PARALYMPIC SPORT: BIBLIOMETRIC EVALUATION OF PUBLICATIONS

ESPORTE PARALÍMPICO: AVALIAÇÃO BIBLIOMÉTRICA DAS PUBLICAÇÕES

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Abstract

Paralympic sport has been expanding, both in number of participants and the variety of sport modalities included, thus increasing scientific research with different objectives has increased. This bibliometric review used the keyword "Paralympic Sport" to assess the evolution of publications over the years. We created 12 categories: Paralympic Movement; Performance and Periodization; Nutrition; Rehabilitation; Review Studies; Psychobiological Aspects; Physiology; Biomechanics; Functional Classification; Instrument Validation; Anti-doping and COVID-19. The results showed that the number of publications had an exponential increase after the 2008 Paralympic Games, demonstrating that the Paralympic movement has been growing both in public knowledge and in the content of the scientific literature.

Keywords: Adapted Motor Activity. Disabilities. Paralympic Sport. Athletes.

Resumo

O esporte paralímpico vem se expandindo, tanto em número de participantes quanto na variedade de modalidades esportivas, com isso, as pesquisas científicas em diferentes áreas cresceram. Essa revisão bibliométrica usou a palavra-chave "Esporte Paralímpico" para avaliar a evolução das publicações ao longo dos anos. Criamos 12 categorias: Movimento Paralímpico; Desempenho e Periodização; Nutrição; Reabilitação; Estudos de revisão; Aspectos psicobiológicos; Fisiologia; Biomecânica; Classificação funcional; Instrumento de Validação, Antidopagem e COVID-19. Os resultados demonstraram que o número de publicações teve um aumento exponencial após os Jogos Paralímpicos de 2008, demonstrando que o movimento paralímpico vem crescendo tanto no conhecimento público quanto em conteúdo da literatura científica.

Palavras-chave: Atividade Motora Adaptada. Deficiência. Esporte Paralímpico. Atletas.

1 Background

Sport activities for people with disabilities have been recorded for over 100 years, with the 1888 establishment in Berlin of the first Sports Club for The Deaf (SEGUILLON, 2002). In 1944, Dr. Ludwig Guttmann at Stoke Mandeville Hospital in Britain worked with soldiers injured during World War II; he used sport participation as an aspect of rehabilitation, an effort that further evolved into recreational and then competitive sport[1]. The Stoke Mandeville Games later became the Paralympic Games that first took place in Rome, Italy, in 1960, with 400 athletes from 23 countries (CARISBOKE *et al.*, 1956). Since then, Paralympic Games have been occurring every four years. The first Winter Paralympic Games were held in Sweden in 1976 and then took place every four years in addition to the Summer Games (GOLD; GOLD, 2007). Currently, the Paralympic Games involve 28 sport modalities, with 22 allotted to Summer Games and six allotted to Winter Games. In the Summer Games, in Rio de Janeiro, Brazil in 2016, 4,328 athletes from 160 countries participated, while in the 2016 Winter Games, there were 567 athletes from 49 countries[1].

The growth of sports participation by people with disabilities has been reflected within a growing body of scientific research (LEE; PORRETA, 2013; REID; PRUPAS, 1998). Published sports research on athletes with disabilities began in the 1970s, with most early publications devoted to fitness training, performance enhancement, and equipment (KHOO *et al.*, 2018). In the 1990s, a continuation of these early lines of research shifted toward an increased number of psychosocial studies (DEPAUW; GRAVON, 2005). In one of the first literature reviews of Paralympic Sport, Reid and Prupas (1998) retrieved 436 scientific journal articles and conference annals published in English and French between 1986 and 1996. These authors classified these publications into seven prioritized disability research categories as proposed by DePauw(DEPAUW, 1986): (a) training and/or competition effects; (b) selection and training of coaches, volunteers and staff; (c) technological advances; (d) sociological and psychological aspects; (e) similarities and differences between athletes with and without disabilities; (f) demographics; and (g) the legal, philosophical, and historical bases of the sport. They found that most publications were categorized as "legal, philosophical, and historical bases for sport." Category (a) - "effects of training and/or competition" - attracted the least research attention. In most publications, participants were recruited with a variety of disabilities rather than with any specific disability (REID; PRUPAS, 1998).

1 International Paralympic Committee – IPC. (nd). Available from: https://www.paralympic.org/ipc/history. Access in 19/10/2019

More recently, Lee and Porretta (2013) performed a documentary analysis on the same topic, based on 376 articles from peer-reviewed English journals published between 2001 and 2011. Their articles were grouped into the same seven categories as the Reid and Prupas (1998) review, and they added an "Other" category for the 2% of these articles that did not easily fit any of the seven main categories. Lee and Porretta (2013) concluded that disability sports knowledge had progressed to the point of an increased number of peer-reviewed articles.

Thus, in this study, we seek to update and expand previous reviews, analyzing all scientific publications on Paralympic sport from the first publication to the present, deepening contributions and research areas.

2 Method

Our literature review methodology began with content analysis, including organizing and classifying the material categorically. Our organization of existing publications' content involved three phases of review: (a) pre-analysis, (b) exploration, and (c) data processing (GRANEHEIM *et al.*, 2017). In pre-analysis, we first selected articles mentioning Paralympic sport and then read the full description of each available article on the electronic research platforms. In our exploration stage, we constructed an Excel spreadsheet containing the description of each article, extracting such specific important details as the study's title, year of publication, journal, sport modality, participant disability type, and research theme. We also created a second table containing the articles and research we had excluded from selection, noting the reason for exclusion. The following section describes these initial data collection and data analyses in more detail.

2.1 Literature Search and Inclusion/Exclusion Criteria

We conducted a broad article search through PubMed, Medline, Lilacs, and Scielo, using the search term "Paralympic Sport" so as to identify studies mentioning all types of disabilities in the papers' abstracts (physical, visual, intellectual, and multiple disabilities) without specifically using any of these disabilities in our search term or requiring them to be named as key-words. We reviewed publications in English, Spanish, and Portuguese, the databases used for this article did not contain articles in languages different from the ones above. We conducted the search for articles for the period from the first scientific publication in 1972 to September 22, 2022. Two independent reviewers analyzed and categorized the publications found within the eleven categories described below. These quality rating scores were compared for inter-reliability. We screened publication titles and accompanying abstracts for the key

words, and we included clinical and review studies that addressed Paralympic Sport-related content since the first publication (reported in 1972). We excluded duplicated articles and ones that did not provide an abstract.

2.2 Categorizing publications

We identified and grouped articles into 12 categories of research themes in possible relevant topics of adapted sports: (a) Paralympic Movement; (b) Performance and Periodization; (c) Nutrition; (d) Rehabilitation; (e) Review Studies; (f) Psychobiological Aspects; (g) Physiology; (h) Biomechanics; (i) Functional Classification; (j) Instrument Validation; (k) Anti-doping and (l) COVID-19.

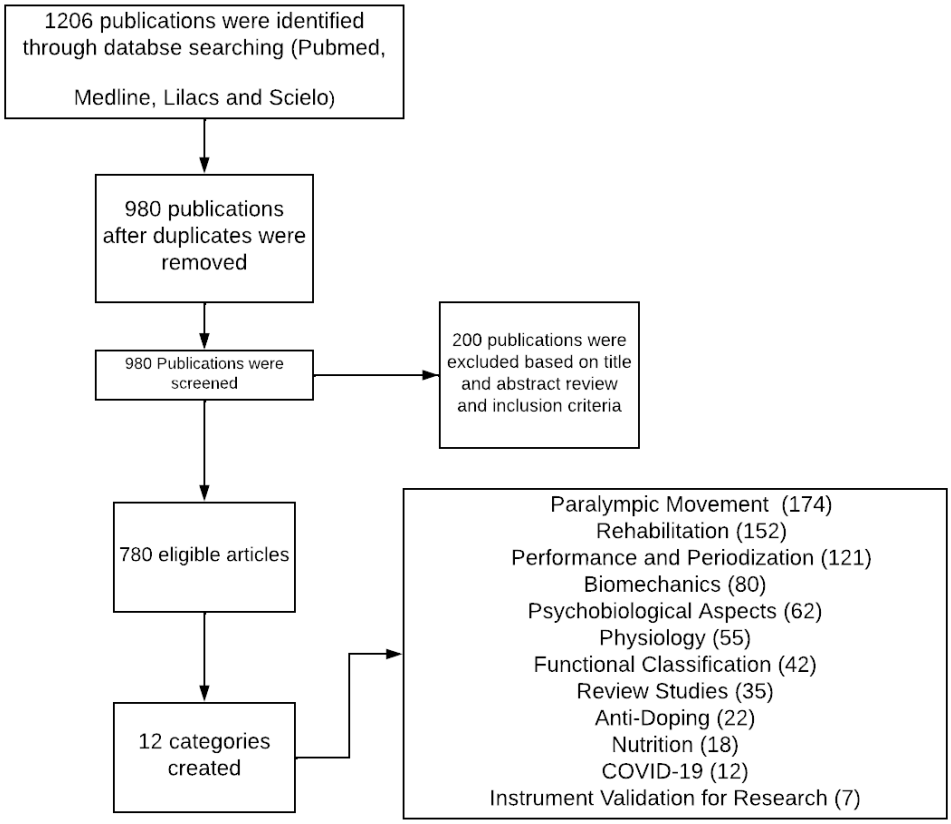
2.3 Data Analysis

We conducted a frequency analysis to calculate frequencies and percentages of both data-based and review articles.

3 Results

In total, we located 1206 Paralympic sport articles published in English, Portuguese, and Spanish from the electronic databases we surveyed (PubMed: 800, Medline: 280, Lilacs: 80, Scielo: 46). We excluded 226 duplicate studies, and 200 studies that failed to meet the inclusion criteria beyond having titles and abstracts mentioning Paralympic sports. A flowchart of the study selection is shown in Figure 1. Following these exclusions, there were 780 remaining eligible articles (n = 712 in English, n = 20 in Spanish, and n = 58 in Portuguese) that could be distributed into the 12 categories named above.

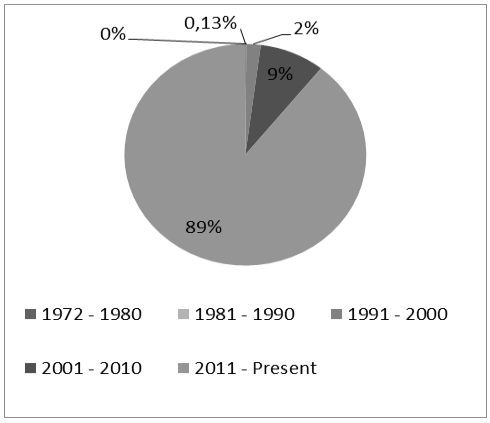
Figure 1 – Flowchart



Fonte: elaboração própria

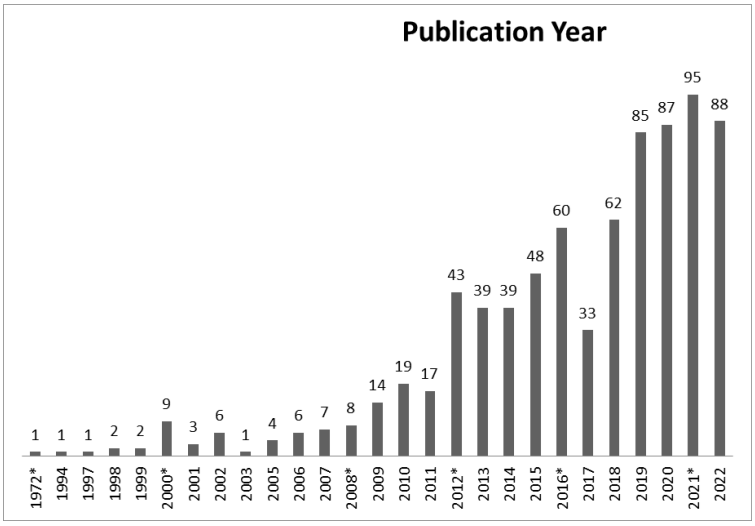
Figure 2A shows the distribution of articles published in each decade analyzed by this study, and Figure 2B shows the percentage of articles published in each year, from 1972 (first article cited in the review) to 2022. There was a growing increase in the number of studies after 2009, representing a significant increase following the 2008 Beijing Paralympic Games.

Figure 2 A - Distribution of articles published per year since 1972



Fonte: elaboração própria

Figure 2 B - Percentage of articles published per decade since 1972



Fonte: elaboração própria

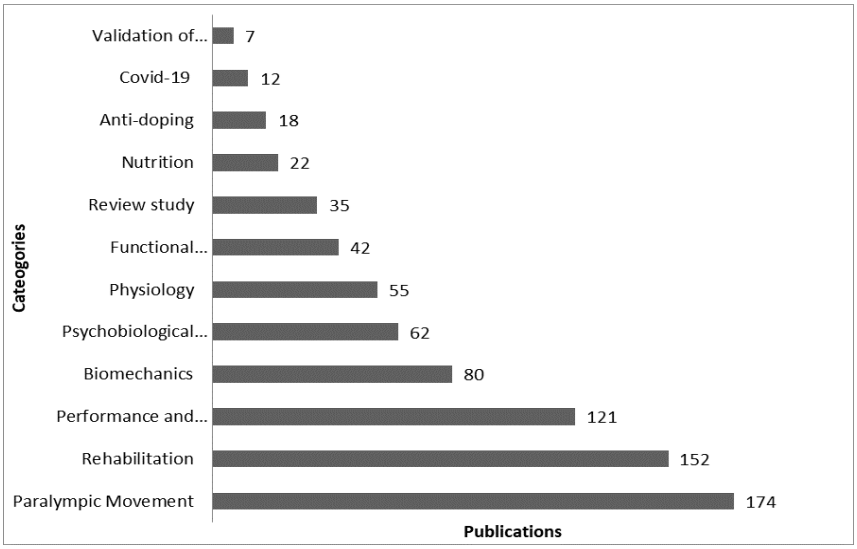
For this study there were 780 publications. Regarding nationality of publication, the United Kingdom provided the highest number of publications with 140 articles, followed by Australia, USA and Brazil with 120, 99 and 62 respectively, it is also noteworthy that Canada (48 publications), Japan the host of the last paralympic (33 publications) and South Africa (30 publications) are countries that are also researching the topic and publishing articles regarding paralympic sport.

Regarding their categorization in our 12 domains Figure 3 shows that the most populated domain over this 48 year period of research, as noted above, was Paralympic Movement (102 publications), and it was followed by Rehabilitation (78 publications).

The domain with the smallest number of publications, Instrument Validation, contained only 5 articles.

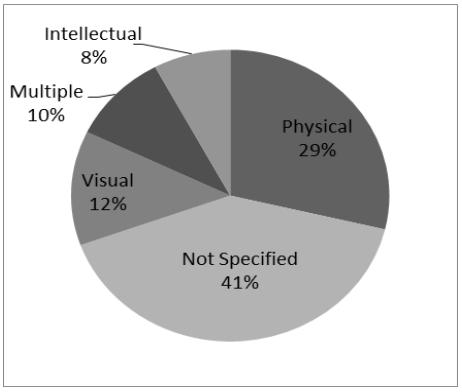
Most of the publications in this review focused on people with physical disabilities (325), but a large number of publications (183) did not specify the participants' disabilities. We categorized most of these publications in the domain of Paralympic Movement, consistent with researchers' tendencies not to identify specific disability. Similarly, most researchers did not identify a specific sports modality.

Figure 3 - Publications by category



Fonte: elaboração própria

Figure 4 - Types of disabilities published



Fonte: elaboração própria

There were a large number of sports modalities that were subject to research investigations (22 summer and winter sports). The sports with the largest number of publications were athletics (120 publications) and swimming (70). Other sports modalities had the following frequencies within this review database: Winter sports (48), Wheelchair Rugby (40), Paracycling (30), Wheelchair basketball (22), Wheelchair tennis (18), 7-a-side side football (19), Powerlifting (15), Judo (11), Shooting (9), Paratriathlon (9), Running (5), Rowing (5), Marathon (5), goalball (5), Table tennis (4), 5-a-side-football (3), sailing (2), va'a (2) and golf (2).

4 Discussion

Our broad review aimed to analyze the scenario of scientific publications related to Paralympic sport from the time of the first published paper in 1972, to 2022 studies.

In a long early period of this literature, between 1972 and 1999, there were only seven publications, and they were distributed over such topical domains as Paralympic movement and Rehabilitation. It is noteworthy that by 1972, three Paralympic Games had already been held. Following this early period in which research literature was sparse, over the two decades (1999-2022) there was an exponential increase in publications.

Of note, since 1996, the International Olympic Committee (IPC) has been stimulating further research through such measures as allowing studies to be conducted during competitions, even at the Paralympic Games, in order to facilitate the dissemination of information leading to a greater understanding of high-performance athletes with disabilities[2]. However, only in 2008 were there a noticeable exponential increase in the number of studies of this kind, and this increase intensified in each of the years that immediately followed the Paralympic Games held every four years. The post-2008 increase in publications tended to coincide with the 2012 Paralympic Games that were held in London, helping to explain why we found the United Kingdom to have led all other countries in the publication of articles related to Paralympic sport.

The category with the most publications was the Paralympic movement and on those studies were reported how the paralympic games impacted the city it was held on, the athletes who competed the games and also the attendees. Each city has its own peculiarities and thus studies address different themes, for example, many studies related to the Rio Paralympics in 2016 aimed to report and evaluate possible developments of the Zika Virus disease which was recently discovered and was on the rise in the country.

During the process of receiving the Paralympic games, and after the event is finished the host country receives the Paralympic legacy, this can be done in infrastructure being built to receive the games but also in other ways, such as a direct impact on the lives of children and adolescents. There is currently a great deal of discussion regarding

the promotion of these human rights and regarding the issue of social inclusion, as a result of the Paralympic legacy. Greater sport access for people with disabilities has sparked wider discussions in the area of health and the humanities (KHOO *et al*., 2018; DEPAUW, 1986).

In the period from 2008-2022, the number of publications increased from 43 articles over a 35-year period (1972 - 2007) to over 300 publications over the next 10 years. However, this explosive growth did not occur in all topical domains. There have been few publications under the broad topic of athlete development, such as in our categories of Nutrition (22 publications), Anti-doping (18), and Instrument Validation (7).

We found that in the most recent years (2016-2022), research in Physiology gained prominence among other publications, especially aspects of physiology related to enhanced athletic performance. In addition, we highlight publications in our categorical domains of Performance and Periodization and Psychobiological Aspects. These studies were also aimed at improving athletic performance and, additionally, at such other factors as the influence of training load on the athlete's performance. This is also due to publications in the areas of biomechanics and functional classification. Paralympic sport uses a functional classification system to achieve an equitable comparative grouping. Thus, researchers have investigated what functional tests best classify prospective athletes, while avoiding bias (KOZINA *et al*., 2019) and what competitions and training evaluations best measure the effects of using different prostheses.

In the year 2020 the covid-19 pandemic started and was responsible for postponing the Tokyo paralympic of 2020, during this period, the studies published focus more heavily regarding the athlete's health and how to return to the training programs, aiming to get the athlete back on its peak performance with the highest security possible. Even with all the restrictions caused by the pandemic we were able to observe that the Tokyo 2021 paralympic was the one with the highest number of publications (95) during our analysis.

The most heavily researched sport modalities in our review were athletics and swimming. Athletics has been part of the Paralympic Games since its first edition and currently includes 17 various track, field, and street events, including relays, for athletes with various types of physical, visual, and intellectual disabilities. However, on the last five years (2018-2022) it is possible to notice an increase in diversity regarding other paralympic sports such as: Paracycling, winter sports, wheelchair rugby, goalball, paratriathlon, wheelchair basketball, judo, fencing, rowing, powerlifting, bocce ball, 7-a-side side football and sitting volleyball.

While most researchers failed to specify types of participant disabilities, most articles were related to the participants' physical impairment rather than their psychological impairment.

5 Conclusion

Our objective in this study was not to describe all published research, but, rather, to demonstrate the characteristics of the studies in the Paralympic scenario and the incentive of these studies. Based on the findings of this review, we can conclude that there has been an exponential increase in the number of Paralympic sport publications in the last nine years, particular in the period just after the Paralympic Games scheduled at four-year intervals. Despite this increase in the number of studies, however, there remain research gaps with regard to specificity in Paralympic sport modalities, type of participant disability, and participant psychological factors that may be associated with this activity. Considering that the Paralympic Games are among the largest sporting events in the world, researchers should be studying how to best enhance athletic performance for athletes in specific sport activities.

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