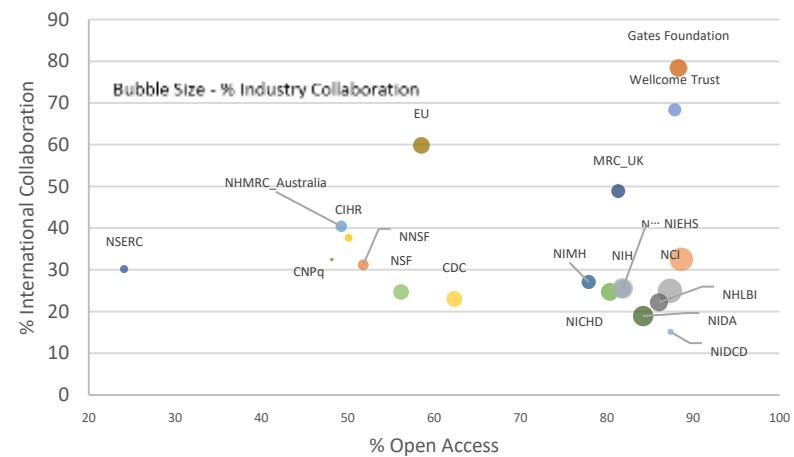
Worldwide



B



C



D

227 **Figure 12. A.** Publication Impact for Brazilian Physical Education by financing agency **B.** Publication Impact for Physical Education by
 228 financing agency worldwide **C.** Interaction of Open Access Publishing with International and Industry Collaboration in Brazilian Physical
 229 Education by Financing Agency **D.** Interaction of Open Access Publishing with International and Industry Collaboration in Physical Education
 230 by Financing Agency Worldwide
 231

232 **Discussion**

233 Most research in Brazil is produced in higher education institutions (HEIs), showing the
234 importance of the institutions in Figures 1 and 2, and many institutions have more than
235 one program. At present there are 81 physical education postgraduate programs in Brazil¹
236 (36 academic masters, 4 professional masters, 40 academic masters and doctorates and
237 one professional masters and doctorate). The major knowledge areas for physical
238 education in Brazil include physical education (39 programs), physical and occupational
239 therapy (30) as well as speech therapy (12).

240 Tahamtan et al. (2016) found three general categories (paper related, journal related and
241 author-related) and twenty-eight factors associated with the number of citations. The size
242 of a nation's scientific community may determine the need for international collaboration
243 (Puuska et al., 2014; Frame and Carpenter, 1979). Small countries have been more active
244 in international collaboration, possibly because they have fewer opportunities to find
245 collaborators inside their own country than larger countries, so they have a greater need
246 for foreign research partners (Narin et al. 1991; Confraria & Godinho, 2014).
247 International co-publications in these countries are more extensive than their overall
248 scientific production than larger countries (Glänzel 2001). While international
249 collaboration shows positive relationships with citation impact (Jeong et al., 2013), there
250 is still a need for academic excellence (Fortunato et al., 2018; McManus et al., 2020c).
251 Moreover, these collaborations are affected by several other factors, including relative
252 socio-economic level, overall scientific activity and geographic distance (i.e., Parreira et
253 al. 2017), which may constrain the impact of citation indices. Overall, Oliveira (2016)
254 reinforces this by stating that high-impact publishing requires demanding conditions,
255 interesting scientific/technological problems, trained scientists, infrastructure, and the
256 ability to communicate the results and concepts (Jordan et al., 2003).

257 Countries that spend more on R&D produced more results (Meo et al., 2013), including
258 the number of publications, citations per document and H-index. Nevertheless, Man et
259 al. (2014) saw that the number of publications correlated with economic conditions only
260 in developing countries, but not in more developed countries. Countries with less material
261 and intellectual resources are more likely to look for foreign research partners than richer

¹<https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/programa/quantitativos/quantitativoAreaConhecimento.jsf?areaAvaliacao=21>

262 countries (Luukkonen et al. 1992). Confraria et al. (2017) found a large gap between
263 higher and lower-income countries. These authors cite actions such as increasing levels
264 of collaboration with highly reputed scientific authors and publishing in high impact
265 journals to positively affect the relationship between these countries. Higher
266 international collaboration levels may help countries with both low GDPpc (Gross
267 Domestic Product per capita) and smaller scientific communities. Countries in the
268 scientific periphery (Goldfinch et al., 2003) also benefit from foreign collaboration, while
269 domestic partnerships between institutions in these countries negatively correlate with
270 citation rates (Schubert and Sooryamoorthy 2010). King (2004) and Confraria et al.
271 (2017) found that the relation between GDPpc and citation impact is not strictly positive.
272 Baeta Neves et al. (2020) also found similar results, with one Brazilian citation costing
273 half of that from Portugal and 1/12 from Qatar. Results here show that financing is
274 available in this area of knowledge from private companies and foreign research agencies.

275 The number of papers in the most popular themes studied worldwide and in Brazil showed
276 a correlation of 0.79, indicating similarity between the two datasets. Nevertheless, papers
277 published in journals not registered in Scopus and Web of Science were not included in
278 this analysis and a significant fraction of the “topics” defined by SciVal does not perfectly
279 fit the article’s field (Zanotto & Carvalho, 2021) which may lead to bias. Nascimento
280 (2010), in a survey of thesis themes in physical education found that the main areas of
281 research were Physical/Sports Training (12.9%). Biomechanics (8.7%). Physical
282 Activity/Sports in special groups (8.4%); Teacher Training/Physical Education and
283 curriculum (8.1%); Physiology (7.5%); Sociology (6.6%) and Physical Education/sports
284 in schools (6.3). This author showed a large amount of research lines with low production
285 indices. On the other hand, Manoel & Carvalho (2011) showed concentration in
286 biodynamics, in detriment of sociocultural and pedagogical areas of research, while
287 Lazzarotti Filho et al. (2012) noticed wide dispersion in the themes studied.

288 In the present study (Supplementary Table 2) questions linked to older ages such as
289 osteoarthritis, knee, *Medialis oblique*, bone density, frailty (elderly, phenotype),
290 Alzheimer’s, as well as life style such as diabetes remission, body mass index, behaviour
291 and prolonged sitting etc are also more prevalent and showed significant growth in recent
292 years. This is in line with Formica (2002) and Green et al. (2006) who showed a move
293 away from studies with children in school towards more adult physical education and life-

294 style choices. Important research areas centre around conditions such as aging
295 (Osteoarthritis, fragility), lifestyle (diabetes, body mass index (BMI), hypertension,
296 obesity) and illnesses (such as cancer, diabetes, hypertension etc). Given the effect that
297 earlier experiences with physical education have on adult physical activity and life style
298 choices (Ladwig et al., 2018), these authors suggest that research efforts should include
299 how childhood memories affect physical activity and health in terms of attitude, intention
300 and sedentary behaviour in adulthood. Balwan & Kour (2021) state that Lifestyle
301 Disease are a major health problem worldwide, with cardiovascular, cancers, respiratory
302 and diabetes linked diseases accounting for over 80% of non-communicable disease
303 deaths (WHO, 2017). Many of the most prevalent techniques seen in Supplementary
304 Table 2 have been used in the control of these conditions. Quennerstedt (2019) argues
305 for the use of health in physical education, and the themes studied here confirm this
306 tendency, through promoting activities and behaviour that reduce the risk of disease, at
307 present or in the future.

308 In the analyses presented here, bibliometric landscape cluster analysis establishes
309 boundaries of knowledge, links between edges of studies, and areas of opportunity for
310 future research (Swanson & Santamaria, 2021). Co-citation is when two documents
311 receive a citation from the same third document and presumes they are highly related
312 (Cancino et al., 2017), therefore forming clusters as seen here. This provides insight into
313 how authors connect their studies with those of others already published (Chen et al.,
314 2001). Bibliographic coupling is when two studies cite the same third document,
315 indicating to some degree of similarity between the two documents, authors, institutions
316 or countries. Co-citation is therefore important for authors. Brazil therefore shows
317 significant coupling for Brazilian authors, as does the USA and Portugal. The analyses
318 suggest that authors are diverse and only loosely organized around topics of interest
319 (Mas-Tur et al., 2021). Many key words are also generic which may contribute this
320 analysis (such as sports or exercise). We also see a movement in citation themes over
321 time.

322 Chen et al. (2015) and Benneworth & Jonbloed (2009) found the valorization of a
323 universities' worth solely through citations, patenting, licensing, spin-off formation and
324 technology transfer as a worrying development, limiting the impact other products. This
325 is, in part, the analyses of the impact of these are harder to determine. Universities' main

326 stakeholders include the international scientific community, industry, politics, the public
327 sector, and the general public (Jongbloed et al. 2007), which demand a return from their
328 investments, so some form of return must be indicated for them.

329 **Conclusions**

330 Brazilian authors in physical education, have cooperation with and receive financing
331 from institutions and funding agencies worldwide, but papers funded by Brazilian
332 agencies have lower impact. Brazilian researchers are researching the same topics as
333 international researchers, but citation analysis shows relatively closed clusters of
334 researchers with little interaction.

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337 **Declaration of interest**

338 The authors declares that they have no competing interests.

339 **Ethics statement**

340 This research was exempted from human research ethics review as it involved analysis
341 of non-identifiable aggregate data that freely and openly available in the public domain
342 or behind paywalls.

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346

347 **Author's Contribution**

348

349 CM responsible for supervision, methodology, validation and formal analyses; FP
350 responsible for data curation, and visualization; DP responsible for data curation,
351 Writing original Draft; all authors were responsible for Writing – Review & Editing

352

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465 Supplementary Table 1. Technical Services from Sports Education Courses in Brazil (2017-2020)

Institution	Short Courses	Apps	Dev. Technique	Didactic material	Product Dev.	Editing	Event Organization	Patent	TV Prog	Research Report	Tech Service	Newspaper Article
FIOCRUZ							1					
FPL									1			
FUFPI			1					1			1	
FUFSE							1			1		
FURG									3			
IEPASD									3			2
IFRN						3						
IFSUL							1					
UCB		5									6	1
UCP/RJ											1	
UDESC				1								
UECE							4				1	
UEFS							1					
UEL		3		2			4		2	1	3	
UEM	3			5		6	21			1	1	
UEPA							3			6		
UEPG			1									
UERGS						1						
UERJ	4											
UERN								1		14		
UESB							1		1			
UFAC							1					
UFAL								2				
UFAM							16					1
UFES						6						
UFESBA							1					
UFF	1							2				
UFFS								3				
UFG	1							3	1			
UFJF	4						14		1			4
UFMA								1		2	1	
UFMG							12			2	1	1
UFMT							2	8	2	13	1	

UNIVASF								2					
UNIVERSO									2		1		1
UNOCHAPECÓ								1					
UNOESTE								1					
UNOPAR										1			
UPE	2		3					1	2		7		1
URI					1								1
USJT								1					
USP	2		4		1			23		6			17
USP/RP										4			
UTFPR								1					1
UTP											1		
Total	40	14	3	25	2	31		239	18	77	57	60	15

466

467 Supplementary Table 2. Growth, Impact and Prominence of Topics by Brazilian authors with more than
 468 100 papers sorted by growth of topic (Scival® 2015 – 2020)

	Scholarly Output	Growth (%)	Field-Weighted Citation Impact	Prominence percentile
Resistance Training	505	222.34	1.01	82.35
Plyometric training	122	218.70	1.14	98.41
Moderate-intensity continuous	133	216.10	1.09	98.74
Carcinoma, Papillary	108	196.28	2.43	92.02
Osteoarthritis, Knee	134	137.12	1.13	94.34
Vitamin D Deficiency	225	98.88	1.34	96.56
Bone Density	154	77.79	1.16	84.72
<i>Medialis oblique</i>	112	72.40	1.06	94.61
Behavior	102	54.60	3.44	99.48
Prolonged sitting	102	54.60	3.44	99.48
Thyroid Neoplasms	258	53.63	1.91	86.97
Diabetes remission	124	49.40	1.14	99.03
Body Mass Index	193	48.70	1.03	94.22
Frail Elderly	198	36.30	1.22	99.73
Frailty phenotype	198	36.30	1.22	99.73
Training RT	216	17.00	1.26	95.93
Arcuate nucleus	100	15.60	1.04	99.26
Hypothalamus	100	15.60	1.04	99.26
BFR exercise	108	13.90	1.29	92.86
Health	222	8.93	8.86	68.52
Muscle index	235	4.20	1.67	99.78
Sarcopenia	236	4.20	1.20	86.33
Inactivation PDI	409	1.80	1.17	98.92
Peptidyl-Dipeptidase A	163	0.50	1.12	95.49
Receptor axis	163	0.50	1.12	95.49
Adipose Tissue, Brown	104	0.25	1.00	93.58
Hypertension	257	-0.92	0.99	73.62
Photosensitizing Agents	495	-2.25	1.20	86.53
Metagenome	208	-5.20	1.59	99.99
Microbial composition	208	-5.20	1.59	99.99
Adipose Tissue	108	-15.43	1.05	58.69
Osteoporosis	341	-15.77	1.03	81.64
MPS IIIA	180	-17.20	1.14	96.09
Muco-polysaccharidoses	180	-17.20	1.14	96.09
Foot	105	-19.30	1.06	78.81
Mutation	107	-21.87	1.31	85.65
Photochemotherapy	540	-26.13	1.35	68.33
Alzheimer Disease	414	-28.38	1.16	76.57
Diet, High-Fat	192	-28.50	1.17	96.13
Weight Loss	170	-31.03	0.99	89.31
Rehabilitation	144	-32.86	5.80	64.60
Mitochondria	106	-38.38	1.79	79.14
Neoplasms	147	-45.44	1.05	66.49
Intercellular Signaling Peptides & Proteins	118	-48.90	1.19	98.89
Risk	201	-59.50	1.28	74.05
Diabetes Mellitus, Type2	206	-66.04	4.32	86.30
Periodicals Topic	245	-81.96	3.80	59.65
Blood Platelets	129	-82.97	1.14	77.01

469

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