

Article

Gold Medals, Silver Medals, Bronze Medals, and Total Medals: An Analysis of Summer Paralympic Games from 1992 to 2016

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Abstract: The Paralympic Games (PG) are considered one of the biggest events in the world, with increasing coverage by media and participation. The present study aimed to investigate the variation in the number of gold, silver, bronze, and totals medals in the Summer PG from 1992 to 2016. Data related to the results were extracted from the International Paralympic Committee to an SPSS database. Descriptive statistics and Friedman’s two-way analysis of variance by ranks were used to check the differences across medals in seven editions of the Summer PG, with the correspondent effect sizes. There was a peak in the maximum number of any type of medal between the 1996 and 2000 Summer PG and a decrease until 2008. After that, the number of any kind of medals has been increasing again. There were also significant differences with intermediate to large effect sizes when comparing more distant PG with more recent events. Several external factors can influence performance indicators (e.g., the number of medals) in a negative or positive way. An increase in the number of participants and a greater and better investment by the countries may explain part of our results. The preparation of an athlete must be based on a multidisciplinary team, and future organizing countries must take into account reports of previous events.

Keywords: athletes; disability; Paralympic Games; performance indicators; sports



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1. Introduction

The Paralympic Games (PG), considering both the Summer and Winter PG, are a movement that was initiated during the Second World War in rehabilitation centres [1]. In these centres, where soldiers returned with various types of injuries, doctors used sport as a means of rehabilitating the body and mind and of contributing to reintegration into society [2–4]. In the space around the rehabilitation centres where small competitions were practiced, they quickly evolved into regional, national, and international events with the format that is now known worldwide as the PG [5,6]. The first PG took place in Rome in 1960 and involved 400 athletes from 23 different countries who competed in 57 medal events across eight sports [7].

On 22 September 1989, the International Paralympic Committee (IPC) was founded, being responsible for directing the Paralympic Movement, with the mission of guaranteeing and supervising its organization [8]. According to the IPC, the main objectives of the PG are: (i) to allow Paralympic athletes to achieve their best performance at the highest level of competition through adequate and adapted conditions and services in a solid environment; (ii) to provide visibility, differentiation, and opportunities that promote and demonstrate

the spirit and values of the Paralympic Movement (courage, determination, inspiration, and equality); and (iii) to promote social development and leave a positive framework that benefits communities in the host country and around the world [8].

The PG take place every four years, immediately after the respective Olympic Games, in the same city that hosts them [8] and represent an opportunity to convey messages of peace, justice, integration, resilience, values, culture, resistance to the adverse effects of events, inclusion, change in attitudes, stereotyped behaviours, an environment free of urban and architectural barriers, and the greatest achievement for an athlete [4,9], with the number of participants increasing from event to event [10].

The 1992 Barcelona PG represented a turning point, as they presented a new classification concept [11], taking into account their health and functioning (according to the International Classification of Functioning, Disability, and Health) and sport participation, in contrast to a purely medical model [12,13]. This model is based on three steps: (i) determining if an athlete has an eligible impairment; (ii) determining if the athlete meets the minimum impairment criteria for a sport; and (iii) deciding an athlete's sports class [14]. This allows the athlete to participate on equal terms with other athletes [11]. These athletes go through an evidence-based classification process and are grouped into classes, depending on the degree of limitation and the modality practiced [11,14,15]. Nowadays, according to the IPC [14], the PG involve athletes with a series of deficiencies, namely, impaired muscle power, impaired passive range of movement, limb deficiency, leg length difference, short stature, hypertonia, ataxia, athetosis, vision impairment, and intellectual impairment.

There are currently 22 Paralympic sports held in the Summer PG [16]. Due to the different modalities, there are sports with only one class and others with up to 50 [14], with a high number of events. Subsequently, the first, second, and third place in each class are awarded gold, silver, and bronze medals, respectively.

During the first editions of the Summer PG (between 1960 and 1984), we saw an increase in the number of medals (from 113 to 975), mainly caused by the increase in classes and sporting events. Subsequently, there was a decrease in the number of medals between the 1984 and 1992 Summer PG (from 975 to 489) that was caused by a reduction in the number of sporting events. After this phase of decline, the number of medal events and sporting events remained stable. This number of medals remained stable, despite a slight increase in classes, due to the fact that some sports combined classes in the same event, while others excluded classes from certain events [17].

Previous studies mention that there is a clear advantage at the country level ($p < 0.05$) when it plays at home in the PG [18]. However, the causes are not clear, and further investigation is recommended. More recently, when investigating the Summer PG using a standardized measure of success, some authors confirmed that home advantage is predominant for countries ($p < 0.01$) and in some specific sports ($p < 0.05$) [19].

Knowing that the Paralympic Movement has grown and the number of athletes has increased and that the number of medals is related to the number of sporting events (stable since 1992) and to the number of classes (a slight increase), as far as we know, no study has analysed how the performance has evolved over the events. Therefore, the present study intends to investigate the variation in gold, silver, bronze, and total medals by event in the summer games from 1992 to 2016.

2. Materials and Methods

The results of each edition of the Summer PG between 1992 and 2016 were obtained by experienced researchers (M.J., R.A., and D.M.) through the results history file of the IPC [20] and downloaded to the software SPSS. For our analysis, we considered only the countries that were awarded gold in each of the seven selected editions ($n = 28$).

Statistical Analysis

Descriptive statistics, including the median, mean, standard deviation, and interquartile range, were calculated for all variables. The Shapiro–Wilk ($n < 50$) test was used to

verify data normality. In addition, a Friedman's two-way analysis of variance by ranks was used (since the normality was not verified) to check the differences across gold, silver, and bronze medals in seven editions of the Summer PG (i.e., 1992 to 2016), with the correspondent effect sizes for nonparametric tests (Eta squared, η^2) [21]. The interpretation of the effect size using η^2 was based on the following criteria: <0.01, no effect; 0.01–0.04, small effect; 0.06–0.11, intermediate effect; and 0.14–0.20, large effect [22]. The significance level to reject the null hypothesis was set at 5% [23]. The analyses were conducted using IBM SPSS, version 27.0.

3. Results

Table 1 presents the descriptive statistics of the Summer PG (1992–1996), with means, standard deviations, medians, interquartile ranges, and total medals values.

Table 1. Descriptive statistics of Summer PG (1992–2016).

Variables	Mean	SD	Median	IQ	S_W	Total Medals
Gold 1992	15.68	3.48	9.0	18	$p \leq 0.05$	439
Gold 1996	15.79	2.63	9.5	16		442
Gold 2000	15.96	2.97	8.5	22		447
Gold 2004	13.04	2.53	8.0	15		365
Gold 2008	12.96	3.42	5.0	12		365
Gold 2012	13.04	3.49	8.0	9		365
Gold 2016	14.00	4.29	8.0	11		392
Silver 1992	15.11	2.98	9.5	19	$p \leq 0.05$	423
Silver 1996	15.29	2.85	9.5	16		428
Silver 2000	14.75	2.61	8.0	22		413
Silver 2004	13.61	2.32	9.5	21		381
Silver 2008	11.89	2.85	5.0	16		333
Silver 2012	13.04	2.85	7.5	13		365
Silver 2016	14.04	3.35	7.0	17		393
Bronze 1992	15.39	3.00	10.5	19	$p \leq 0.05$	431
Bronze 1996	15.75	3.05	10.5	18		441
Bronze 2000	15.46	2.56	10.0	17		433
Bronze 2004	13.29	2.29	7.0	22		372
Bronze 2008	11.79	2.28	6.0	17		330
Bronze 2012	13.04	2.79	7.5	14		365
Bronze 2016	12.93	2.50	7.5	13		362
Total Medals 1992	46.14	9.26	32.5	58	$p \leq 0.05$	1292
Total Medals 1996	46.82	8.30	30.0	46		1311
Total Medals 2000	46.18	7.81	27.5	65		1293
Total Medals 2004	39.93	6.75	22.5	59		1118
Total Medals 2008	36.64	8.35	16.0	42		1026
Total Medals 2012	38.46	8.99	20.5	31		1077
Total Medals 2016	38.14	9.79	19.5	29		1068

Legend: SD—standard deviation; IQ—interquartile range; S_W—Shapiro-Wilk.

We can verify that the peak of each of the analysed variables occurred in 1996, except for the gold medals, which had their peak in the year 2000 (Table 1 and Figures 1–4). After that, there was a decrease until the PG of 2008, as the number of gold and silver medals has been increasing since then, although far from the values previously achieved (Table 1 and Figures 1–4).

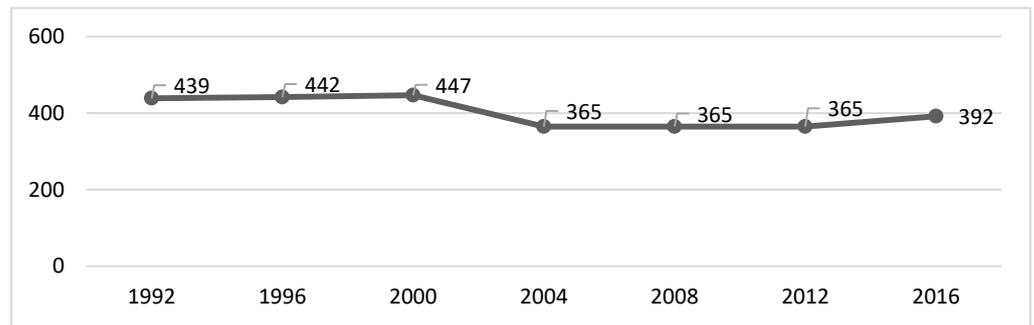


Figure 1. Gold medals evolution all over the editions.

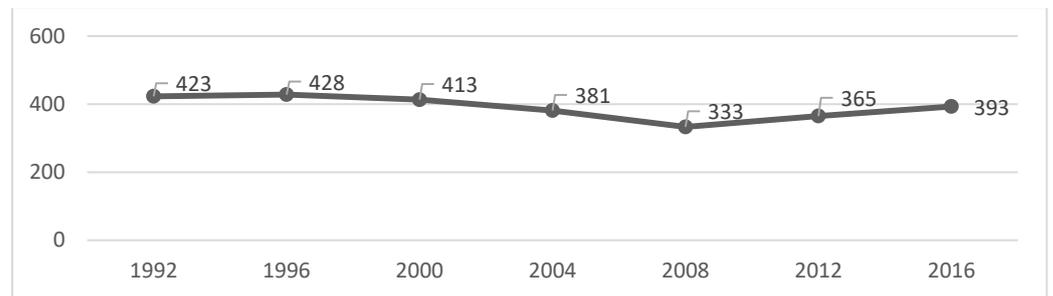


Figure 2. Silver medals evolution over all the editions.

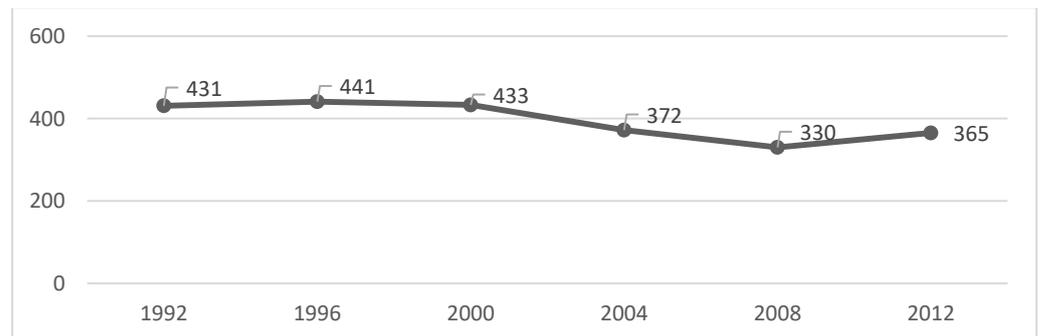


Figure 3. Bronze medals evolution over all the editions.

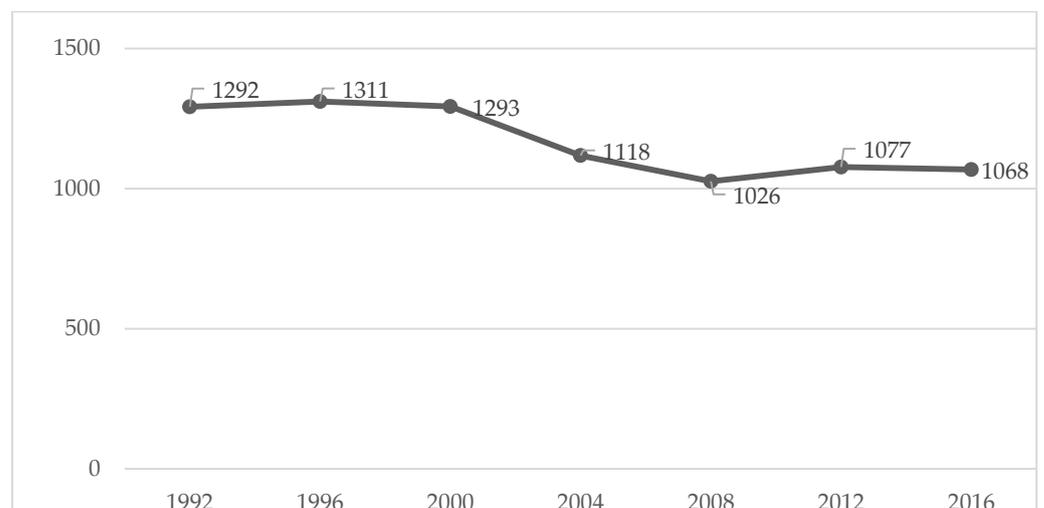


Figure 4. Total medals evolution over all the editions.

The figures show some stabilization in the number of medals across the seven analysed editions.

Table 2 presents the differences across gold, silver, and bronze medals in seven editions of Summer PG (i.e., 1992 to 2016) with the corresponding effect sizes for nonparametric tests.

Table 2. Variation in medals for the Summer PG (1992–2016).

Medals	F _r Value	Z	p	η ²
Gold				
1992–1996		−0.91	0.12	-
1992–2000		−0.29	0.62	-
1992–2004		0.34	0.54	-
1992–2008		1.01	0.07	-
1992–2012		0.70	0.23	-
1992–2016		0.09	0.12	-
1996–2000		0.63	0.28	-
1996–2004		1.25	0.03	0.06
1996–2008		1.93	≤0.01	0.13
1996–2012		1.60	0.01	0.09
1996–2016	F _r = 17.98; p ≤ 0.01	1.80	≤0.01	0.12
2000–2004		0.63	0.28	-
2000–2008		1.30	0.02	0.06
2000–2012		0.98	0.09	-
2000–2016		1.18	0.04	0.05
2004–2008		0.68	0.24	-
2004–2012		0.36	0.54	-
2004–2016		0.55	0.34	-
2008–2012		−0.32	0.58	-
2008–2016		−0.13	0.83	-
2012–2016		0.20	0.73	-
Silver				
1992–1996		0.46	0.42	-
1992–2000		−0.09	0.88	-
1992–2004		0.02	0.98	-
1992–2008		1.36	0.02	0.07
1992–2012		0.52	0.37	-
1992–2016		0.66	0.25	-
1996–2000		0.38	0.52	-
1996–2004		0.48	0.40	-
1996–2008		1.82	≤0.01	0.12
1996–2012	F _r = 13.66; p = 0.03	0.98	0.09	-
1996–2016		1.13	0.05	0.05
2000–2004		0.11	0.85	-
2000–2008		1.45	0.01	0.08
2000–2012		0.61	0.29	-
2000–2016		0.75	0.19	-
2004–2008		1.34	0.02	0.06
2004–2012		0.50	0.39	-
2004–2016		0.14	0.81	-
2008–2012		−0.84	0.15	-
2008–2016		−0.70	0.23	-
2012–2016		0.14	0.81	-

Table 2. Cont.

Medals	F _r Value	Z	p	η ²
Bronze				
1992–1996		−0.16	0.78	-
1992–2000		−0.75	0.19	-
1992–2004		0.23	0.69	-
1992–2008		1.23	0.03	0.05
1992–2012		0.52	0.37	-
1992–2016		0.55	0.34	-
1996–2000		−0.59	0.31	-
1996–2004		0.39	0.50	-
1996–2008		1.40	0.02	0.07
1996–2012		0.68	0.24	-
1996–2016	F _r = 14.53; p = 0.02	0.71	0.21	-
2000–2004		0.98	0.09	-
2000–2008		1.98	≤0.01	0.14
2000–2012		1.27	0.03	0.06
2000–2016		1.30	0.02	0.06
2004–2008		1.10	0.08	-
2004–2012		0.29	0.62	-
2004–2016		0.32	0.58	-
2008–2012		−0.71	0.22	-
2008–2016		−0.68	0.24	-
2012–2016		0.04	0.95	-
Total Medals				
1992–1996		−0.27	0.64	-
1992–2000		−0.66	0.25	-
1992–2004		0.36	0.54	-
1992–2008		1.41	0.02	0.07
1992–2012		0.77	0.18	-
1992–2016		0.77	0.18	-
1996–2000		−0.39	0.50	-
1996–2004		0.63	0.28	-
1996–2008		1.68	≤0.01	0.1
1996–2012		1.03	0.08	-
1996–2016	F _r = 19.23; p ≤ 0.01	1.04	0.07	-
2000–2004		1.01	0.08	-
2000–2008		2.07	≤0.01	0.15
2000–2012		1.43	0.01	0.07
2000–2016		1.50	0.01	0.08
2004–2008		1.05	0.06	-
2004–2012		0.39	0.47	-
2004–2016		0.41	0.48	-
2008–2012		−0.64	0.27	-
2008–2016		−0.64	0.26	-
2012–2016		0.01	0.55	-

Legend: F_r—Friedman test; Z—Z-Score; p—p-value; η²—Eta squared.

For gold medals, there were differences with intermediate effect sizes, essentially for the 1996 Summer PG compared to the 2004 to 2016 Summer PG. Likewise, there were differences with intermediates effect sizes when comparing the 2000 Summer PG with 2008 and 2016. Knowing that gold medals have a greater “weight”, 1996 was the edition with a greater preponderance compared to the last four editions.

Regarding silver medals, there were differences with intermediate effect sizes when comparing the results of the 1992–2008, 1996–2008, 1996–2016, 2000–2008, and 2004–2008 Summer PG.

Considering bronze medals, there were differences with intermediate effect sizes when comparing the 1992–2008, 1996–2008, and 2000 Summer PG and the last three events.

Likewise, when analysing the total number of medals, differences with intermediate to large effect sizes were verified for the same events as the bronze medals.

4. Discussion

The present study aims to investigate the variation in gold, silver, bronze, and total medals in the Summer PG from 1992 to 2016 in a selected sample (countries that were awarded gold in each of the seven selected editions).

Through the performed analyses, there was a peak in the number of any type of medal between the 1996 and 2000 Summer PG and a decrease until the year 2008. Apparently, this number of any type of medal has been increasing again. Likewise, the differences were significant when comparing more distant PG with more recent ones.

Given that the number of events, countries, and participants has increased, a greater distribution of medals may justify the results obtained in this study. However, the literature had already shown that the various indicators (e.g., medals) were stable [16], which is something we confirmed in Figures 1–4. If we analyse the editions separately, we see that there was a slight decrease in the number of medals from 2004, which can be interpreted in light of several factors that will be discussed below. Several reports, which are mostly unofficial, reveal the existence of various problems with doping and fraud in sport (classification) at the PG [24]. Since 2004, these issues have been overseen by the IPC [25] with greater rigor and control [26,27]. This fact may have a decreasing effect on the analysed variables (medals won).

Another factor to consider is the prevalence of various injuries and illnesses between the 2000 and 2008 PG [28,29]. The sample of countries selected for the analysis in our study may have been affected by these issues in the period in which there was a decrease in medals.

People with disabilities were rarely seen in the media and in public spaces before the PG. The Paralympic Movement acted as a showcase for its participants, giving visibility and helping to challenge stereotypes and stigmas as well as opening new doors [30]. However, the media can promote both positive and negative/stigmatizing images about people with disabilities [31–34], and they should be aware of their importance for the Paralympic Movement. Some athletes might not be prepared for such exposure, and their performance may be affected.

This increase in media exposure, greater interest and expectations for sports results (pressure), a high-intensity training environment, and below-average performances lead athletes to exhaustion, physical and psychological injuries, and lower incomes [35–37]. As the intensity of training and the number of sporting events increase (qualifications for the PG), life beyond sport is impaired, and this can be another destabilizing factor for sporting performance [38–40].

In the same sense, the effects of continuous support for athletes, together with the expectations of institutions/organizations/countries, parents, media scrutiny, and the thought that employment will depend on sports results, can lead to coach exhaustion, which impairs the quality of training and, subsequently, the athletes' performance [41–44].

Likewise, several factors may be contributing to the decrease in the number of barriers to the practice of physical activity [45] and the increase in the number of people enrolled in this practice [46], which positively impacts the number of people participating in the PG and performance indicators. Although the interest in the psychological skills of athletes started in the 1980s [47], the development of psychological skills training programs in Paralympic sports is recent [48–50]. It is a systematic and consistent practice of mental or psychological skills aimed at improving performance and increasing pleasure and physical activity self-satisfaction and includes training in arousal regulation, imagery, self-talk, goal setting, and concentration [50]. A multidisciplinary team is important before the competition, during the competition, and after the competition, controlling all the issues that can negatively influence an athlete and providing the ideal conditions for the Paralympic athlete to be able

to be at the fullest of their performance indicators in the events of the PG. As an example, Israel only started providing psychological support to its athletes in 2000 [51].

Currently, we observe an increase in the social and scientific interest in the athlete's personality, preparation, and sports results [5,52,53], and the training of psychological skills must be integrated with physical training, enhancing both variables [50,54]. This fact may be one of the reasons why the values of the number of medals won are increasing again.

Another issue that may justify the fact that the value seems to be increasing again is the existence of previously published literature that assesses the risk and identifies critical success factors (public health, surveillance, assessment and control, safety, environmental health, outbreaks of infectious diseases, weather conditions, travel information—public transport, economic assessment, and allergies, among others) that will help to formulate recommendations and organizational plans that manage the identified risks [55–59]. This aspect is essential, not only for the organizing country but also for the entourage that will participate in the PG, since the knowledge of the conditions they will encounter is complete and allows them to prepare accordingly [58–60]. A simple example is the fact that weather conditions, namely, temperature and humidity, can influence the performance of athletes [61–63]. A prior knowledge of these issues allows adjusting and adapting the structure of the training plan to the conditions that the athlete will find in the competition and the reorganization of future events.

An individual's eating strategies can significantly influence their physical performance [64]. A nutritional plan for athletes should be differentiated according to their disability, sport, frequency and intensity of exercise, and occupation [65–68]. Correct nutrition guarantees energy needs and recovery during and after exercise [37], while insufficient nutrition can increase the risk of injury and illness and decrease performance [69]. Despite being scarce, studies on the nutritional knowledge of athletes with disabilities and its relationship with sport have increased [37,70–72], as this is also a key element for performance indicators.

There are still some studies that address that the game/modality itself has evolved in technical, tactical, and physical terms over the years, a fact that has been proven in the PG [73–75], which is currently considered a high-performance sport. The use of technology in Paralympic sport created tools capable of eliminating disadvantages or measuring them and compensating for performance [76] as well as the development of more, better adapted, and more accurate tools to assess physical [77] and physiological [78] responses and may justify an increase in the number of medals.

Reducing the number of medals may not mean a decrease in performance. The study by Hassani et al. [79] did not find differences in the performance of amputees from 2004 to 2012. Since Paralympic sport has increased interest, increased participation (more athletes and new participating countries) and a greater commitment by countries make the distribution of medals among the countries greater [80]. In this way, the usual winners, namely, the countries analysed in this study, are faced with greater and better competitiveness, and the reduction in the number of medals is not necessarily negative when analysing the PG events.

This document is aligned with the studies on different performance indicators in the PG, where the variation in medals over the last seven editions of the event was studied. Our results point to variations in the number of medals by the sample we selected for analysis. There are several factors (independent variables) that can justify it. However, after the starting point of our study, this conclusion will have to be reached by future studies that study the countries' individual paths. Likewise, more qualitative studies, focusing on athletes, are needed to understand all the issues around preparation, competition, and the experience after participation in the PG.

In addition, future studies should analyse the moderating effect of the organizing country or continent on the number of participants compared to the number of medals.

5. Conclusions

Considering the seven editions of the Summer PG from 1992 to 2016, the present study intends to investigate the variation in gold, silver, bronze, and total medals. There was a variation, with the 1996 and 2000 editions having the highest number of medals won by the sample of this study. A decrease followed. However, it is possible to verify an increase in the last editions.

Faced with high-performance events, the number of participants increasing in the PG, and a greater commitment by countries, we will witness greater competitiveness among athletes, which could lead to a greater distribution of medals, depending on countries, reducing the number of those who can always earn one or more.

Pre- and post-PG reports are also essential to create knowledge that can help in the development of strategies to be adopted during preparations and in future events and to minimize external factors that can negatively affect athletes' performance.

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References

1. Silver, J.R. Ludwig Guttmann (1899–1980), Stoke Mandeville Hospital and the Paralympic Games. *J. Med. Biogr.* **2012**, *20*, 101–105. [[CrossRef](#)]
2. Goodman, S.; Wales, H.T.P. *Spirit of Stoke Mandeville: The Story of Sir Ludwig Guttmann*; Collins: London, UK, 1986; p. 191.
3. Guttmann, L. *Textbook of Sport for the Disabled*; HM+M: Aylesbury, UK, 1976.
4. Gold, J.R.; Gold, M.M. Access for all: The rise of the Paralympic Games. *J. R. Soc. Promot. Health* **2007**, *127*, 133–141. [[CrossRef](#)] [[PubMed](#)]
5. DePauw, K.P.; Gavron, S.J. *Disability Sport*, 2nd ed.; Human Kinetics: Champaign, IL, USA, 2005; p. 408.
6. International Paralympic Committee. Paralympic Games—All Editions. Available online: <https://www.paralympic.org/paralympic-games> (accessed on 1 June 2022).
7. International Paralympic Committee. Rome 1960 Paralympic Games. Available online: <https://www.paralympic.org/rome-1960> (accessed on 28 June 2022).
8. International Paralympic Committee. About the International Paralympic Committee. Available online: <https://www.paralympic.org/ipc/history> (accessed on 1 June 2022).
9. Pelliccia, A.; Adami, P.E. Tokyo 2020 summer Olympic and Paralympic Games: The games of innovation and resilience. *J. Sports Med. Phys. Fit.* **2021**, *61*, 1037–1038. [[CrossRef](#)] [[PubMed](#)]
10. Dehghansai, N.; Lemez, S.; Wattie, N.; Baker, J. A Systematic Review of Influences on Development of Athletes with Disabilities. *Adapt. Phys. Activ. Q.* **2017**, *34*, 72–90. [[CrossRef](#)]
11. Tweedy, S.M.; Vanlandewijck, Y.C. International Paralympic Committee position stand—background and scientific principles of classification in Paralympic sport. *Br. J. Sports Med.* **2011**, *45*, 259–269. [[CrossRef](#)] [[PubMed](#)]
12. Sherrill, C. Disability Sport and Classification Theory: A New Era. *Adapt. Phys. Act. Q.* **1999**, *16*, 206–215. [[CrossRef](#)]
13. Legg, D.; Steadward, R. The Paralympic Games and 60 years of change (1948–2008): Unification and restructuring from a disability and medical model to sport-based competition. *Sport Soc.* **2011**, *14*, 1099–1115. [[CrossRef](#)]
14. International Paralympic Committee. Classification. Available online: <https://www.paralympic.org/classification> (accessed on 1 June 2022).
15. Tweedy, S.; Williams, G.; Bourke, J. Selecting and modifying methods of manual muscle testing for classification in Paralympic sport. *Eur. J. Adapt. Phys. Act.* **2010**, *3*, 7–16. [[CrossRef](#)]

16. International Paralympic Committee. Paralympic Sports. Available online: <https://www.paralympic.org/sports> (accessed on 1 June 2022).
17. Baumgart, J.K.; Blaauw, E.R.; Mulder, R.; Severin, A.C. Frontiers in Sports and Active Living. Changes in the Number of Medal Events, Sport Events, and Classes during the Paralympic Games: A Historical Overview. 2022. Available online: <https://www.frontiersin.org/article/10.3389/fspor.2021.762206> (accessed on 5 June 2022).
18. Wilson, D.; Ramchandani, G. Home advantage in the Winter Paralympic Games 1976–2014. *Sport Sci. Health* **2017**, *13*, 355–363. [[CrossRef](#)]
19. Wilson, D.; Ramchandani, G. An investigation of home advantage in the Summer Paralympic Games. *Sport Sci. Health* **2017**, *13*, 625–633. [[CrossRef](#)]
20. Paralympic Games Results. Available online: <https://www.paralympic.org/results/historical> (accessed on 5 June 2022).
21. Fritz, C.O.; Morris, P.E.; Richler, J.J. Effect size estimates: Current use, calculations, and interpretation. *J. Exp. Psychol. Gen.* **2012**, *141*, 2–18. [[CrossRef](#)] [[PubMed](#)]
22. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed.; Routledge: New York, NY, USA, 1988; p. 567.
23. Ho, R. *Handbook of Univariate and Multivariate Data Analysis with IBM SPSS*; CRC Press: Boca Raton, FL, USA, 2013; p. 572.
24. Collier, R. Most Paralympians inspire, but others cheat. *CMAJ* **2008**, *179*, 524. [[CrossRef](#)] [[PubMed](#)]
25. International Paralympic Committee. Anti-Doping. Available online: <https://www.paralympic.org/antidoping> (accessed on 1 June 2022).
26. Sobolevsky, T.; Krotov, G.; Dikunets, M.; Nikitina, M.; Mochalova, E.; Rodchenkov, G. Anti-doping analyses at the Sochi Olympic and Paralympic Games 2014. *Drug Test. Anal.* **2014**, *6*, 1087–1101. [[CrossRef](#)] [[PubMed](#)]
27. Pereira, H.M.G.; Sardela, V.F.; Padilha, M.C.; Mirotti, L.; Casilli, A.; de Oliveira, F.A.; Cavalcanti, G.d.A.; Rodrigues, L.M.L.; de Araujo, A.L.D.; Levy, R.S.; et al. Doping control analysis at the Rio 2016 Olympic and Paralympic Games. *Drug Test. Anal.* **2017**, *9*, 1658–1672. [[CrossRef](#)]
28. Sobiecka, J. Injuries and ailments of the Polish participants of the 2000 Paralympic Games in Sydney. *Biol. Sport* **2005**, *22*, 353–362.
29. Liang, X.Y.; Lan, L.; Chen, W.N.; Zhang, A.P.; Dai, J.P. Disease distribution and medical resources during the Beijing 2008 Olympic and Paralympic Games. *Chin. Med. J.* **2011**, *124*, 1031–1036.
30. de Souza, D.L.; Brittain, I. The Rio 2016 Paralympic Games: The Visibility of People with Disabilities in Brazil as a Possible Legacy. *Commun. Sport* **2022**, *10*, 334–353. [[CrossRef](#)]
31. de Leseleuc, E.; Pappous, A.; Marcellini, A. La cobertura mediática de las mujeres deportistas con discapacidad. Análisis de la prensa diaria de cuatro países europeos durante los Juegos Paralímpicos de Sidney 2000. *Apunt. Educ. Física Deportes* **2009**, *1*, 97.
32. Poffo, B.N.; Velasco, A.P.; Kugler, A.G.; Furtado, S.; dos Santos, S.M.; Fermio, A.L.; de Souza, D.L. Media and Paralympic Games in Brazil: Investigating stigmas in Folha de S. Paulo's coverage. *Movimento* **2017**, *23*, 1353–1366. [[CrossRef](#)]
33. Silva, C.F.; Howe, P.D. The (In)validity of Supercrip Representation of Paralympian Athletes. *J. Sport Soc. Issues* **2012**, *36*, 174–194. [[CrossRef](#)]
34. A Mídia Diante da Deficiência: Além dos Estereótipos. Comunicar. Available online: <https://recyt.fecyt.es/index.php/comunicar/article/view/25250> (accessed on 7 June 2022).
35. Foskett, R.L.; Longstaff, F. The mental health of elite athletes in the United Kingdom. *J. Sci. Med. Sport* **2018**, *21*, 765–770. [[CrossRef](#)] [[PubMed](#)]
36. Schaal, K.; Tafflet, M.; Nassif, H.; Thibault, V.; Pichard, C.; Alcotte, M.; Guillet, T.; Helou, N.E.; Berthelot, G.; Simon, S.; et al. Psychological balance in high level athletes: Gender-based differences and sport-specific patterns. *PLoS ONE* **2011**, *6*, e19007. [[CrossRef](#)] [[PubMed](#)]
37. Nor, N.M.; Manaf, H.; Azhari, N.A.M. A Conceptual Model for Developing a Valid and Reliable Questionnaire on Nutritional Knowledge and Supplement Habits Among Disabled Athletes in Malaysia. *Curr. Res. Nutr. Food Sci. J.* **2017**, *5*, 223–229. [[CrossRef](#)]
38. Kristiansen, E.; Hanstad, D.V.; Roberts, G.C. Coping with the media at the Vancouver Winter Olympics: 'We all make a living out of this'. *J. Appl. Sport Psychol.* **2011**, *23*, 443–458. [[CrossRef](#)]
39. Pensgaard, A.M. Consulting under pressure: How to help an athlete deal with unexpected distracters during Olympic Games 2006. *Int. J. Sport Exerc. Psychol.* **2008**, *6*, 301–307. [[CrossRef](#)]
40. Pensgaard, A.M.; Ursin, H. Stress, control, and coping in elite athletes. *Scand. J. Med. Sci. Sports* **1998**, *8*, 183–189. [[CrossRef](#)]
41. Bentzen, M.; Lemyre, P.N.; Kenttä, G. Development of Exhaustion for High-Performance Coaches in Association with Workload and Motivation: A Person-Centered Approach. *Psychol. Sport Exerc.* **2015**, *25*, 22. [[CrossRef](#)]
42. Hawkins, P. The coaching profession: Some of the key challenges. *Coach. Int. J. Theory Res. Pract.* **2008**, *1*, 28–38. [[CrossRef](#)]
43. Olusoga, P.; Butt, J.; Hays, K.; Maynard, I. Stress in Elite Sports Coaching: Identifying Stressors. *J. Appl. Sport Psychol.* **2009**, *21*, 442–459. [[CrossRef](#)]
44. Dehghansai, N.; Pinder, R.A.; Baker, J.; Renshaw, I. Challenges and stresses experienced by athletes and coaches leading up to the Paralympic Games. *PLoS ONE* **2021**, *16*, e0251171. [[CrossRef](#)]
45. Jacinto, M.; Vitorino, A.S.; Palmeira, D.; Antunes, R.; Matos, R.; Ferreira, J.P.; Bento, T. Perceived Barriers of Physical Activity Participation in Individuals with Intellectual Disability—A Systematic Review. *Healthcare* **2021**, *9*, 1521. [[CrossRef](#)] [[PubMed](#)]
46. Bloemen, M.; Van Wely, L.; Mollema, J.; Dallmeijer, A.; de Groot, J. Evidence for increasing physical activity in children with physical disabilities: A systematic review. *Dev. Med. Child Neurol.* **2017**, *59*, 1004–1010. [[CrossRef](#)] [[PubMed](#)]

47. Goldberg, G.; Shephard, R.J. Personality profiles of disabled individuals in relation to physical activity patterns. *J. Sports Med. Phys. Fitness.* **1982**, *22*, 477–484. [[PubMed](#)]
48. De la Vega, R. Mental training of a boccia athlete participating in the London 2012 Paralympic Games. In *Global Practices and Training in Applied Sport, Exercise, and Performance Psychology: A Case Study Approach*; Cremades, J.G., Tashman, L.S., Eds.; Routledge/Taylor & Francis Group: New York, NY, USA, 2016; pp. 105–112.
49. Hanrahan, S.J.; Andersen, M.B. *Routledge Handbook of Applied Sport Psychology: A Comprehensive Guide for Students and Practitioners*; Routledge: London, UK, 2010; p. 584.
50. Weinberg, R.S.; Gould, D. *Fundamentals of Sport and Exercise Psychology*, 6th ed.; Human Kinetics: Champaign, IL, USA, 2015.
51. Blumenstein, B.; Orbach, I. Psychological Preparation for Paralympic Athletes: A Preliminary Study. *Adapt. Phys. Activ. Q.* **2015**, *32*, 241–255. [[CrossRef](#)] [[PubMed](#)]
52. Bawden, M. Providing sport psychology support for athletes with disabilities. In *The Sport Psychologist's Handbook: A Guide for Sport-Specific Performance Enhancement*; Wiley: Hoboken, NJ, USA, 2008; pp. 665–683.
53. Gilbert, K.; Schantz, O.J.; Schantz, O. *The Paralympic Games: Empowerment or Side Show?* Meyer & Meyer Verlag: Aachen, Germany, 2008; p. 256.
54. Martin, J. Mental preparation for the 2014 Winter Paralympic Games. *Clin. J. Sport Med.* **2012**, *22*, 70–73. [[CrossRef](#)]
55. Enock, K.E.; Jacobs, J. The Olympic and Paralympic Games 2012: Literature review of the logistical planning and operational challenges for public health. *Public Health* **2008**, *122*, 1229–1238. [[CrossRef](#)]
56. Heggie, T.W. Traveling to Canada for the Vancouver 2010 Winter Olympic and Paralympic Games. *Travel Med. Infect. Dis.* **2009**, *7*, 207–211. [[CrossRef](#)]
57. Nakamura, S.; Wada, K.; Yanagisawa, N.; Smith, D.R. Health risks and precautions for visitors to the Tokyo 2020 Olympic and Paralympic Games. *Travel Med. Infect. Dis.* **2018**, *22*, 3–7. [[CrossRef](#)]
58. Shaw, M.T.M.; Leggat, P.A.; Borwein, S. Travelling to China for the Beijing 2008 Olympic and Paralympic Games. *Travel Med. Infect. Dis.* **2007**, *5*, 365–373. [[CrossRef](#)]
59. Fagher, K.; Baumgart, J.K.; Solli, G.S.; Holmberg, H.C.; Lexell, J.; Sandbakk, Ø. Preparing for snow-sport events at the Paralympic Games in Beijing in 2022: Recommendations and remaining questions. *BMJ Open Sport Exerc. Med.* **2022**, *8*, e001294. [[CrossRef](#)]
60. Groschl, S. Planning and organizing the Olympic and Paralympic Games: The case of Rio 2016. *Sport Bus. Manag. Int. J.* **2021**, *11*, 365–383. [[CrossRef](#)]
61. Goosey-Tolfrey, V.; Swainson, M.; Boyd, C.; Atkinson, G.; Tolfrey, K. The effectiveness of hand cooling at reducing exercise-induced hyperthermia and improving distance-race performance in wheelchair and able-bodied athletes. *J. Appl. Physiol.* **2008**, *105*, 37–43. [[CrossRef](#)] [[PubMed](#)]
62. Maltais, D.; Wilk, B.; Unnithan, V.; Bar-Or, O. Responses of children with cerebral palsy to treadmill walking exercise in the heat. *Med. Sci. Sports Exerc.* **2004**, *36*, 1674–1681. [[CrossRef](#)]
63. Bhambhani, Y. Physiology of wheelchair racing in athletes with spinal cord injury. *Sports Med.* **2002**, *32*, 23–51. [[CrossRef](#)] [[PubMed](#)]
64. Flueck, J.L. Nutritional Considerations for Para-Cycling Athletes: A Narrative Review. *Sports* **2021**, *9*, 154. [[CrossRef](#)] [[PubMed](#)]
65. Jeoung, B.; Kim, J. Analysis and Evaluation of Nutritional Intake and Nutrition Quotient of Korean Athletes with Disabilities in the Tokyo Paralympic Games. *Nutrients* **2021**, *13*, 3631. [[CrossRef](#)] [[PubMed](#)]
66. Blauwet, C.A.; Brook, E.M.; Tenforde, A.S.; Broad, E.; Hu, C.H.; Abdu-Glass, E.; Matzkin, E.G. Low Energy Availability, Menstrual Dysfunction, and Low Bone Mineral Density in Individuals with a Disability: Implications for the Para Athlete Population. *Sports Med.* **2017**, *47*, 1697–1708. [[CrossRef](#)]
67. Sanz, S.; Moya, M.; Costa, G.; Rice, I.; Urbán, T.; López-Grueso, R. Nutritional strategies in an elite wheelchair marathoner at 3900 m altitude: A case report. *J. Int. Soc. Sports Nutr.* **2019**, *16*, 1–10.
68. Egger, T.; Flueck, J.L. Energy Availability in Male and Female Elite Wheelchair Athletes Over Seven Consecutive Training Days. *Nutrients* **2020**, *12*, 3262. [[CrossRef](#)]
69. Burke, L.M.; Hawley, J.A.; Wong, S.H.S.; Jeukendrup, A.E. Carbohydrates for training and competition. *J. Sports Sci.* **2011**, *29*, S17–S27. [[CrossRef](#)]
70. Rastmanesh, R.; Taleban, F.A.; Kimiagar, M.; Mehrabi, Y.; Salehi, M. Nutritional Knowledge and Attitudes in Athletes with Physical Disabilities. *J. Athl. Train.* **2007**, *42*, 99–105. [[PubMed](#)]
71. Graham-Paulson, T.S.; Perret, C.; Smith, B.; Crosland, J.; Goosey-Tolfrey, V.L. Nutritional Supplement Habits of Athletes with an Impairment and Their Sources of Information. *Int. J. Sport Nutr. Exerc. Metab.* **2015**, *25*, 387–395. [[CrossRef](#)] [[PubMed](#)]
72. Deguchi, M.; Yokoyama, H.; Hongu, N.; Watanabe, H.; Ogita, A.; Imai, D.; Suzuki, Y.; Okazaki, K. Eating Perception, Nutrition Knowledge and Body Image among Para-Athletes: Practical Challenges in Nutritional Support. *Nutrients* **2021**, *13*, 3120. [[CrossRef](#)]
73. Sánchez-Pay, A.; Sanz-Rivas, D. Competitive Evolution of Professional Wheelchair Tennis from the Paralympic Games in Athens 2004 to Rio 2016: An Observational Study. *Int. J. Environ. Res. Public Health* **2021**, *18*, 3157. [[CrossRef](#)]
74. Vorobev, S.A.; Baryaev, A.A. Peculiarities of athletic training at final stage of annual training cycle for 2021 paralympic games. *Teor. I Prakt. Fiz. Kult.* **2020**, *2020*, 48–50.
75. Jakub, K.; Ryszard, K.; Ryszard, P. A comparative analysis of sports levels in the selected swimming competitions of the paralympic games in the years 1992–2008. *J. Orthop. Trauma Surg. Relat. Res.* **2011**, *6*.

76. Dyer, B.; Woolley, H. Desenvolvimento de uma prótese transtibial específica para ciclismo de alta performance para os Jogos Paralímpicos de Londres 2012. *Prosthet. Orthot. Int.* **2017**, *41*, 498–502. [[CrossRef](#)]
77. Willems, A.; Paulson, T.A.W.; Keil, M.; Brooke-Wavell, K.; Goosey-Tolfrey, V.L. Dual-Energy X-Ray Absorptiometry, Skinfold Thickness, and Waist Circumference for Assessing Body Composition in Ambulant and Non-Ambulant Wheelchair Games Players. *Frontiers in Physiology*. 2015. Available online: <https://www.frontiersin.org/article/10.3389/fphys.2015.00356> (accessed on 31 May 2022).
78. Weissland, T.; Faupin, A.; Borel, B.; Leprêtre, P.M. Comparison between 30–15 Intermittent Fitness Test and Multistage Field Test on Physiological Responses in Wheelchair Basketball Players. *Frontiers in Physiology*. 2015. Available online: <https://www.frontiersin.org/article/10.3389/fphys.2015.00380> (accessed on 31 May 2022).
79. Hassani, H.; Ghodsi, M.; Shadi, M.; Noroozi, S.; Dyer, B. An Overview of the Running Performance of Athletes with Lower-Limb Amputation at the Paralympic Games 2004–2012. *Sports* **2015**, *3*, 103–115. [[CrossRef](#)]
80. International Paralympic Committee. Tokyo 2020 Sees More Countries than Ever Winning Medals at a Paralympics. Available online: <https://www.paralympic.org/news/tokyo-2020-sees-more-countries-ever-winning-medals-paralympics> (accessed on 1 June 2022).