

Data ownership in individual sports: Narrative review

NUNO FONSECA¹, MÁRIO C. MARQUES², DULCE ESTEVES³

^{1,2,3}Sports Science Department, Beira Interior University, Covilhã, PORTUGAL

^{2,3} Research Center in Sports Sciences, Health Sciences and Human Development (CIDESD), Covilhã, PORTUGAL

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Abstract:

Background. The massive use and consumption of the digital age, combined with constant technological advances, has silently allowed the collection and excessive use of each person's personal data. When extrapolated by science and applied to sport, they can respond to the challenges of the actors/members, but the question arises: who owns the data collected from athletes? **Objectives.** The aim of this narrative review was to understand through the specialized literature the question of who owns the collected data. **Methods.** A narrative review was carried out through studies indexed in the following electronic databases: PubMed and Web Of Science. The following keywords were selected: Big Data, Sport, and Ethical, and a time cut was applied in the last 5 years. There was no specification regarding the language, and to broaden the discussion, articles and review articles focusing on Big data and Biometric data were also analyzed. **Results.** The results point to a massive use of technology, collection and overuse of personal data, raising legal and ethical problems regarding the ownership of the data. **Conclusion.** The evolution of technology, when combined with sports performance, creates legal and ethical problems leading athletes and actors to expose their data in an abusive way, creating the need to draw up individual agreements before starting any project.

Keywords: Big Data, Ethical, Sport, Biometric Data

Introduction

The big data of contemporaneity has managed to become popular in our society through a constantly online mobile network, and computer science has enabled the use of new technologies to digitize, classify and store any and all interaction and behavior adopted by human beings every minute of the day (Tian,2020). According to these authors, the production of big data is built and fed by all kinds of places and forms through the use of mobile phones, daily searches on the internet, and social networks. Although today the concept of big data cannot be defined unanimously, according to Romanillos et al. (2016), it is not enough to define big data only considering its characteristics, but rather trying to understand the effects it produces. Many of these technological advances allowed a greater use of the personal data collected by this equipment, which when correlated with sports practices, either individual or collective, help to change training methods (Kolovson, Liang, Munson, & Starbird,2020). The donation of organs, tissues or cells is an important part of health, provided that the different legal forms are respected (Cammarota et al.,2017; Shamseer et al.,2015).

In the digital age in which we live it does not seem to be the only donation to be made in the medical context. The growing digitization with the increase associated with the generation of digital data has suggested, through the specialized literature, the theme, "Digital data donation" (Strotbaum et al.,2019). According to these authors, medical data are a major research base for the creation and development of drugs with an above-average degree of efficacy in the treatment and prevention of chronic diseases (Strotbaum et al.,2019). Biometric data correspond to a valuable subcategory of big data, and these are usually used in the field of sport (Osborne,2017). According to the author, through these data, we can perceive how our body works through skeletal and muscular structures, and the biomechanics of sport usually relate to these body measurements correlating them with analysis between the athlete and the equipment he uses (Osborne,2017).

Nowadays many sportsmen already use wearable tracking equipment in and out of training that allows the collection of data (e.g., sleep) in real time, allowing coaches to combine this data to help make decisions regarding sport performance (Kolovson, Liang, Munson, & Starbird,2020). The market for wearable and portable technology has managed to provide people with the means to monitor their physical and physiological parameters in real-time, which combined with the health record, allows for patient analysis (Sikka et al.,2019). But with the increasing use of this technology and the use of new methods adopted by the sports industry, it is necessary to verify the ethical and legal assumptions of this collection and the use of the various data of the athletes (Osborne,2017). The researchers focus on the specific ethical issues of implementing these technologies with the aim of optimizing the performance of professional athletes, as it is through them that those interested in individual athlete data arise (Karkazis & Fishman,2017). These authors identify coaches, team owners, sports

agents, and professional leagues as stakeholders, and classify these ethical concerns as follows, (i) validity and interpretation of the data; (ii) increased surveillance and threats to privacy; (iii) data confidentiality and security risks; (iv) conflicts of interest; and (v) coercion (Karkazis & Fishman,2017). There seems to be great potential for overuse of biometric data by all those involved: the athletes to improve sports performance, coaches to monetize training, and technology companies to update algorithms and software (Sikka et al.,2019). According to these authors, the ownership of the data varies, depending on the context in which they were collected and used, because if the data were monitored during sports activities they belong to the teams and may be shared with other higher bodies without the consent of the athlete (Sikka et al.,2019). In the United States, athletes have limited ownership over their own data, however, there is a recent decision by the NFL Players Association that data collected by specific devices belongs to the athlete and can only be used according to his criteria. This is due to the fact that revealing data with above-average physiological performance values the athlete, but inferior data can devalue the athlete (Sikka et al.,2019). Thus, the objective of this narrative review was to understand the ethical issues related to the possession of data collected from athletes.

Methods

This is a narrative review study based on research indexed in the following electronic databases: PubMed and Web Of Science. In January 2022, the keywords were selected through the topic of data in individual sports: Big Data, Sport, and Ethical, generating a total of 321 articles according to Prisma, Preferred Reporting Items for Systematic Reviews and Meta Analyses, (Shamseer et al.,2015) presented in Figure 1. A cut-out was made in the temporal space comprised in the last 5 years, with no specification regarding the language. To reinforce the discussion, articles and review articles focusing on Big Data and Biometric data were included. These provide a deeper analysis of the theme, creating a better understanding of the concepts addressed and a greater possibility of clearly pointing out the importance of understanding who owns the data collected from sportsmen. This narrative review seeks to use specific methods oriented to the search of a particular topic under analysis in the scientific literature, using mechanisms and methodologies used by researchers in the field of ethics in sport to describe the state of the art of the topic.

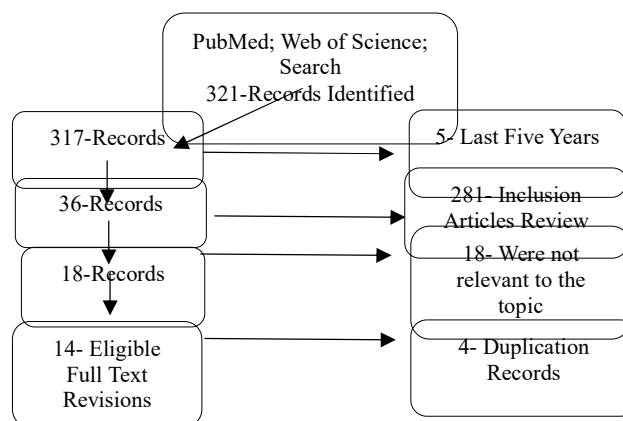


Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta Analyses) study flow diagram.

Results and Discussion

Among the 14 studies included in the present review, one article specifies the importance of understanding how biological issues are used in medical databases, giving as an example the use of DNA; six reinforce the importance that data collected from athletes must not be shared in projects with different purposes; three alert to the understanding of the rational use of technology; and, finally, four articles reinforce the ethical and legal problem of misappropriation of athlete data. The main results included in this review belong to the studies presented in Table 1.

Table 1. Characteristics of the studies included in the review, type of study, and main outcomes.

References	Study Type	Main outcomes
Tanisawa et al., (2020)	Review Article	Creation of clear standards on how DNA data is collected for the protection of sportsmen and their storage. Considering the genetic advance in sport, it is necessary to reduce the misuse of genomic information of athletes, using ethical principles.
Kolovson, Liang, Munson, & Starbird; (2020)	Article	Understanding the limits of the use of personal data when collaborating with sportsmen. When procedures are used in the collection of data that are then used by third parties, or in other projects without athletes' consent, it is necessary to clarify that the use of data by various equipment may be available in bases other than the specific study.

Baerg, (2017)	Article	The possibility for athletes to create their own database so that they are not exposed. It will be appropriate to realize whether the athlete should allow the control of physiological parameters outside of training. This will enable him not to disclose his data, but improve his performance without appealing to large databases.
Tian, (2020)	Article	Considering where sport is practiced today, and with the evolution of the use of digital equipment to better understand the phenomenon, a critical view of the use of these means must be created.
Sikka; Baer; Raja; Stuart; & Tompkins, (2019)	Article	Through the appearance of multidisciplinary teams in the field of sports, with new equipment for the collection and understanding of data aimed at increasing the performance of sportsmen, it becomes dangerous to disseminate the data in various purposes other than sports. Medical offices will face extra pressure to share databases.
Arnold; & Sade, (2017)	Article	In the collection of biometric data, either teams of professional athletes or amateur athletes, should work to create a unique consensus on the use of the data. Universities must not use the biometric data of their athlete students without their consent.
Osborne, (2017)	Article	The collection of biometric data from both individual teams and players live somewhat outside the law as to the use of collective and individual physiological records, as there are lobbies that influence professional sports leagues to collect and disseminate such data.
Nebeker et al., (2017)	Article	This review attempted to create ethical methods that enable an organization to create privacy tools to obtain personal health status data through equipment that allows knowing the location of a person.
Strotbaum; Pobiruchin; Schreiweis; Wiesner; & Strahwald, (2019)	Exploratory Article	A system should be set up to inform data donors about what researchers, doctors and other actors develop with their data for the benefit of other citizens. They may adopt a procedure similar to the organ donation bank. Data should be considered the beginning of everything and not the end.
Kostkova et al., (2016)	Article	Huge barriers are created when managing people's privacy in relation to BIG DATA. It is a challenge to achieve full transparency in a set of clinical data by creating legal policies. It is necessary to find an approach that balances medical benefit with possible data trading.
Phatak; Wieland; Vempala; Volkmar; & Memmert, (2021)	Narrative Review	The development of sensors and equipment that allow the collection of data in real time is worrying the scientific community, as they are so present in several areas that it is necessary to create sensors that develop algorithms allied to data protection.
Sheehan et al., (2019)	Research Article	The authors suggest that, in the future, population consent in biomedical research should require limits in order to control research. They list the creation of a law that monitors the grounds of investigations and their progress. Knowing all the actors when designing an investigation will help to understand the intentionality of the project.
Goodyear, (2017)	Article	The author clarifies the ethics in digital research that includes the human being and the involvement of data on the Internet in research conducted by investigators. It is necessary to reflect and discuss these points.
Karkazis & Fishman, (2017)	Article	The use of technology in the collection of biometric data in professional teams is influencing other areas and spectators including children to use software that allows tracking and possible misuse of data by third parties and other areas.

These studies focus in particular on the importance of creating legal and ethical processes, allowing all actors in different projects and areas to consciously use data coming from population, sport, and medicine. After conducting a detailed analysis of the selected articles on the problem of to whom the sportspeople data belong, we focused on understanding the process. It seems that the use of new technological equipment allows, in first instance, to collect the data. While not claiming that the technology needs to be perfect to make itself available to multiple users, the researchers believe it must be reliably better than other methods used, as this leads athletes to exposure, causing greater risks (Karkazis & Fishman, 2017). The authors report that with the lack of a standard of evaluation of the technology used, there is no way to understand its causes and the risks associated with its use (Karkazis & Fishman, 2017). In a review recently published in the journal *Nature Biotechnology*, there appears to be a growing interest in wearable biosensor technology by academic researchers and by the health industry due to its potential real-time supply of physiological information (Kim, Campbell, from Ávila, & Wang, 2019). These technologies have been used to collect accurate data that has greatly helped medicine and the fitness industry (cheol Jeong, Bychkov, & Searson, 2018; Seshadri et al., 2019).

According to Phatak et al. (2021) placing sensors in the body allowed the collection of accurate data that helped to solve various problems. This device data is stored in databases belonging to technology companies or teams, and this property only changes depending on where it was collected or the purpose for which it is proposed (Sikka et al., 2019). Data is not just the basis for medical and epidemiological research, its transfer or processing can lead to abusive risks when the intention is to link these data to assumption profiles using other sources (Strotbaum et al., 2019). Health apps are a booming market, very unregulated and with potential damage to user privacy when it comes to data usage (Parker, Bero, Gillies, Raven, & Grundy, 2019). Its involuntary sharing is above all a lack of transparency that constitutes a challenge to its use, raising concerns of trust and

integrity (Strotbaum et al.,2019). According to Sikka et al. (2019), the data used on the various devices worn by athletes are usually integrated with other features such as performance, risk of injury, and health, allowing the evaluation of sports performance rates. The uncertainty raised around the technologies and the procedures used to optimize sports performances is due to the fact that, if applied responsibly, it can help the athlete, but it can also compromise data privacy and reliability (Karkazis & Fishman,2017). Discussions focus on these dilemmas that can pose an ethical problem when using the collected data. According to Goodyear (2017), informed consent, anonymity, protection, and legality are considered indispensable and preponderant ethical principles, regardless of the ethics that investigators take on the procedures. Although professional athletes in the United States are protected by the collective employment contract, most of them do not address the use of technologies, collection, and misuse of data (Karkazis & Fishman,2017). Regarding the ambiguity about who owns the data, protection is essential, and it will be necessary to ensure an agreement with third parties on the collection and use of this data before starting any project (Sikka et al.,2019).

Conclusion

Although there are significant effects already studied in increasing the performance of athletes using individual data, or in the growing base of medical data, which help to create new drugs to treat new diseases, there is evidence of the excessive and improper use of this data. In this review, we show through the studies that there is a misappropriation of data collected from athletes, letting institutions or clubs to use them indiscriminately. Thus, it is clear that with the massive use of technological equipment, and the constant evolution of technology allied to the increase in sports performance, a gap was created between ethical and legal problems, leading athletes to expose themselves in an abusive way, allowing the sharing of their data. Based on these results, we consider that there is currently an ethical problem regarding the ownership of the data collected, suggesting the creation of individual agreements when it is intended to initiate an investigation, or when it is linked to a sports project.

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