

IMPACT OF COVID-19 ON PARALYMPIC ATHLETES: A LITERATURE REVIEW

IMPATTO DEL COVID-19 SUGLI ATLETI PARALIMPICI: UNA REVISIONE DELLA LETTERATURA

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ABSTRACT

Sports championships and physical activities during the Covid-19 were repeatedly interrupted or postponed, as in the case of the Tokyo 2020 Olympic and Paralympic Game. This literature review will investigate the impact of Covid-19 on Paralympic athletes by highlighting the most frequently discussed topics in the literature and any research gaps. The authors included 25 original studies (n=2674) that investigate the impact of Covid-19 on Paralympic athletes.

I campionati sportivi e le attività fisiche durante l'emergenza Covid-19 sono stati più volte interrotti o rinviati, come nel caso dei Giochi Olimpici e Paralimpici di Tokyo 2020. Questa revisione della letteratura indagherà l'impatto del Covid-19 sugli atleti paralimpici evidenziando gli argomenti più frequentemente discussi in letteratura ed eventuali lacune nella ricerca. Gli autori hanno incluso 25 studi originali (n=2674) che indagano l'impatto del Covid-19 sugli atleti paralimpici.

KEYWORDS

Paralampic, athlete, covid-19, impact
Atleti, paralimpici, covid-19, impatto

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Introduction¹

The period 2019-2022 was characterised by a global pandemic of Covid-19, an infectious disease caused by SARS-CoV-2. The coronavirus originated in Wuhan, Hubei Province, China, in December 2019 and spread rapidly to neighbouring countries. On 30 January 2020, the World Health Organization (WHO) declared a Public Health Emergency of International Concern. This unexpected and unprecedented phenomenon in recent history forced national and international governing bodies to take very strict measures to limit the spread of the disease.

Despite medical successes, brought about by vaccines and restrictions (Zinatizadeh, 2022), normal social interactions often had to be sacrificed in the name of health. Many of the venues of social activities, such as cinemas, theatres, sports facilities, religious places, were inaccessible for a long time. When they were reopened, their effectiveness was limited due to the restrictions still in place. For example, the number of participants was limited, or physical contact was not allowed. Personal protective equipment, such as masks, made communication even more difficult for people with specific disabilities (such as deafness).

Throughout the acute phase of the pandemic, sports were severely affected. In many cases there was an abrupt halt, with ongoing championship tournaments interrupted and events cancelled. The last forced interruption of sports events in their entirety had happened only in the Second World War. After a period of great uncertainty, the Tokyo Olympics and Paralympics were postponed until the following year. This created organisational and economic problems among the various businesses involved (e.g., hotel and travel bookings). In this scenario, the athletes faced an uncertain and negative present.

Recently, international research has focused on the mental and physical well-being of athletes and para-athletes. It is well known that being an athlete has important physical and mental demands. Long periods of forced rest can affect

¹ Introduction, Discussion: Prof.essa Angela Magnanini
Il resto del documento è a carico del Dott. Giulio Morelli

physical performance and increase the risk of injury (Mujika, 2000, 2001; Bosquet, 2013; Sarto, 2020; Córdova-Martínez, 2022).

Mental health is correlated with an athlete's physical health, and prolonged stressful situations can negatively affect the well-being of a person with a disability (Reardon, 2019). At the highest levels of skill, female or minority athletes may be exposed to greater mental health risks; COVID-19 further exacerbated the usual stressors leading to symptoms of anxiety and depression (Hauff, 2022). A Japanese study on female athletes and non-athletes suggests that isolation and restrictions contributed to an increase in Body Mass Index, a deterioration in sleep quality and changes in the menstrual cycle, normally associated with stressful periods, during the COVID-19 pandemic (Tsukahara, 2022). An Italian study measured perceived stress and psycho-bio-social states on 1132 Italian athletes; an Italian 10-item version of the perceived stress scale (IPSS-10; Mondo et al., 2019) suggests the Covid-19 lockdown increased level of perceived stress, especially in women or novice athletes (Di Fronso, 2022).

Several pre-post studies have suggested a link between increased mental health symptoms and Covid-19 isolation, lockdown or home confinement; the authors suggest that “social isolation (e.g., with team and tournament ‘bubbles’), concerns about well-being and financial problems, a fear of body changes with altered training and dietary regimens, as well as uncertainty about their identity, career and future, have been mentioned as COVID-19-specific mental health contributing factors. Loss of motivation, meaning and identity may have also perpetuated depressive symptoms in athletes, especially for those exposed to competition postponement” (Gouttebauge, 2022). A review of 35 studies suggests that social interactions with teammates and coaches, mental health professionals and good coping mechanisms can improve mental health for Olympic athletes (Jia, 2022). To compound the above, there is a stigma present in the sports culture when addressing or talking about mental health in both genders (Bauman, 2016; Souter, 2018; Sarto 2020).

Given this, being a Paralympic athlete at that time represented an additional challenge due to the constant confrontation with one's disability on and off the competition field. Covid-19 may also have presented another obstacle for those with disabilities who wanted to participate. Considering Covid-19 from a bio-psycho-social angle, Olympic/Paralympic athletes found it difficult to participate in sports, advance their careers, or make the transition (Stambulova, 2020). It was and will continue to be a source of additional stress for athletes, and paralympic athletes in particular, that sports events, such as the Tokyo Olympics and

Paralympics, are uncertain for the foreseeable future (Hkansson, 2020). Given the social and amateur character of many Paralympic sports, this would seem to indicate that Paralympic athletes may have suffered more harm than able-bodied athletes.

Within this framework, it is useful to explore the scientific literature on the subject. A literature review on the impact of the Covid-19 pandemic on paralympic athletes is still lacking. The main goal is to identify the most important studies in the literature from 2020 to 2022 and organize them into a few relevant themes.

Methods

An online search in the PubMed, Google Scholar, Science Direct and Scopus databases was conducted in January 2023. The keywords used in the search were: COVID-19 or COVID or CORONAVIRUS and Paralympic. Two independent researchers screened the articles to detect duplicates and to include relevant study of interest. The inclusion criteria were as follows:

- Peer-reviewed studies with full-text availability;
- Studies that investigate the effects of COVID-19 on paralympic athletes before, during and after COVID-19;
- Studies on paralympic athletes or similar samples.

The exclusion criteria were as follows:

- Abstracts, posters, editorials, considerations or studies with no participants;
- Studies done prior to December 2019 and after January 2023;
- Studies on Olympic athletes only.

Fig. 1 synthesises the study inclusion process. All the findings were summarised through a literature review approach.

Results

Methodological approach of the studies

The authors retrieved 770 articles. 108 duplicates were found. 25 original studies were included with a total population of 2674. The sample size varies from 10 to 551; a retrospective study with a sample of 4403 paralympic athletes was also included.

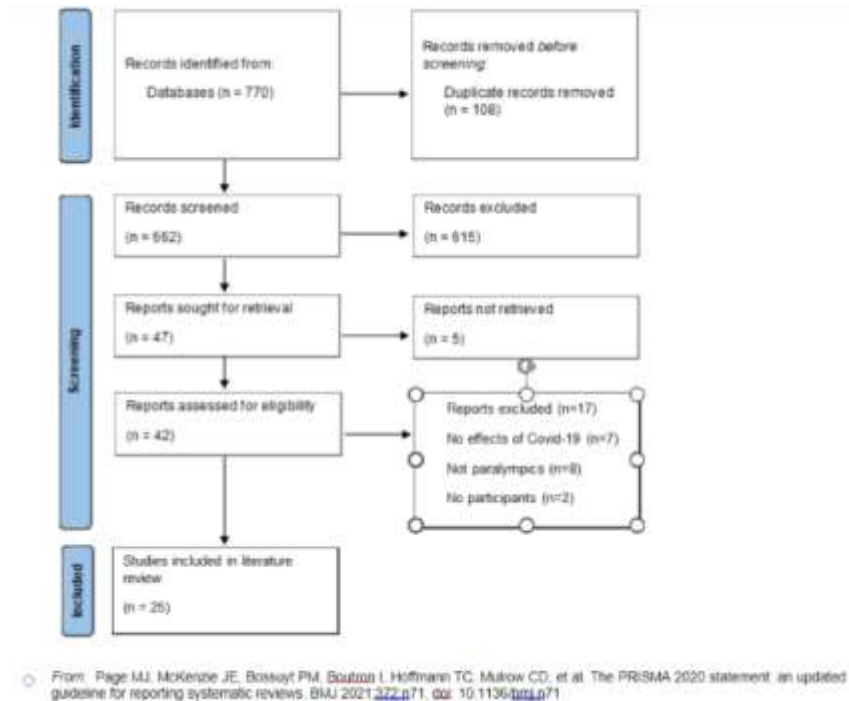


Fig. 1. Flow-chart of included studies.

The authors' methodological approach was influenced by the Covid-19 pandemic. The survey (n=14) was the most frequently used method, followed by retrospective studies (n=3), semi-structured interviews (n=4), pre-post tests (n=2), a prospective study (n=1) and mixed quali-quantitative methods (n=1). Most of the studies recruited Paralympic athletes (n=16); studies involving Olympic and Paralympic athletes (n=8) or studies with Paralympic coaches (n=3) were also included in the review.

Themes, Debates and Gaps

Reactions to Tokyo 2020 postponement

Four studies investigated the reactions of Paralympic athletes to the postponement of Tokyo 2020. Three studies used qualitative methodology, while one study used a mixed qualitative-quantitative methodology.

One of the most significant moments of the Covid-19 pandemic was precisely the postponement of the Tokyo 2020 Olympic and Paralympic Games. Dehghansai et al. (2022) conducted qualitative research on 3 Paralympic coaches and 6 Paralympic athletes with semi-structured interviews. Athletes and coaches were relieved when the postponement of the Paralympics was announced. Each person reacted differently and needed various tools and assistance. Due to the large range of complex and interactive biopsychosocial elements that impact athletes' settings, research in Paralympic contexts highlighted the need to consider the environments and associated restrictions that are specific to each athlete. Many participants showed the ability to amend their emphasis in order to maintain a positive attitude, even though there were concerns related to the epidemic and the Paralympic Games.

Another qualitative study was conducted by Benneth et al. (2022) in Canada. They interviewed 7 Paralympic athletes and 14 Paralympic hopefuls on how they perceived, experienced and coped with the postponement. Participants went through complicated emotional tangles and even questioned their role as athletes as a result of the suspension of training and competition and the resulting inability to continue the desired performance narrative. They tried to cope by reinterpreting the postponement as a chance for development and a risk-free chance to contest the performance narrative by incorporating a recovered time narrative and making related efforts to diversify their identities into non-sport domains. However, difficulties and conflicts associated with their athletic identity, its salience, selection status, professional stage, retirement uncertainties, age, and gendered time demands served as the foundation for effective coping and adaptation attempts.

Bundon et al. (2022) also explored 7 Paralympic athletes' experience of well-being during the postponement. Initially, the Canadian athletes had said they felt they were all in the same boat. As time went on, the first problems began. The restrictive measures affected all athletes, but the Paralympians felt hardest hit. Paralympic athletes reported that they trained less, had difficulty finding funding, and finally felt like "second-class athletes" compared to the Olympians. The difference between equality and equality has often emerged. Some athletes compared the experience of Covid-19 to the injury that resulted in their disability, "Honestly, I've experienced it before". In both cases, their lives were turned upside down by an

external situation. This theme, combined with resilience, would emerge powerfully in this narrative review.

Patatas et al. (2022) used instead a mixed quali-quantitative methodology to evaluate the impacts of Covid-19 and the postponement of the Tokyo 2020 Paralympic Games from the Brazilian athletes' and coaches' perspective. Results showed that participants' perceptions of the impact on training conditions converged. The coaches anticipated that athletes' performances would decline at the Paralympics, whereas the athletes appeared either confident or unconcerned. The conclusions drawn strengthen the necessity to develop additional initiatives that actively work to reduce the underrepresentation and underexposure of Paralympic sports.

Mental Health, Stress, Anxiety and Coping Strategies

Eight studies focused on the mental health of Paralympic athletes. Depression and anxiety were investigated in two studies, stress in two studies and mental health in four other studies with specific questionnaires.

Fiorilli et al. (2021) administered the Impact of Event Scale—Revised (IES-R) from Weiss and Marmar, a self-report questionnaire for the evaluation of perceived stress, to a group of 73 disabled athletes and a control group of 73 athletes. The authors reported that young adults had a significantly higher level of stress ($p < 0.031$). Individual sports participants had a significantly ($p < 0.049$) higher value of stress than team sports. However, the disabled athletes had lower levels of emotional distress than the athletes in the control group. This suggests that interfacing with sports and a disability may have had a buffer effect on the stress caused by Covid-19 restrictions.

Similar results were found by Martinez-Patino et al. (2021). The Covid-19 phenomenon negatively affected Olympic ($n=447$) and Paralympic ($n=64$) athletes with regard to behaviour, perception of threat, stress and training patterns. The authors sent athletes the following surveys: Questionnaire on Perception of Threat from COVID-19, Perceived Stress by Psychometric Properties of a European Spanish Version of the Perceived Stress Scale (PSS-10), academic and training pattern information and individual information, and perceptions and harmful behaviour with regard to the COVID-19 crisis. Paralympic athletes reacted significantly better than Olympians. They felt more able “to cope with their personal problems, less lonely and reported more frequently that their life events were going well. Athletes

in individual sports “felt better able to cope than players in team sports”. Women were more psychologically affected by Covid in many variables and their training routines were more fragmented than men’s.

Parallel conclusions have been drawn by Pensgaard et al. (2021). The authors investigated mental health among 378 Norwegian athletes during the Covid-19 pandemic (194 Olympic and Paralympic athletes and 184 elite and semi-elite athletes). Hopkins Symptoms Check list – 10 (HSCL-10) was used to measure anxiety and depression; Bergen Insomnia Scale (BIS) measured insomnia; Eating Disorder Examination Questionnaire Short (EDE-QS) measured eating disorder; Canadian Problem Gambling Index (CPGI) for gambling problems; 5-item Satisfaction with Life Scale (SWLS) for life satisfaction; Covid-19 questions for economic challenges, motivational status, perceived coping and positive experiences related to COVID-19. Insomnia and depression are the most commonly occurring mental health conditions. Women are generally more at risk of eating disorders. Non-professional athletes are at higher risk of anxiety and depression than Olympic and Paralympic athletes. Perceived ability to cope with Covid-19 reduces the risk of anxiety and depression. The biggest concern related to the Covid-19 pandemic is financial instability. The authors suggest having access to financial and professional support for elite athletes may reduce the risk of depression and anxiety.

Despite a small sample, Mirna et al. (2021) demonstrated a statistically significant difference before and after a period of quarantine in vitality, social functioning, role emotional limitation and mental health. 12 people with cerebral palsy completed the SF-36 questionnaire. Despite the low number of participants, the authors noted a decrease in many psychological parameters. According to the data, the COVID-19 epidemic negatively impacted the mental health of people with cerebral palsy by limiting their ability to participate in sports and isolating them from their social circles.

On the same wavelength as previous studies, Busch et al. (2022) examined the mental health of German Paralympic athletes (n=78) during the first year of the pandemic compared to a matched general population sample (n=78). The PHQ-4 questionnaire showed lower results in the paralympic sample compared to the matched control group. Athletes felt less depressive and anxious than the general sample population. Lower PHQ-4 values were significantly associated with decreased physical activity. The authors explained that higher resilience and the additional support mechanisms offered by project staff and sponsors after the postponement could explain the lower PHQ-4 values.

Urbański et al. (2022) evaluated mental health, coping styles and their relationship, and training opportunities in 75 elite athletes with disabilities. The authors used the 48-item CISS (Coping Inventory for Stressful Situations) to assess coping with the pandemic, the 21-item HADS (Hospital Anxiety and Depression Scale) to assess anxiety and depression and consequently effectiveness of coping strategies, and measured their effective training time in each session. There was a significant change in anxiety and depression levels during the four surveys. Increased levels of anxiety and depression compared to the pre-pandemic phase were found. However, these changes are not associated with personal coping mechanisms. The authors suggest that government interventions (such as vaccinations, effective treatment, preventive measures) were important for mental health. Anxiety was related to the severity of the pandemic waves, while depression increased linearly over time, cumulatively. Finally, there was a discrepancy between planned and effective training time, ranging from 9% to 20%.

As in the previous study Matthias et al. (2022) investigated the emotional distress caused by the Tokyo 2020 Paralympic Games postponement on an international group of Olympic/Paralympic athletes (n=20) and coaches (n=11). The authors used different validated questionnaires, including a patient health questionnaire (PHQ-9), generalized anxiety disorder assessment (GAD-7), and the impact of events scale-revised (IES-R), in which feelings regarding the postponement of the Tokyo 2020 Paralympic Games were asked. Participants reported that negative mental health impacts were similarly limited generally, with low levels of likely depression and generalized anxiety disorder. In comparison to the general, able-bodied population, this pattern has been observed in other studies of Paralympians. 10% of athletes and coaches showed signs of PTSD after the games were postponed. Even though athletes of all types frequently experience PTSD-like symptoms, the study's data shows a connection between PTSD and the postponing of the Tokyo 2020 Paralympic Games in a relatively small subsample of individuals. The study suggests that the Paralympic population is more resilient in general to these adverse events.

Depression and anxiety were also investigated by Denerel et al. (2022). The authors reported that athletes with disabilities infected with SARS-Cov-2 had higher depression, anxiety and Coronavirus Anxiety (CAS) scores than the athletes with disabilities who were not infected. Female athletes with disabilities reported higher depression scores, while individual athletes with disabilities had higher depression, stress, anxiety scores (K-10) and performance concerns.

Physical Health, Injuries, Performance and Training Sessions

Seven studies explored the physical health of the Paralympic Athletes: three studies focused on performance, two on training sessions, one on physical health and one on injuries.

D'Andrea et al. (2021) measured the performance improvement of 10 disabled athletes between the 2018-19 and the 2020-21 season. The authors demonstrated a statistically significant difference between the beginning and end of the 2018-19 season and the same period in the 2020-21 season. The various tests (Pizzolato's 7-minute, Capanni-Sassi and long jump) suggested that the Covid-19 pandemic had a huge impact on training. VO₂max, speed and muscle strength improved much less than in the non-pandemic season.

Training was the subject of the study by Shaw et al. (2021) that assessed sport-specific fitness, reported training volume and intensity, dietary intake and sedentary screen time prior to and during the pandemic on a sample of 24 Paralympic cyclists and triathletes. Training Stress Score (TSS), Food Frequency Questionnaire (FFQ) and an "incremental ramp test" were administered. While the amount of time spent watching television rose during the COVID-19 epidemic, there were no changes in training, fitness, or dietary intake over a short period of time (3 months).

Schipman et al. (2022) retrospectively analysed the performance of the top 10 athletes in 255 Paralympic events from 2010 to the Tokyo Paralympics. In the period under consideration, the performance of Paralympic athletes declined to an extent comparable to that of the two World Wars. In 2020, sports performance declined significantly, going back 6-10 years. It was also found that in 2020 there was a significantly high number of new athletes with fewer Paralympic competitions.

Mirna et al. (2021), already mentioned in the previous section on mental health, also investigated with SF-36 surveys the general physical health of athletes with cerebral palsy. In detail, Role Physical Limitation, General health status and Physical Composite Score were significantly different with lower levels when compared between training before and after the Covid-19 quarantine period.

Negative changes in training were evidenced by Kubosch et al. (2021). The authors stated that Covid-19 had a profound impact on many paralympic athletes. 109 German athletes preparing for the Tokyo Paralympic Games completed a non-validated questionnaire. As a result, 67% of the athletes trained less than before,

15% of the athletes did not adjust their training volume after February 2020, while 9% increased their training volume. Similar results for training intensity were found. Maintaining their training regimen even though some athletes experienced the loss of their short- or mid-term sports goals, appeared helpful in enabling them to cope with the uncertainty and anxiety brought on by the pandemic. The authors assume that disabled athletes are constantly faced with having to overcome obstacles in their daily lives, as well as in their life as high-performance athletes.

Covid-19 disrupted the athletes' normal training routine. Martins et al. (2022) explored changes in training patterns due to the Covid-19 pandemic among 52 Brazilian Olympic (n=38) and Paralympic (n=14) athletes through a non-validated questionnaire. The authors found a decrease in weekly training frequency, volume, and intensity as a result of the COVID-19 epidemic only for those athletes with higher pre-lockdown training loads. These findings, which are quite comparable to numerous other studies of various sample sizes and in different geographic locations, suggest that the phenomena seen among Brazilian athletes were widespread.

Similarly, Trigo et al. (2022) measured a decrease in training hours during the pandemic on 180 athletes with limb impairment and spinal cord injury. The main results showed a reduction in training hours, as well as in the number of training sessions, especially in team sports. Furthermore, the sports and disability groups showed no differences in life satisfaction values and most athletes seemed to realise that the pandemic period would probably penalise their performance in Tokyo 2020.

Irregular workouts and numerous forced breaks may have increased or aggravated injuries. Derman et al. (2022) conducted a retrospective study of the 4403 Paralympic athletes involved in the Tokyo 2020 Paralympics through web-based injury and illness surveillance system and local polyclinic services. Injuries and illnesses were fewer than in the previous Paralympics but more serious. Probably the lower number of injuries and illnesses was thanks to the extraordinary safety measures against the Covid-19 pandemic, while the severity of injuries could be attributed to the introduction of two new sports (badminton and taekwondo). Athletes may have experienced less physical stress before and during the Games period as a result of changes made to training and competition opportunities prior to the Games, as well as restrictions on social interactions within venues and in surrounding areas during the Games; less overall exposure to situations that could result in an injury may have reduced the risk.

Covid-19 infections and Paralympics Athletes

Two studies measured infection rates for Covid-19. It is worth including these studies to understand whether Paralympic athletes were further penalised by Covid-19 itself and how they reacted to it.

Hull et al. (2022) analysed the impact of Covid-19 infection retrospectively on a cohort of 147 UK Olympic (n=122) and Paralympic (n=25) athletes who received medical care recorded in the electronic medical records systems used by the sports and exercise medicine physicians of the UK Sports Institutes of England, Northern Ireland, Scotland and Wales. Symptom duration was similar among Olympic and Paralympic athletes. Covid-19 infections impacted full sports participation for more than a month in a quarter of the athletes. The most prevalent symptoms were fatigue (57%), dry cough (50%) and headache (46%). Covid-19 symptom duration was greater than non-Covid respiratory diseases.

Kaneda et al. (2022) compared infection rates during the Olympic and Paralympic Games using a retrospective methodology. The authors obtained the data through the website of the Japan Broadcasting Corporation NHK and Tokyo Metropolitan Government. Paralympic infection rate was superior to Olympic Games (0.54% versus 0.48%), while infection rate among athletes was 0.30% and 0.25% respectively (1.2 times higher in the Paralympics than in the Olympics). Covid-19 equally impacted the world population. The preventive measures put in place during the Games proved effective despite the great risks of an event with athletes from all over the world. Infection spread rates at the Games were lower than in Tokyo.

Athletic Identity and the Risks of Professional Diminishment

The last two studies included in this review addressed the issue of athletic identity and the risks associated with the athlete's profession during the Covid-19 pandemic.

Clemente-Suarez et al. (2020) investigated through a survey the modulators of personal and professional threat perception of 175 Olympic (n=136) and Paralympic (n=39) athletes during the Covid-19 crisis. Considering the Tokyo Olympics' suspension, Olympic and Paralympic competitors demonstrated unfavourable perceptions of confinement regarding their exercises but not

regarding their performances. In terms of their preparation and performance, Paralympians reacted to the confinement more negatively than Olympic athletes did. In terms of gender disparities, female athletes had negative perceptions of neuroticism and psychological rigidity, as well as incidence of sports performance. Finally, professional athletes performed worse on the personality tests than amateur athletes.

Hu et al. (2021) examined how Covid-19 affected Athletic Identity with a qualitative study. The authors interviewed 29 US Paralympic Hopefuls Athletes. Covid-19 transformed the athletic identity of some Paralympians. The absence of training and competitions made them feel they like they were no longer athletes. Others saw the period as a transitional phase in their lives as athletes; a mental toughness was noticed in these players, i.e., the ability to remain focused, emotionally stable and adaptable. A minority saw Covid-19 as a challenge from which they emerged strengthened. Isolation and restrictions only increased their desire to practice their sport and be in a group. This study suggests that having a strong athletic identity did not necessarily adversely affect the person during the pandemic. The results once again demonstrate the mental resilience of these athletes.

Gaps

What is missing in this review narrative is a study of the social impacts in terms of inclusion and quality of life in general. Sports for people with disabilities are important for their well-being and social inclusion. The literature is flawed in this respect. In one study (Magnanini, Morelli, 2021) we found that the possibility to practice sports has a significance for people with disabilities that transcends the physical or merely performance aspects. Inclusive processes can transform the sports experience into a tool for growth and equality. It is therefore essential to stimulate reflection and research in this direction as well.

Discussion

The sports movement in general was greatly affected by the pandemic. The Eurobarometer 2022 survey showed that half of Europeans reduced or ceased physical activity during the Covid-19 pandemic. However, there is a lack of reliable data for the Paralympic population and for people with disabilities in general. One of the most important limitations of research on the Paralympic world is finding

reliable data on the actual participation in activities for people with disabilities (except for the Paralympics for which the actual number of participants is known). Fortunately, international research has thoroughly investigated the effects of Covid-19 on the Paralympic population.

The reactions to the postponement of the Tokyo 2020 Olympics and Paralympics were one of the first aspects analysed. The reactions were commensurate with the historical moment. There was no anger or indignation in the Paralympic athletes but an awareness of the right choice. As happens in times of crisis, Paralympic athletes also experienced an internal dilemma: to remain athletes or to start diverting to something else. When the pandemic lasted longer than expected, Paralympic athletes felt like second-class athletes compared to the Olympians. However, already in the first reactions to the postponement, the incredible resilience of these athletes came to the surface. Overcoming physical trauma in a positive way increased their ability to cope with life's negative events.

In general, the Paralympic population reacted very well to the adverse events related to the Covid-19 pandemic. Personal resilience skills helped athletes overcome the difficulties, with lower levels of anxiety and depression compared to control groups. Two studies suggest increased levels of anxiety and depression, but one study compared athletes infected with the disease and uninfected athletes; another study was without a control group and cannot be used for comparative purposes. Only one study with a small sample and no comparative group reported a decrease in psychological parameters. These studies suggest that mental health is a sensitive issue for athletes with disabilities and, although they seem, on the whole, to have reacted better than the Olympic athletes, the problem needs to receive more attention on the part of everyone involved.

Regarding the aspect of performance and physical health, the studies included in the review testify to a clear deterioration in training and competition conditions, except as regards injuries, which seem to have actually decreased in the last Paralympic Games in Tokyo. Restrictions and isolation generally penalized training opportunities, especially for team sports. Any compensatory training (e.g., home training) only cushioned the damage, proving its predictable ineffectiveness. This aspect may be an important consideration for trainers, coaches and rehabilitators in the future.

One of the effects of Covid-19 for numerous athletes was the increase of respiratory illness and temporary isolation. Although the symptoms and duration of illness were similar between Olympic and Paralympic athletes, the latter

contracted the disease more frequently. In general, the bubble created for the Games worked: the percentage of those infected was lower than in the city of Tokyo. The good practices put in place during the Olympics and Paralympics will certainly be studied for future editions.

Covid-19 finally questioned the athletic identity of Paralympic athletes, although the authors found a certain mental toughness. The distance from teammates, from training, the destruction of the routine triggered different reactions in the Paralympic athletes. Some saw Covid-19 as yet another opportunity to prove their true worth, others felt diminished by the pandemic.

Most of the articles included focused on performance-related aspects. For instance, mental health is seen mainly as a factor influencing present and future performance. Very few publications focused on the social aspects of Paralympic sports. This can be traced back to a medical-physiological view of Paralympic sports. The most recent definitions of health focus not only on these aspects, but also on psychological, educational and social factors (WHO). They exclude, however, the impact of sports in terms of inclusion and social participation. A gap is found in the literature that can be filled by pedagogical studies from an inclusive perspective. This would best understand one of the fundamental elements of the lives of people with disabilities, respecting everyone's right to be involved and include.

Conclusions

This literature review shines a light on the most important research regarding the effects of Covid-19 on the Paralympic population. The analysis provides a picture of the state of research on the topic.

Covid-19 affected Paralympic athletes in various areas of their athletic and private lives. Mental health deteriorated, especially in the parameters of stress, anxiety and depression, but not as much as among their fellow Olympians. The resilience of these athletes, previous injuries and a positive attitude towards the pandemic mitigated the negative effects. Similarly, Covid-19 greatly affected the athletes' physical health. Forced isolation and the slow resumption of training activities affected the number of sessions, injury severity and overall performance parameters. The Covid-19 disease affected Paralympic athletes more than Olympics, although the symptoms and duration were similar. Finally, the pandemic changed the perception of athletic identity; many no longer felt like athletes or considered retirement. Women and athletes of individual sports suffered more

from the effects of Covid-19 than men and players of team sports. Covid-19 was a barrier to participation and affected people with disabilities more than athletes without disabilities, unfortunately exacerbating the differences between Olympians and Paralympians.

Scientific literature has long investigated the beneficial effects of sports and physical activities for people with and without disabilities. Media attention to the achievements, medals, and extraordinary prowess of these athletes despite difficulties has placed increasing emphasis on performance. However, to be an athlete does not simply mean being able to execute certain techniques or perform certain feats, but has a very important social value for people with disabilities. Only include indispensable images or drawings or graphics in the article and check that they are saved in a format readable by all computers. Images, graphs and tables must be captioned with a number. References in the article to the image should indicate its type and number (e.g. Fig. 1; Graph.2; Tab. 3).

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