

BIBLIOMETRICS

IVO L. MULLER-JUNIOR^{1(ADEF)}, ANDRE M. CAPRARO^{2(ADEF)}

1 ORCID: 0000-0003-1710-2807

Federal University of Parana, Faculty of Physical Education, Curitiba (Brazil)

2 ORCID: 0000-0003-3496-3131

Federal University of Parana, Faculty of Physical Education, Curitiba (Brazil)

Corresponding author: Ivo L. Muller-Junior, Doctoral student of Physical Education at the Federal University of Parana; e-mail: ivojunior11@yahoo.com.br, tel.: +55(41)98411-7100

Postal code: Eurides Cunha, 263, apt 301. CEP – 80320-010. Curitiba, Parana, Brazil.

Profile of scientific publications on Muay Thai: An analysis based on Scopus and Web of Science databases (1998–2021)

Submission: 14.07.2022; acceptance: 1.03.2023

Key words: Muay Thai, Thai boxing, bibliometrics, combat sports, martial arts

Abstract

Background and Aim. Following the growing popularity of Mixed Martial Arts events, Muay Thai has drawn the attention and interest of the scientific community. Moreover, in 2021 it was fully recognized by the International Olympic Committee. The objective of this study was to outline the profile of scientific articles considering Muay Thai, indexed in Scopus and Web of Science databases. **Methodology.** A bibliometric analysis was conducted, presenting the state of the art on the topic from a multifactorial perspective. The search addressed titles, abstracts, and keywords, with no restriction on language, research area, or time of publication. The following variables were studied: year of publication; journals; authors; countries and continents publishing articles on the topic; most cited articles; classification of Muay Thai as a fighting art, martial art, and/or combat sport; and keywords.

Results. Altogether, 129 articles were analyzed, most of them published in the last 5 years; 106 articles were published in English, predominantly in the Biological and Health Science fields. Muay Thai has been researched in 34 countries, of which Brazil has published the most articles (27) *Archives of Budo* (7) and *Ido Movement for Culture Journal of Martial Arts Anthropology* (5) are the main journals publishing articles on the topic; Emerson Franchini (8) and Tony Myers (5) are the main authors publishing articles on Muay Thai.

Conclusion. Muay Thai is still an incipient field of research. Nonetheless, Muay Thai research trend analysis shows the absence of studies related to the Social and Human Sciences, which indicates the need for further publications. Moreover, there were neither any strong research groups focused on Muay Thai research nor study groups led by a Thai university or Thai researchers among the most important researchers on the topic.

Introduction

With more than 300 million practitioners worldwide [Pookaiyaudom 2020], Muay Thai, known as Thai boxing in some countries, is recognized as both a traditional

Thai martial art and an international combat sport – it is one of the main cultural export products from Thailand [Jukping 2020; Raimondo, Stampi, Giacometti 2019]. According to Cynarski [2019], these features characterize Muay Thai as a fighting art. “Fighting” is a term

For citation – in IPA style:

Muller-Junior I.L., Capraro A.M. (2024), *Profile of scientific publications on Muay Thai: An analysis based on Scopus and Web of Science databases (1998–2021)*, “*Ido Movement for Culture Journal of Martial Arts Anthropology*”, vol. 24, no. 3, pp. 32–43; doi: 10.14589/ido.24.3.4.

In other standard – e.g.:

Muller-Junior, I.L., Capraro, A.M. Profile of scientific publications on Muay Thai: An analysis based on Scopus and Web of Science databases (1998–2021). *Ido Mov Cult J Martial Arts Anthropol*, 2024, 24 (3): 32–43 DOI: 10.14589/ido.24.3.4

that encompasses combat skills and styles erroneously referred to as martial arts, besides elements of self-defense, combat sports, and training programs. Thus, approaching it as a fighting art makes it possible to comprehensively research and explain this new holistic paradigm [Cynarski 2016].

The number of Muay Thai practitioners has grown over the last decades, making it one of the most popular fighting arts worldwide [Ong, Ruzmin 2015]. It gained world notoriety and importance in the 1990s in the wake of the growing popularity of mixed martial arts (MMA) events [Muller Junior, Capraro 2020a]. Moreover, some authors have considered Muay Thai as one of the main elements of MMA [Boghossian *et al.* 2017; Jensen *et al.* 2017; Bledsoe 2009].

According to Jones and Theerawong [2021], the Ministry of Tourism and Sports of Thailand, in partnership with the Ministry of Foreign Affairs and the International Federation of Muaythai Amateur (IFMA), has been working since 2012 to include this fighting art in the International Olympic Committee (IOC). IFMA merged with the World Muaythai Council to improve its worldwide quality, adopting the global standard of Muaythai as an IOC – preferred style of amateur sport, besides increasing the number of federated countries. Another strategy used by IFMA was to change the name Muay Thai to Muaythai, to diminish its connection with Thailand and make it an international sport. Nevertheless, this study keeps the name Muay Thai, as this is the name used in 96% (133) of the articles, besides being the terminology recommended by Perez-Gutierrez *et al.* [2011] as the most appropriate to identify this fighting art. IFMA has been working to include Muay Thai in the 2024 Summer Olympics, to be held in Paris [Muller Junior, Capraro 2020a; Zhang *et al.* 2018; Chitas 2017].

The growing popularity of Muay Thai has drawn the attention and interest of the scientific community, especially since the beginning of the 21st century, producing a variety of specific literature on this martial art. The contribution of such studies is important in many ways. For example, they may help fighters improve the efficiency of their low kick [Socci *et al.* 2021], roundhouse kick [Gavagan, Sayers 2017], front kick [Grymanowski *et al.* 2019], and straight punch, using kinematic and kinetic analysis [Tong-Iam, Rachanavy, Lawsirirat 2017]. They are also helpful regarding the physiological responses [Crisafulli *et al.* 2009] and energy demand during a Muay Thai competition [Cappai *et al.* 2012], the development of physical testing models applied to high-skill Muay Thai fighters [Okhlopkov, Migalkin, Danilov 2017], safe dehydration methods during the loss of body weight [Pereira, Casarini 2019], effects of Muay Thai training on body composition [Saraiva *et al.* 2021] and pre-adolescent bone mineral [Costa *et al.* 2018], the debate on which judging system should be implemented internationally [Myers, Nevill, Al-Nakeeb 2013], the impact of

crowd noise on officiating in a live international Muay Thai tournament [Myers, Balmer 2012], Thai government support to make Muay Thai an official Olympic sport [Jones, Theerawong 2021], and so forth. Nevertheless, little is known about the profile of worldwide Muay Thai scientific publications, in contrast with other sports such as Judo [Peset *et al.* 2013; Reis, Franchini, Capraro 2022], Taekwondo [Perez-Gutierrez *et al.* 2015; Perez-Gutierrez *et al.* 2017], Karate [Gutierrez-Garcia *et al.* 2018b], Kickboxing 1991 [Podrigalo *et al.* 2022] and MMA [Nieto-Fernandez *et al.* 2017].

Hence, the objective of the present study was to outline the profile of scientific articles on Muay Thai indexed in Scopus and Web of Science databases. Such bibliometric studies verify how a topic has been approached in the literature, as well as its trends, limitations, and new research possibilities [Thanuskodi 2010].

Methodology

Data were collected from Scopus and Web of Science databases. The Web of Science core collection was used, which include Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI) and Emerging Sources Citation Index (ESCI). According to Gutierrez-Garcia *et al.* [2018a], these are the most relevant multidisciplinary scientific databases in the world, with valuable bibliometric indicators.

“Muay Thai”, “Muaythai”, and “Thai boxing” were the descriptors used, as these terms are internationally accepted and represent the name of the fighting art in question [Perez-Gutierrez, Gutierrez-Garcia, Escobar-Molina 2011]. The authors also used the Thai script “มวยไทย” (Muay Thai). They also followed the recommendations of Perez-Gutierrez, Gutierrez-Garcia and Escobar-Molina [2011] to introduce the different terms and spellings manually (“Muay Thai”, “Muaythai”, “Muay Thay”, “Thai boxing”, “Thaiboxing”, “มวยไทย”). The results were individually analyzed to determine their relevance and then included in Excel 2021 for statistical analysis.

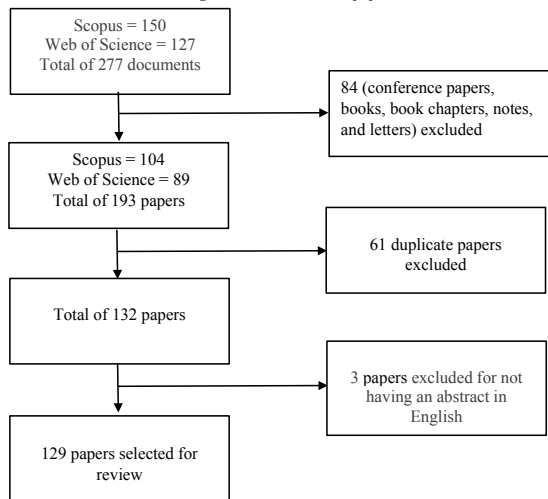
The search addressed titles, abstracts, and keywords, with no restriction on language or time of publication. No limits of date were used, it included articles from the first year found in the databases through December 31, 2021.

Only full-text articles were included in this study; conference papers, books, book chapters, notes, and letters were excluded. Duplicate documents were removed, as well as articles without an abstract in English, as shown in Figure 1.

Then, the data were analyzed based on the concepts proposed by Stemler [2000], resulting in the description, classification, and interpretation of the investigated situation. The following variables were analyzed: article

distribution per year of publication; language of publication; scientific journals publishing articles on Muay Thai; authors, countries and continents publishing articles on the topic; most cited articles; Muay Thai classification as a fighting art, martial art, and/or combat sport, according to the General Theory of Fighting Arts (GTFA); whether the research belongs to the Biological and Health Sciences or Social and Human Sciences, according to [Rigo, Ribeiro, Hallal 2011]; and the most used keywords.

Figure 1 – Flowchart of paper selection



Source: The authors [2022]

Data on journals, years of publications, most cited articles, authors, and countries were found on the platforms. Author description and classification did not follow the order in which they were written; instead, they were listed based on the number of published articles. As for the number of citations, if they differed between the two databases, the highest value was considered. The authors defined the topic area after reading the abstracts and, if necessary, the full text. Information on author affiliation was obtained from the affiliated institutions' websites.

After organizing them per country, the study verified which continent published the most articles on the topic. Since Russia is in both Europe and Asia, the researchers defined the continent of Russian studies based on where the author's university is located – i.e., some Russian publications were considered European and others, Asian.

GTFA was used to analyze whether articles understood it as a fighting art, combat sport, or martial art. “The term ‘fighting arts’ combines the skills, forms or fighting behaviour, which are mistakenly called martial arts by cultural anthropologists and hoplologists. The term describes also self-defence and other combat sports, training programmes within this scope etc.” [Cynarski 2019: 25]. There are five varieties of fighting arts: weapons arts; self-defense arts; performance arts; internal arts; combat sports (grappling, striking, and a combination of both) [Cynarski 2019]. Martial arts have been defined as a historical combat method category (either using weapons or not), combined with cultural and spiritual elements of transcendence and personal

development [Cynarski 2019; Cynarski, Skowron 2014]. GTFA also points out that combat sports are understood as martial art variants whose main characteristic is the focus on competition, having universal rules to protect the competitors' health and being held in specific settings and durations [Cynarski 2019; Cynarski, Skowron 2014].

The analysis to define whether an article belonged to the Biological and Health Sciences or the Social and Human Sciences was based on articles the researchers read. The Biological and Health Sciences comprise lines of research such as biomechanics, kinesiology, exercise physiology, physical training, biochemistry, sports nutrition, and so forth. The Social and Human Sciences encompass sociocultural studies in the scope of sociology, anthropology, history, philosophy, psychology, tourism, political sciences, educational sciences, etc. [Rigo, Ribeiro, Hallal 2011].

The last variable was presented in a keyword cloud generated in Nvivo software, which is one of the most used in qualitative research [Lage 2011]. The cloud encompassed title words and the keywords used to delimit the study topics that occurred six or more times. It was necessary to include title words because journals sometimes ask authors not to include the same words in both the title and keywords. Verifying keywords helps understand how authors classify their studies, as these definitions synthesize the characteristics of the text [Dart 2014].

Results

The first article on Muay Thai, entitled “Renal and liver functions and muscle injuries during training and after competition in Thai boxers”, was published in 1998 [Saengsirisuwan, Phadungkij, Pholpramool 1998]. Figure 2 shows that most pieces of research (67%; n = 86) were published in the last 5 years – i.e., between 2017 and 2021.

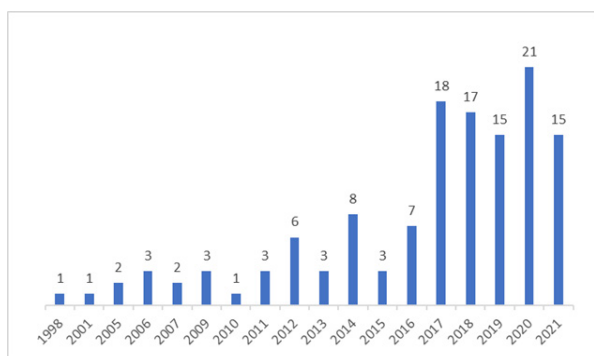


Figure 2. Distribution of articles per year of publication

Source: The authors [2022]

Articles indexed on these databases were published in eight languages – 82% (106) of them were in English, followed by Portuguese, with 7% (9), French and Russian, with 3% (4) each, and Italian, with 2% (3). Articles written in German, Indonesian, and Czech were also found, with one article (approximately 1%) each.

Altogether, 74 journals indexed in Scopus and Web of Science have already published articles on Muay Thai. The 12 with the most articles published on the topic are presented in Table 1, in which *Archives of Budo* (6%; n = 7) and *Ido Movement for Culture* (5%; n = 5) stand out.

Table 1. Journals publishing articles on Muay Thai

ISSN	Journal	No. of publications
1643-8698	Archives of Budo	7
2082-7571	Ido Movement for Culture of Martial Arts Anthropology	5
0040-3601	Teoriya i Praktika Fizicheskoy Kulturny	4
1524-1602	Strength and Conditioning Journal	3
0125-2208	Journal of the Medical Association of Thailand	3
2174-0747	Revista de Artes Marciales Asiaticas	3
1988-5202	Journal of Human Sport and Exercise	3
0025-7826	Medicina dello Sport	3
1664-1078	Frontiers in Psychology	3
1517-8692	Revista Brasileira de Medicina do Esporte	3
1579-1726	Retos: Nuevas Tendencias en Educacion Fisica, Deportes y Recreacion	3
2197-1714	Injury Epidemiology	3
1474-8185	International Journal of Performance Analysis in Sport	3
0022-4707	Journal of Sports Medicine and Physical Fitness	3

Source: The authors (2022).

Up to the present, 397 researchers have published on Muay Thai, 88% (352) of them only once. Among the 12 authors publishing at least three articles on the topic, there are three Brazilians, two British, two Canadians, and two Belgians, as shown in Table 2 below.

Table 2. Authors publishing articles on Muay Thai

Author	Number of publications	Country	University
Emerson Franchini	8	Brazil	University of Sao Paulo
Tony Myers	5	United Kingdom	Newman University College
Diego G. D. Christofaro	4	Brazil	Sao Paulo State University
Bruna T. Ciccoffi Saraiva	4	Brazil	Sao Paulo State University
Benjamin Lee	3	Canada	University of Waterloo
Nigel Balmer	3	United Kingdom	University College London
Stanislav E. Podhurskyi	3	Ukraine	National University of Ukraine
Stuart McGill	3	Canada	University of Waterloo
Marc Theeboom	3	Belgium	Vrije Universiteit Brussel
Pattana Kitiarsa	3	Singapore	National University of Singapore
Jikkemien Vertonghen	3	Belgium	Vrije Universiteit Brussel
Stephen Strotmeyer Jr.	3	Australia	Macquarie University

Source: The authors (2022).

Researchers from 34 countries and five continents have published articles on the topic. Europe published the most articles (65), followed by America (47), Asia (36), Oceania (10), and Africa (1). Figure 3 shows the countries that have published two or more such articles. Hence, Colombia, Croatia, Cyprus, Czech Republic, Germany, Iraq, Mexico, Peru, Portugal, Qatar, Saudi Arabia, South Korea, and Tunisia, which had only one publication each, were not included in it.

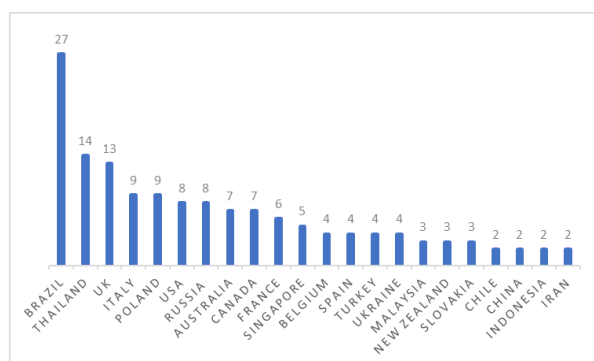


Figure 3. Distribution of publications per country

Source: The authors (2022).

Of the 129 articles analyzed, 70% (90) addressed issues in the field of the Biological and Health Sciences and 30% (39), in the Social and Human Sciences.

Table 3 shows the 15 most cited articles. Altogether, the articles were cited 906 times, although 38 of them were not cited at all. The mean number of citations per article was 7.02. The 10 first ones belonged to the Biological and Health Sciences, whereas only two belonged to the Social and Human Sciences. Four of these were published in the last 5 years – the period when most articles were published.

Table 3. Most cited articles on Muay Thai

Author	Year	Title	No. of citations	Average citations per year
Gartland et al.	2001	Injury and injury rates in Muay Thai kick boxing Towards a Determination of the Physiological Characteristics Distinguishing Successful Mixed Martial Arts Athletes: A Systematic Review of Combat Sport Literature	81	4.1
James et al.	2016	Physiological responses and energy cost during a simulation of a Muay Thai boxing match	58	11.6
Crisafulli et al.	2009	Strength and conditioning considerations for mixed martial arts	52	4.3
La Bounty et al.	2011	Weight loss strategies in combat sports and concerning habits in mixed martial arts	46	4.6
Barley et al.	2018	Effect of long-term isometric training on core/torso stiffness	44	14.6
Lee, McGill	2015	Time-motion analysis in Muay-Thai and Kick-Boxing amateur matches	38	6.3
Silva et al.	2011	Injuries Sustained by the Mixed Martial Arts Athlete	35	3.5
Jensen et al.	2017	Renal and liver functions and muscle injuries during training and after competition in Thai boxers	33	8.3
Saengsirisuwan	1998	Prevalence and patterns of combat sport related maxillofacial injuries	29	1.3
Shirani et al.	2010	'Lives of Hunting Dogs' Muai Thai and the Politics of Thai Masculinities	28	2.6
Kitiarsa	2005	A prospective study of injuries sustained during competitive Muay Thai kickboxing	28	1,6
Gartland, Malik, Lovell, Vertonghen, Theeboom, Pieter	2005	Mediating factors in martial arts and combat sports: an analysis of the type of martial art, characteristics, and social background of young participants	25	1.5
Polmann et al.	2014	Prevalence of dentofacial injuries among combat sports practitioners: A systematic review and meta-analysis	24	2.0
Gavagan; Sayers	2020	Prevalence of expert practitioners: A comparison between the martial arts disciplines of Muay Thai, Karate, and Taekwondo	21	10.5
	2017	A biomechanical analysis of the roundhouse kicking technique of expert practitioners: A comparison between the martial arts disciplines of Muay Thai, Karate, and Taekwondo	19	3.8

Source: The authors (2022)

As indicated in the methodology, the study surveyed the researchers' understanding of Muay Thai as a fighting art, martial art, or combat sport. It was found that 45% (58) of the 129 articles analyzed consider Muay Thai a combat sport, 35% (45) see it as both a martial art and a combat sport, and 20% (26) approach the topic only as a martial art; none of them referred to it as a fighting art.



Figure 4. Word cloud

Source: The authors (2022)

After surveying the most used title words and keywords, it was decided to present them in a word cloud. The greater the predominance of a word – i.e., its incidence in indexing –, the more it stood out in Figure 4. Muay Thai was the keyword that stood out the most (82), followed by Martial Arts (50), Combat Sports (38), Athletes (32), Training (18), Thai Boxing (16), Injuries (15), Performance (15), Kickboxing (13), Injury (12), Analysis (11), Boxing (11), Effect (10), Physical (10), Effects (9), Mixed Martial Arts (9), Balance (8), Thailand (8), Weight (8), Practitioners (7), Sports (7), Strength (7), Fighters (6), Loss (6), Study (6), Women (6).

Discussion

This review aimed to outline the profile of scientific articles on Muay Thai indexed in Scopus and Web of Science databases by 2021. Hence, the results were compared with other bibliometric studies on popular fighting arts, such as Judo [Peset *et al.* 2013; Reis, Franchini, Capraro 2022], Kickboxing [Podrigalo *et al.* 2022], Taekwondo [Perez-Gutierrez *et al.* 2015; Perez-Gutierrez *et al.* 2017], focused on a single database (WoS). In contrast, studies on Karate [Gutierrez-Garcia *et al.* 2018b], and Aikido [Gutierrez-Garcia *et al.* 2018c] explored a wide range of worldwide multidisciplinary and/or specific databases. The main findings of this search were the few publications and articles published in six languages (with emphasis to Portuguese, only behind English). Brazil has published the most articles, almost twice as much as the second place (Thailand). Researchers from 34 countries and five continents have published such articles, highlighting Europe, which published the most.

The comparison of the number of publications on Muay Thai (129) with those of other fighting arts, as Karate had 1209 articles [Gutierrez-Garcia *et al.* 2018b], Judo had 637 [Reis, Franchini, Capraro 2022], Taekwondo had 340 [Perez-Gutierrez *et al.* 2017], Aikido had 243 [Gutierrez-Garcia *et al.* 2018c] and Kickboxing had 194 [Podrigalo *et al.* 2022]. Such low number of publications is related to the late beginning of academic production on Muay Thai.

The text by Saengsirisuwan, Phadungkij, Pholpramool [1998], which is related to the Health Sciences, was the oldest publication found. In contrast with the beginning of publications on other fighting arts, the first article on Judo was published in 1956 [Peset *et al.* 2013], on Karate, in 1963 [Gutierrez-Garcia *et al.* 2018b], on Aikido, in 1973 [Gutierrez-Garcia *et al.* 2018c], on Taekwondo, in 1988 [Perez-Gutierrez *et al.* 2017], and on Kickboxing, in 1991 [Podrigalo *et al.* 2022]. This significant difference may be due to the later import of this fighting art to the West. For instance, Muay Thai arrived in Brazil in 1978 [Muller Junior, Capraro 2020b].

Gutierrez-Garcia *et al.* [2011] informs that between 2000 and 2009, publications on martial arts and combat sports increased by 359%. The growth trend continued in the following decade, from 225, in 2010, to 500, in 2019 [Gutierrez-Garcia *et al.* 2020]. Thus, Muay Thai scientific publications increased exponentially in the last years – 11 articles were found published in the first period (2000-2009), while 81 are from the second period (2010-2019). This quantitative growth is possibly related to the overall development of Biological and Health Sciences and the broader coverage of databases. This is similar to what Gutierrez-Garcia *et al.* [2018b] verified by analyzing Karate, and Peset *et al.* [2013] and Reis, Franchini, and Capraro [2022] verified by analyzing Judo.

Another possible factor is the coalition formed in the last decade between the Ministries of Foreign Affairs and of Tourism and Sports of Thailand and IFMA, which enabled the development of a project to include the modality in the Olympic movement. In 2016, Muay Thai was partially recognized, and in 2021, fully recognized by part of the IOC. This is a significant step toward affirming and professionalizing the modality and providing worldwide notoriety – possibly leading to an increase in academic production [Chitas 2017], as it happened with Taekwondo [Perez-Gutierrez *et al.* 2015]. Such an increase was verified in this research, as article distribution per year of publication (Figure 2) showed a significant increase in the last 5 years (2017-2021). Moreover, it corroborates the idea that when a sports modality calls the attention of society and media, academia studies it more in depth [Franchini, Gutierrez-Garcia, Izquierdo 2018; Franchini, Kokubun 2019]. Muay Thai research increased by 211% in the last 5 years, while the mean worldwide scientific production increased by 22%, from 3,751,076 articles published in 2016 to 4,593,512 in 2020 [www.scimagojr.com]. As for the growth in fighting arts research over 10 years – between the first and second decades of the 21st century –, the number of doctoral and postdoctoral theses (2009-2018) indexed in the Bielefeld Academic Search Engine (BASE) increased by 65% [Perez-Gutierrez, Cobo-Corrales 2019]; articles on Karate (2008-2017) increased by 54% [Gutierrez-Garcia *et al.* 2018b]; on Judo (2008-2018), by 246% [Reis, Franchini, Capraro 2022]; on Brazilian Jiu-Jitsu (2011-2016), by 452% [Vicentini, Marques 2018]; on Aikido (2010-2017), by 40.7% [Gutierrez-Garcia *et al.* 2018c]; on Taekwondo (2003-2013), by 320% [Perez-Gutierrez *et al.* 2015]; on Jujutsu (2010-2019), by 79% [Perez-Gutierrez *et al.* 2021], and on MMA (2011-2016), by 552% [Nieto-Fernandez *et al.* 2017].

This growth trend in fighting arts research is demonstrated by the increase in the number of journals specializing in the topic in the 21st century. Gutierrez-Garcia *et al.* [2018a] catalogued the existence of at least 12 scientific martial arts and combat sports journals. Of these, only four specific martial arts and combat

sports journals are indexed in Scopus and Web of Science databases. As seen in Table 1, Archives of Budo is the journal publishing the most articles on Muay Thai (7), followed by *Ido Movement for Culture Journal of Martial Arts Anthropology*, with five publications. Other examples of journals specializing in fighting arts are the *Revista de Artes Marciales Asiaticas* (3) and *Archives of Budo Science of Martial Arts and Extreme Sports* (2), totaling 17 publications. Most research on Muay Thai ($n = 112$; 87%) has not been published in specific martial arts and combat sports journals. On the other hand, Perez-Gutierrez *et al.* [2017] reported that Taekwondo had 36 publications in Archives of Budo alone, showing that Muay Thai is still an incipient field of study.

Altogether, 74 journals have already published articles on Muay Thai, as more than 50% of them were scattered in journals with one or two studies. The high number of journals with only one or two of them indicates the appearance of new fields of study and the interest for understanding Muay Thai from different approaches.

It was verified that all these journals specializing in fighting arts publish articles in English. The language in which publications are written helps understand the internationalization trend, estimate the reach of scientific publications, and identify where research centers are located worldwide – which makes the researchers' data mapping process easier. Of the 129 articles analyzed, 82% (106) were published in English, followed by Portuguese, with 7% (9), and French and Russian, with 3% (4) each. Peset *et al.* [2013] reports that 87.2% of Judo research was published in English, followed by French (4.9%) and German (3.9%). These data show a trend towards the internationalization of Muay Thai research, although most journals indexed on WoS and Scopus databases publish exclusively in English. The few journals that accept publications in other languages require that titles, abstracts, and keywords be also published in English, making it possible to index studies on these platforms. This norm helps internationalize research; however, it is a disadvantage to authors who cannot write in English and must often resort to translators and revisors specializing in academic writing [Archambault *et al.* 2006; Martinez 2018]. For instance, English is not a native language in either Brazil or Thailand, the two countries with the most publications, neither is it widely taught in their educational systems.

The analysis of Muay Thai publication distribution per country agrees with Gutierrez-Garcia *et al.* [2020], in that research on fighting arts has boomed since the late 1990s, demonstrating its increasing worldwide popularity and notoriety in the last years [Chitas 2017]. Brazil is not a high-level country, but the differential factor is the tremendous popularity of fighting arts in the country, of course including MMA. This has led many scholars to research on fighting arts.

Europe (65) and America (47) were the two continents that most stood out in number of studies, followed by Asia (36), Oceania (10), and Africa (1). The high number of European studies is due to the popularity of master's and doctoral programs in the continent, which stimulate scientific publications. Green, Svinth [2010] highlight the growth of research on fighting arts since the 1990s, with an interest in fields such as sports science, anthropology, political sciences, history, sociology, cinema, theater, and so forth. Green, Svinth [2010] pointed out other factors that help understand the high number of European publications, such as regular colloquia focused on fighting arts – e.g., the French event *Journées de Reflexions et de Recherches sur les Sports de Combat et les Arts Martiaux* (Conference for Reflection and Research on Combat Sports and Martial Arts) – and the judo-specific degree in “sports performance”, granted by the University of Bath, in England. Green and Svinth [2010] also highlight the increased research on fighting arts in America, citing for instance the University of Bridgeport (in Connecticut), which implemented a bachelor's degree in martial arts, and some universities that treat fighting arts as primary subjects – e.g., Texas A&M University, Sewanee: The University of the South (in Tennessee), the University of Maine, and Indiana University.

Between 2000 and 2009, the USA was the country that researched the most on fighting arts, concentrating more than one third of the world production [Gutierrez-Garcia *et al.* 2011]. According to Franchini, Gutierrez-Garcia, and Izquierdo [2018], Brazil is one of the three countries with the most publications on Olympic combat sports and the one that most researches on Judo [Reis, Franchini, Capraro 2022], Brazilian Jiu-Jitsu [Vicentini, Marques 2018], and Muay Thai. Thailand, the birthplace of Muay Thai, ranked second in the number of studies on the topic, with 12% (14), followed by the United Kingdom, with 11% (13). As previously stated, there may be more studies published in Thai which have not yet been indexed in Scopus or WoS.

In the last decade (2010-2020), the number of articles published in Brazil increased by 85%, from 51,195 to 94,965 per year. Hence, it was ranked 14th in the list of countries that most published research in 2021 – though still quite behind the leader China, which published 860,012 articles in 2021 [www.scimagojr.com]. The high number of Brazilian publications reflects data on the researchers that most published on the topic – three out of the four researchers that published the most articles are Brazilian.

As for researchers publishing articles on the topic, Emerson Franchini stands out, with eight publications. This is a relatively low number in contrast with his 83 publications on Judo [Reis, Franchini, Capraro 2022] and 10 on Taekwondo, and Willy Pieter's 19 publications on Taekwondo [Perez-Gutierrez *et al.* 2017]. Franchini is

a professor at the University of Sao Paulo and coordinates the Research and Study Group on Fights, Martial Arts, and Combat Modalities [www.scopus.ez22]. He is one of the main researchers in the world specializing in fighting arts [Gutierrez-Garcia *et al.* 2020]. Franchini is also among the most important researchers on Taekwondo [Perez-Gutierrez *et al.* 2017] and Judo [Reis, Franchini, Capraro 2022; Peset *et al.* 2013]. Even though 397 researchers have up to now published on the topic, only a few (if any) are specialized in Muay Thai – which clearly reflects the embryonic stage in which Muay Thai research is.

Franchini also published two articles in partnership with Diego G. D. Christofaro and Bruna T. Ciccotti Saraiva. These Brazilian researchers stood out among the authors who published the most studies on Muay Thai (Table 2) and likewise belong to the Research and Study Group on Fights, Martial Arts, and Combat Modalities, led by Franchini.

Tony Myers is the second author with the most articles published on Muay Thai (5). His interest in the topic goes beyond university laboratories and libraries. Myers is a Muay Thai coach and international referee, being the former British Team Coach for Amateur Muay Thai in world championships between 1996 and 1998 [sachdeepdhillionr2.wordpress.com]. He is also a professor at Newman University and the University of Wolverhampton, where he coordinates a study group on the influence of sports referees' decisions and combat sports psychology [newman.ac.uk]. Myers published three articles in partnership with Nigel Balmer, a professor of Law and Social Statistics at the University College London [ucl.ac.uk], who also stood out as one of the authors with the most publications on Muay Thai (Table 2).

Creating fighting arts research groups is a way to promote and strengthen national (and sometimes international) cooperation, as in the cases of those led by Franchini and Myers. However, the absence of Thai researchers or research groups linked to Thai universities with a considerable number of publications is unexpected, given the notoriety of Muay Thai in the country [Kraitus 1988; Gomaratut 2011; Vail 2014; Phuykae-okam, Deebhijarn 2020]. The language is hypothesized to be one of the limitations, which suggests the existence of local journals on the topic that are not included in the databases surveyed in this research. Muay Thai research published in Thai can be retrieved by using native Thai script “มวยไทย” (Muay Thai) in databases such as scholar.google or the Thai ones tci-thailand.org and tci-thaijo.org. The researchers used the Thai script “มวยไทย” in Scopus and Web of Science databases, but found no results. Not finding a specific research group also helps demonstrate that Muay Thai is still an incipient field of study.

It was verified that 70% (90) of the articles are from the Biological and Health Sciences. This percentage is

relatively near that of Judo [Peset *et al.* 2013, Reis, Franchini, Capraro 2022], Kickboxing [Podrigalo *et al.* 2022], Taekwondo [Perez-Gutierrez *et al.* 2015, Perez-Gutierrez *et al.* 2017], MMA [Nieto-Fernandez *et al.* 2017], and Jujutsu [Perez-Gutierrez *et al.* 2021].

The predominance of studies from the Biological and Health Sciences, in detriment of the Social and Human Sciences, is exemplified in Table 3. Only two out of the 15 most cited articles on Muay Thai are from the Social and Human Sciences; also, the first 10 studies are from the Biological and Health Sciences. Another fact that calls the attention in Table 3 is the few citations of the articles. For instance, an article by Franchini *et al.* [2011] was the most cited one on Judo, with 233 citations [Reis, Franchini, Capraro 2022].

As for the most cited articles, the one entitled “Injury and injury rates in Muay Thai kick boxing” [Gartland *et al.* 2001], published in the British Journal of Sports Medicine, was cited 81 times – a mean of 4.1 citations per year. On the other hand, the paper “Weight loss strategies in combat sports and concerning habits in mixed martial arts” [Barley *et al.* 2018] had the highest citation rate per year (14.6). In contrast with Judo [Reis, Franchini, Capraro 2022], reported that the article “Physiological Profiles of Elite Judo Athletes” [Franchini *et al.* 2011] was cited 233 times and had the highest citation rate per year (29.12). These values are much higher than the ones found in either relative or absolute analysis in this research, which demonstrates that Judo is more cited in academia for being an Olympic sport. Such comparisons must be made in relative values, as by using absolute values older papers would certainly have a greater impact than newer ones. These data show the relevance of the paper to academia and the researchers' interest on the topic.

Even though the central objective of the present research is focused on Muay Thai, articles in our sample – e.g., James *et al.* [2016], Barley *et al.* [2018], La Bounty *et al.* [2011], Jensen *et al.* [2017] (Table 3) – show a considerable influence of MMA and comparisons with other fighting arts. They analyzed Muay Thai as a fighting art practiced by MMA athletes.

We sought to understand how authors approached Muay Thai regarding fighting arts, martial arts, and combat sports. It was verified that 45% (58) of the 129 articles considered it a combat sport, 20% (26) approached the topic only as a martial art, and 35% (45) understood it as both a martial art and a combat sport. For instance, Dewi *et al.* [2021: 1544] reported that “Muay Thai, translated into English as Thai Boxing, is Thailand's national sport and is a martial art with its origins in the Siamese or Thai army”.

Muay Thai has been changing over the years, due to the influence of Western boxing, the growing number of foreign practitioners and competitors, and their efficiency in MMA combats. According to Henry [2013],

this quick popularization process disregarded its cultural, linguistic, and spiritual fundamentals – which led most countries to understand Muay Thai as a combat sport. Diplomatic measures to approach the Ministry of Tourism and Sports of Thailand and the Ministry of Foreign Affairs to the IOC may also have influenced researchers to understand it as a combat sport [Jones, Theerawong 2021]. The changes suggested by IOC, the greater number of competitions held worldwide, and the equal development of the male and female categories drew the attention of researchers, who studied the topic and approached Muay Thai as a combat sport – unlike Aikido, which rejects all forms of competition and is seen exclusively as a martial art [Gutierrez-Garcia *et al.* 2018c]. There was also a predominance of research from the Biological and Health Sciences that understood Muay Thai as a combat sport. Contrastingly, the Social and Human Sciences predominantly approached Muay Thai as either a martial art or one that developed over the years from martial art into a combat sport.

Lastly, Figure 4 shows the title words and keywords most used by authors. Larger words were cited more often than smaller ones – which were mentioned at least six times. Muay Thai was the term most used in title words and keywords (occurring 82 times). Although only 20% (26) of the articles consider Muay Thai exclusively as a martial art, the term “Martial Art” was the second most used (50), followed by Combat Sport (38), Athletes (32), Training (18), Thai Boxing (16), Injuries (15), Performance (15) and Kickboxing (13). This word cloud helps understand the main information in the articles and shows what research has addressed the most on the topic. Keywords help make research known and compare data on the same topic. For instance, in Judo, Peset *et al.* [2013] analyzed the words most used in titles, among which Judo stood out (occurring 170 times), followed by athlete, elite, training, performance, and sports. Reis, Franchini, and Capraro [2022] analyzed the most used keywords, which were Judo (294), Performance (125), martial arts (114), sports (106), and combat sports (96).

The analysis of Figure 4 shows the predominance of research in the Biological and Health Sciences. Words such as performance, injury, training, strength, balance, weight, athletes, physical, etc. are mostly related to studies in Biological and Health Sciences. This reinforces the idea that Muay Thai studies are more focused on Biological and Health Sciences research. This tendency is likewise observed in Judo [Peset *et al.* 2013; Reis, Franchini, Capraro 2022] and Taekwondo [Perez-Gutierrez *et al.* 2015; Perez-Gutierrez *et al.* 2017]. Keywords such as pedagogy, sociology, culture, philosophy, and history – which are often used in Social and Human Sciences studies on fighting arts – are not in Figure 4. This demonstrates the lack of studies with these approaches to the topic and the possibility of further research.

Conclusions

The research aimed to outline the profile of scientific articles on Muay Thai indexed in Scopus and Web of Science. Thus, 129 results were found and analyzed. It was verified that this fighting art has been studied since 1998, with a significant increase in the frequency of publications after 2016. This may be due to three factors: In 2016, the IOC partly recognized the project of integrating the modality in Olympism; the global increase in scientific publications; and the interest of authors (such as Brazilian, Thai, British, and Italian ones), who embraced this topic as a relevant study object. Moreover, the increase in journals specializing in combat sports and martial arts in the 21st century may have also contributed to greater research on Muay Thai.

It was verified that fighting arts research is steadily growing, whereas Muay Thai is still an incipient field of study. Its profile is inferior to that of other fighting arts, given the few worldwide publications, especially in journals specializing in fighting arts. The wide dispersion of articles appearing in journals with up to two publications also called the attention. It was also verified that few authors – if any – are specialized on the topic; for example, Emerson Franquini, the author with the most publications, is specialized in Judo, on which he has 83 publications.

This study also verified that no strong research group focused on Muay Thai research. The Research and Study Group on Fights, Martial Arts, and Combat Modalities of the University of Sao Paulo (Brazil) conducted some pieces of research on the field of the Sports Science, as well as the research group of the Newman University (United Kingdom), which studies referees' decision-making and combat sport psychology. These groups are led by the two authors who published the most articles on the topic – Emerson Franchini, from Brazil (8), and Tony Myers, from the United Kingdom (5). In contrast, despite the relevance of Muay Thai in Thailand, there was no study group led by a Thai university or researcher in the select group of researchers on the topic.

It was verified that Scopus and Web of Science list the most published articles on Muay Thai focusing mainly on Biological and Health Science studies – which is confirmed by the keywords the authors used.

The main limitation of this study is the strategy used to search and retrieve documents. It was decided to outline the profile of articles published in the two main databases. Although this study is not exhaustive (as not all journals are indexed in these databases), it presents a significant sample of world production. However, there are other materials for research, such as books, journals, dissertations, and theses, that were not addressed. Language is another limiting factor. As previously mentioned, three articles did not have an abstract in English and were removed. There are possibly other Southeast

Asian journals approaching Muay Thai, particularly written in Thai, indexed in other databases.

Another aspect was the lack of studies related to the Social and Human Sciences, which points to the need for further publications. Moreover, studies on the impact of the fighting arts on sports and cultural tourism, the influence of MMA on the development of fighting arts, and the predominance of certain modalities in MMA events are thought-provoking topics that may be addressed in future research.

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

References

1. Archambault E., Vignola-Gagne E., Cote G., Lariviere V., Gingras Y. (2006), *Benchmarking scientific output in the social sciences and humanities: The limits of existing databases*, "Scientometrics", vol. 68, no. 3, pp. 329-342.
2. Barley O.R., Chapman D.W., Abbiss C.R. (2018), *Weight loss strategies in combat sports and concerning habits in mixed martial arts*, "International journal of sports physiology and performance", vol. 13, no. 7, pp. 933-939; doi: 10.1123/ijsp.2017-0715
3. Bledsoe G.H. (2009), *Mixed martial arts* [in:] W.A. Wallace, R.R. Wroble, N. Maffulli, R. Kordi [eds.], *Combat sports medicine*, Springer, London, pp. 323-330.
4. Boghossian P., White A., Sanow D., Elder T., Funston J. (2017), *Critical Thinking, Pedagogy, and Jiu Jitsu: Wedding Physical Resistance to Critical Thinking*, "Radical Pedagogy", vol. 14, no. 1, pp. 1-13.
5. Cappai I., Pierantozzi E., Tam E., Tocco F., Angius L., Milia R., Crisafulli A. (2012), *Physiological responses and match analysis of Muay Thai fighting*, "International Journal of Performance Analysis in Sport", vol. 12, no. 3, pp. 507-516.
6. Chitas J.P.O. (2017), *Divulgacao do Muay Thai em Portugal: plano de content marketing para a rede social youtube [Promotion of Muay Thai in Portugal Youtube's Social Network Content Marketing Plan, in Portuguese]*, Doctoral dissertation, Instituto Politecnico de Lisboa, Escola Superior de Comunicacao Social.
7. Costa P., Franchini E., Saraiva B.T., Gobbo L.A., Casonatto J., Fernandes R.A., Christofaro D.G. (2018), *Effect of grappling and striking combat sports on pre-adolescent bone mineral*, "Medicina Dello Sport", vol. 71, no.1 pp. 65-74.
8. Crisafulli A., Vitelli S., Cappai I., Milia R., Tocco F., Melis F., Concu A. (2009), *Physiological responses and energy cost during a simulation of a Muay Thai boxing match*, "Applied Physiology, Nutrition, and Metabolism", vol. 34, no. 2, pp. 143-150.
9. Cynarski W.J. (2019), *Martial Arts and Combat Sports: towards the general theory of fighting arts*, Wydawnictwo Naukowe Katedra, Gdansk.
10. Cynarski W.J. (2016), *Towards a general theory of fighting arts*, "Revista de Artes Marciales Asiaticas", vol. 11, no. 2s, pp. 4-5; doi: 10.18002/rama.v11i2s.4146.
11. Cynarski W.J., Skowron J. (2014), *An analysis of the conceptual language used for the general theory of martial arts – Japanese, Polish and English terminology*, "Ido Movement for Culture Journal of Martial Arts Anthropology", vol. 14, no. 3, pp. 49-66; doi: 10.14589/ido.14.3.7.
12. Dart J. (2014), *Sports review: A content analysis of the International Review for the Sociology of Sport, the Journal of Sport and Social Issues and the Sociology of Sport Journal across 25 years*, "International Review for the Sociology of Sport", vol. 49, no. 6, pp. 645-668; doi: 10.1177/1012690212465736.
13. Dewi M., Hanifah G., Purnawan A.I., Putri W.P., Mulyo G.P.E. (2021), *The Effect of Nutrition Education on Nutrition Knowledge and Macronutrition Intake in Muay Thai Athletes*, "Open Access Macedonian Journal of Medical Sciences", vol. 9, no. 1, pp. 1544-1548; doi: 10.3889/oam-jms.2021.6698.
14. Franchini E., Del Vecchio F.B., Matsushigue K.A., Artioli G.G. (2011), *Physiological profiles of elite judo athletes*, "Sports Medicine", vol. 41, no. 2, pp. 147-166.
15. Franchini E., Gutierrez-Garcia C., Izquierdo E. (2018), *Olympic combat sports research output in the Web of Science: a sport sciences centered analysis*, "Ido Movement for Culture Journal of Martial Arts Anthropology", vol. 18, no. 3, pp. 21-27; doi: 10.14589/ido.18.3.4.
16. Franchini E. Kokubun E. (2019), *Sport sciences research and Olympic host countries*, "Sport Sciences for Health", vol. 15, no. 1, pp. 259-261; doi: 10.1007/s11332-018-0510-x.
17. Gartland S., Malik M.H.A., Lovell M.E. (2001), *Injury and injury rates in Muay Thai kick boxing*, "British Journal of Sports Medicine", vol. 35, no. 5, pp. 308-313.
18. Gartland S., Malik M.H., Lovell, M. (2005), *A prospective study of injuries sustained during competitive Muay Thai kickboxing*, "Clinical Journal of Sport Medicine", vol. 15, no. 1, pp. 34-36.
19. Gavagan C.J., Sayers M.G. (2017), *A biomechanical analysis of the roundhouse kicking technique of expert practitioners: A comparison between the martial arts disciplines of Muay Thai, Karate, and Taekwondo*, "PloS One", vol. 12, no. 8, e0182645.
20. Gomaratus C. (2011), *Muai-Thai: The art and science of Thai traditional self defense* [in:] W.J. Cynarski [ed.], *Selected Areas of Intercultural Dialogue in Martial Arts*, Rzeszow University Press, Rzeszow, pp. 123-136.
21. Green T.A., Svinth J.R. (2010), *Martial Arts of the World. An Encyclopedia of History and Innovation*, ABC-CLIO, Santa Barbara.
22. Grymanowski J., Glinska-Wlaz J., Ruzbarsky P., Druzbecki M., Przednowek K. (2019), *Analysis of time-space parameters of the front kick using the example of an athlete training in Muay Thai*, "Ido Movement for Culture Journal of Martial Arts Anthropology", vol. 19, no. 1, pp. 107-110; doi: 10.14589/ido.19.1S.17.

23. Gutierrez-Garcia C., Perez-Gutierrez M., Calderon T.P. (2011), *Bibliometric analysis of the scientific production on martial arts and combat sports articles in the web of science databases (Sci-expanded, SSCI, A&HCI) (2000-2009)* [in:] A.A. Figueiredo, C. Gutierrez-Garcia [eds.], *Scientific Congress on Martial Arts and Combat Sports Proceedings*, Associacao para o Desenvolvimento e Investigacao de Viseu, Instituto Politecnico de Viseu y Escola Superior de Educacao de Viseu, Viseu, pp. 54-55.
24. Gutierrez-Garcia C., Cynarski W.J., De Cree C., Escobar-Molina R., Figueiredo A., Franchini E., Zhang G. (2018a), *In which journals can I publish my research on martial arts and combat sports? An up-to-date approach* [in:] W.J. Cynarski, G. Szajna [eds.], *4th World Scientific Congress of Combat Sports and Martial Arts and 7th International Martial Arts and Combative Sports Scientific Society (IMACSSS) International Scientific Conference*, Abstract book, Rzeszow University Press, Rzeszow, pp. 39-41.
25. Gutierrez-Garcia C., Figueiredo A., Perez-Gutierrez M., Soto-Gonzalez F.J., Ruiz Barquin R. (2018b), *Scientific production on karate: a bibliometric approach* [in:] W.J. Cynarski, G. Szajna [eds.], *4th World Scientific Congress of Combat Sports and Martial Arts and 7th International Martial Arts and Combative Sports Scientific Society (IMACSSS) International Scientific Conference*, Abstract book, Rzeszow University Press, Rzeszow, pp. 31-34.
26. Gutierrez-Garcia C., Perez Gutierrez M., Figueiredo A., Vit M., Reguli Z., Rousselon De Croisoeuil, M., Ruiz Barquin, R. (2018c), *A bibliometric review of scientific production on aikido from the 1970s to today* [in:] W.J. Cynarski, G. Szajna [eds.], *4th World Scientific Congress of Combat Sports and Martial Arts and 7th International Martial Arts and Combative Sports Scientific Society (IMACSSS) International Scientific Conference*, Abstract book, Rzeszow University Press, Rzeszow, pp. 37-39.
27. Gutierrez-Garcia C., Gomez-Alonso M.T., Izquierdo M.E., Ruiz-Barquin R., Santos, L. (2020), *Bibliometric analysis of the scientific production on martial arts and combat sport articles in the Web of Science databases (SCI-EXPANDED, SSCI, A&HCI) (2010-2019)* [in:] M.N.M. Shapie, A.M. Nadzalan, S.J.M. Japilus, M.S. Ramli [eds.], *IMACSSS - International Martial Arts and Combat Sports Scientific Society. GSMACC - 2nd Global Scientific Martial Arts & Cultural Congress. 9th IMACSSS International Conference*, Abstract book, Pertubuhan Seni Gayung Fatani, Malaysia, p. 18.
28. Henry M. (2013), *Development of a Muay Thai enthusiast: An interpretation of Alfred North Whitehead's theory of learning*, Doctoral dissertation, University of Saskatchewan.
29. James L.P., Haff G.G., Kelly V.G., Beckman E.M. (2016), *Towards a determination of the physiological characteristics distinguishing successful mixed martial arts athletes: a systematic review of combat sport literature*, "Sports Medicine", vol. 46, no. 10, pp. 1525-1551; doi: 10.1007/s40279-016-0493-1.
30. Jensen A.R., Maciel R.C., Petrigliano F.A., Rodriguez J.P., Brooks A.G. (2017), *Injuries sustained by the mixed martial arts athlete*, "Sports Health", vol. 9, no. 1, pp. 64-69; doi: 10.1177/1941738116664860.
31. Jones W.J., Theerawong, P. (2021), *Muay Thai Diplomacy: Thailand's Soft Power Through Public Diplomacy*, "Journal of Alternative Perspectives in the Social Sciences", vol. 11, no. 1, pp. 99-124.
32. Jukping S. (2020), *Re-inventing the martial 'hero' and the weak 'beauty queen' through the sporting identity: a tale of two competing gendered bodies, Muay Thai and the stability of the Thai nation-state*, "Sport in History", vol. 40, no. 3, pp. 296-312; doi: 10.1080/17460263.2020.1775693.
33. Kitiarsa P. (2005), *Lives of Hunting Dogs' Muai Thai and the Politics of Thai Masculinities*, "South East Asia Research", vol. 13, no. 1, pp. 57-90.
34. Kraitus P. (1988), *Muay Thai: the most distinguished art of fighting*, Transit Press, Phuket.
35. La Bounty P., Campbell B.I., Galvan E., Cooke M., Antonio J. (2011), *Strength and conditioning considerations for mixed martial arts*, "Strength and Conditioning Journal", vol. 33, no. 1, pp. 56-67.
36. Lage M.C. (2011), *Utilizacao do software NVivo em pesquisa qualitativa: uma experiencia em EaD* [Use of NVivo software in qualitative research: an experience in distance education, in Portuguese], "ETD - Educacao Tematica Digital", vol. 12, no. 1, pp. 198-226; doi: 10.20396/etd.v12i0.1210.
37. Lee B.C., McGill S.M. (2015), *Effect of long-term isometric training on core/torso stiffness*, "The Journal of Strength and Conditioning Research", vol. 29, no. 6, pp. 1515-1526.
38. Martinez R. (2018), *"Specially in the last years...": Evidence of ELF and non-native English forms in international journals*, "Journal of English for Academic Purposes", vol. 33, no. 1, pp. 40-52; doi: 10.1016/j.jeap.2018.01.007.
39. Muller Junior I.L., Capraro A.M. (2020a), *Uma identidade guerreira forjada "a base" das joelhadas e cotoveladas: as narrativas dos primeiros mestres do muay thai brasileiro* [A warrior identity forged based on knee and elbow strikes: the narratives of the first masters of Brazilian muay thai, in Portuguese], "Revista de Artes Marciales Asiaticas", vol. 15, no. 1, pp. 22-33; doi: 10.18002/rama.v15i1.6219.
40. Muller Junior I.L., Capraro A.M. (2020b), *"Ele mesmo contou isso": Nelio Naja, a producao de um mito* [He told it himself": Nelio Naja, the production of a myth], "Movimento", vol. 26, no.1, pp. 1-15; doi: 10.22456/1982-8918.99251.
41. Myers T., Balmer N. (2012), *The impact of crowd noise on officiating in Muay Thai: achieving external validity in an experimental setting*, "Frontiers in Psychology", vol. 3, no. 1, pp. 1-7; doi: 10.3389/fpsyg.2012.00346.
42. Myers T., Nevill A., Al Nakeeb Y. (2013), *A comparison of the effect of two different judging systems on the technique selection of Muay Thai competitors*, "Journal of Human Sport and Exercise", vol. 8, no. 3, pp. 761-777.
43. Nieto-Fernandez F. (2017), *Estudio bibliometrico sobre los articulos de artes marciales mixtas indexados en Scopus* [Bibliometric study of Mixed Martial Arts articles indexed

- in Scopus, in Spanish], Undergraduate thesis, University of Leon.
44. Okhlopkov P.P., Migalkin A.G., Danilov M.V. (2017), *Physical fitness tests of highly skilled Muay Thai fighters*, "Theory and Practice of Physical Culture", vol. 7, no. 1, pp. 25-35.
 45. Ong T.F., Ruzmin W.I.B. W. (2015), *Participation motivation in Muay Thai among Malaysians*, "Proceedings of the 2nd International Colloquium on Sports Science, Exercise, Engineering and Technology 2015" (ICoSSEET 2015), vol. 1, no. 1, pp. 121-132.
 46. Pereira A.A.J., Casarini D.E. (2019), *State of hydration in athletes of combat sports during the loss of body weight*, "RBNE - Brazilian Journal of Sports Nutrition", vol. 13, no. 79, pp. 364-372.
 47. Perez-Gutierrez M., Swider P., Kulpinski J., Cynarski W.J. (2021), *Polish publications on Jujutsu (1906-2020): bibliometric analysis*, "Movimento", vol. 27, p. e27061; doi: 10.22456/1982-8918.111543.
 48. Perez-Gutierrez M., Cobo-Corrales C. (2019), *Martial arts and combat sports theses and dissertations indexed in BASE database: a bibliometric approach*, "Revista de Artes Marciales Asiaticas", vol. 14, no. 2, pp. 3-5; doi: 10.18002/rama.v14i2s.5962.
 49. Perez-Gutierrez M., Valdes-Badilla P., Gutierrez-Garcia C., Herrera-Valenzuela T. (2017), *Taekwondo scientific production published on the Web of Science (1988-2016): collaboration and topics*, "Movimento", vol. 23, no. 4, pp. 1325-1340; doi: 10.22456/1982-8918.75386.
 50. Perez-Gutierrez M., Valdes-Badilla P., Gomez-Alonso M. T., Gutierrez-Garcia C. (2015), *Bibliometric analysis of taekwondo articles published in the Web of Science (1989-2013)*, "Ido Movement for Culture Journal of Martial Arts Anthropology", vol. 15, no. 3, pp. 27-34; doi: 10.14589/ido.15.3.4.
 51. Perez-Gutierrez M., Gutierrez-Garcia C., Escobar-Molina R. (2011), *Terminological recommendations for improving the visibility of scientific literature on martial arts and combat sports*, "Archives of Budo", vol. 7, no. 3, pp. 159-166.
 52. Peset F., Ferrer-Sapena A., Villamon M., Gonzalez L.M., Toca-Herrera J.L., Aleixandre-Benavent R. (2013), *Scientific literature analysis of Judo in Web of Science*, "Archives of Budo", vol. 9, no. 2, pp. 81-91.
 53. Phuykaekam S., Deebhijarn, S. (2020), *Influences on the Muay Thai tourism industry in Thailand*, "African Journal of Hospitality, Tourism, and Leisure", vol. 9, no. 1, pp. 1-10.
 54. Podrigalo L.V., Shi K., Podrihalo O., Volodchenko O.A., Halashko, O.I. (2022), *Main research areas in kickboxing investigations: an analysis of the scientific articles of the Web of Science Core Collection*, "Pedagogy of Physical Culture and Sports", vol. 26, no. 4, pp. 244-259.
 55. Polmann H., Melo G., Conti-Reus J., Domingos F.L., de Souza B.D.M., Padilha A.C., De-Luca-Canto G. (2020), *Prevalence of dentofacial injuries among combat sports practitioners: A systematic review and meta-analysis*, "Dental Traumatology", vol. 36, no. 2, pp. 124-140.
 56. Pookaiyaudom G. (2020), *Understanding Muay Thai camp tourist motivations in Bangkok, Thailand*, "Journal of Sport and Tourism", vol. 24, no. 4, pp. 285-302; doi: 10.1080/14775085.2020.1851290.
 57. Raimondo S., Stampi M.T., Giacometti M. (2019), *Muay Thai, structuring the experience of oneself and the others in the martial arts: a pilot study*, "Ido Movement for Culture Journal of Martial Arts Anthropology", vol. 19, no. 1S, pp. 77-88; doi: 10.14589/ido.19.1S.12.
 58. Reis F.D.G., Franchini E., Capraro A.M. (2022), *Profile of scientific productions on judo: an analysis of the Web of Science database (1956-2019)*, "Ido Movement for Culture Journal of Martial Arts Anthropology", vol. 22, no. 3, pp. 51-59; doi: 10.14589/ido.22.3.8.
 59. Rigo L.C., Ribeiro G.M., Hallal P.C. (2011), *Unidade na diversidade: desafios para a Educacao Fisica no seculo XXI [Unity in diversity: challenges for Physical Education in the XXI century]*, "Revista brasileira de atividade fisica e saude", vol. 16, no. 4, pp. 339-345.
 60. Saengsirisuwan V., Phadungkij S., Pholpramool C. (1998), *Renal and liver functions and muscle injuries during training and after competition in Thai boxers*, "British Journal of Sports Medicine", vol. 32, no. 4, pp. 304-308.
 61. Saraiva B., Scarabottolo C., Christofaro D.G., Rodrigues-Silva G.C., Freitas J.I., Vanderlei L.C., Milanez V.F. (2021), *Effects of 16 weeks of Muay Thai training on the body composition of overweight/obese adolescents*, "Ido Movement for Culture Journal of Martial Arts Anthropology", vol. 21, no. 3, pp. 35-44; doi: 10.14589/ido.21.3.6.
 62. Shirani G., Motamedi M.H.K., Ashuri A., Eshkevari P.S. (2010), *Prevalence and patterns of combat sport related maxillofacial injuries*, "Journal of Emergencies, Trauma, and Shock", vol. 3, no. 4, pp. 314.
 63. Silva J.J.R., Del Vecchio F.B., Picanço L.M., Takito M.Y., Franchini E. (2011), *Time-motion analysis in Muay-Thai and kick-boxing amateur matches*, "Journal of Human Sport and Exercise", vol. 6, no. 3, pp. 490-496.
 64. Soggi M., Varde'i C.H., Giovannelli M., Cejudo-Palomo A., D'Elia F., Cruciani A., Izzo R. (2021), *Definition of physical-dynamic parameters in circular kick in Muay Thai through latest generation inertial sensors with a critical review of the literature*, "Journal of Human Sport and Exercise", vol. 16, no. 2, pp. 319-334; doi:10.14198/jhse.2021.16.Proc2.17.
 65. Stemler S. (2000), *An overview of content analysis*, "Practical Assessment, Research, and Evaluation", vol. 7, no. 1, pp. 17-24.
 66. Thanuskodi S. (2010), *Journal of Social Sciences: A bibliometric study*, "Journal of Social Sciences", vol. 24, no. 2, pp. 77-80.
 67. Tong-Iam R., Rachanavy P., Lawsirirat C. (2017), *Kinematic and kinetic analysis of throwing a straight punch: The role of trunk rotation in delivering a powerful straight punch*, "Journal of Physical Education and Sport", vol. 17, no. 4, pp. 2538-2543; doi: 10.7752/jpes.2017.04287.
 68. Vail P. (2014), *Muay Thai: Inventing tradition for a national symbol*, "Sojourn: Journal of Social Issues in Southeast Asia", vol. 29, no. 3, pp. 509-553.

69. Vertonghen J., Theeboom M., Pieter W. (2014), *Mediating factors in martial arts and combat sports: an analysis of the type of martial art, characteristics, and social background of young participants*, "Perceptual and Motor Skills", vol. 118, no. 1, pp. 41-61.
70. Vicentini L., Marques R.F.R. (2018), *Scientific production on Jiu-Jitsu: analysis of articles, theses and dissertations published between 1996 and 2016*, "Movimento", vol. 24, no. 1, pp. 1335-1352; doi:10.22456/1982-8918.83697.
71. Zhang X., Tambovskij A.N., Cherkashin I.A., Krivoruchenko E.V., Ohlopkov P.P. (2018), *Pedagogical tests for assessing the physical preparedness of the students practicing Muay Thai*, "Physical Education of Students", vol. 22, no. 4, pp. 221-231; doi: 10.15561/20755279.2018.0408.

Electronic sources

1. <https://www.scimagojr.com/countryrank.php> (accessed Sep. 2022).
2. <http://www.newman.ac.uk/research/our-approach/research-groups/> (accessed Apr. 2022).
3. <https://sachdeephillonyr2.wordpress.com/page/2/> (accessed Apr. 2022).
4. <https://www.ucl.ac.uk/laws/people/prof-nigel-balmer> (accessed Apr. 2022).
5. <https://www-scopus.ez22.periodicos.capes.gov.br/authid/detail.uri?authorId=57204081135> (accessed Nov. 2022).
6. <https://scholar.google.com> (accessed Jan. 2023).
7. <https://tci-thailand.org/list%20journal.php> (accessed Jan. 2023).
8. <https://www.tci-thaijo.org/about> (accessed Jan. 2023).

Profil publikacji naukowych na temat Muay Thai: Analiza na podstawie baz danych Scopus i Web of Science (1998-2021)

Słowa kluczowe: muay thai, boks tajski, bibliometria, sporty walki, sztuki walki

Streszczenie

Tło i cel. Wraz z rosnącą popularnością wydarzeń związanych z mieszanymi sztukami walki, Muay Thai przyciągnęło uwagę i zainteresowanie społeczności naukowej. Co więcej, w 2021 roku zostało w pełni uznane przez Międzynarodowy Komitet Olimpijski. Celem niniejszego badania było nakreślenie profilu artykułów naukowych dotyczących Muay Thai, indeksowanych w bazach danych Scopus i Web of Science.

Metodologia. Przeprowadzono analizę bibliometryczną, przedstawiając stan wiedzy na ten temat z perspektywy wieloczynnikowej. Wyszukiwanie dotyczyło tytułów, streszczeń i słów kluczowych, bez ograniczeń co do języka, obszaru badań czy czasu publikacji. Przeanalizowano następujące zmienne: rok publikacji; czasopisma; autorów; kraje i kontynenty publikujące artykuły na ten temat; najczęściej cytowane artykuły; klasyfikację Muay Thai jako sztuki walki, sztuki walki i/lub sportu walki; oraz słowa kluczowe.

Wyniki. W sumie przeanalizowano 129 artykułów, z których większość została opublikowana w ciągu ostatnich 5 lat; 106 artykułów zostało opublikowanych w języku angielskim, głównie w dziedzinie nauk biologicznych i nauk o zdrowiu. Muay Thai było badane w 34 krajach, z których Brazylia opublikowała najwięcej artykułów (27), *Archives of Budo* (7) i *Ido Movement for Culture Journal of Martial Arts Anthropology* (5) zostały głównymi czasopismami publikującymi artykuły na ten temat, a Emerson Franchini (8) i Tony Myers (5) głównymi autorami publikującymi artykuły na temat Muay Thai.

Wnioski. Muay Thai jest nadal początkującą dziedziną badań. Niemniej jednak, analiza trendów badawczych Muay Thai pokazuje brak badań związanych z naukami społecznymi i humanistycznymi, co wskazuje na potrzebę dalszych publikacji. Co więcej, nie było żadnych silnych grup badawczych skupionych na badaniach Muay Thai ani grup badawczych prowadzonych przez tajski uniwersytet lub tajskich naukowców wśród najważniejszych badaczy tego tematu.