

## ORIGINAL SCIENTIFIC PAPER

# Gender Difference, Nutritional Supplements and Drug use in Sport to Enhancing Performance: an Italian Revision over the Last Decade

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## Abstract

In last years, there has been a multitude of studies on doping, such as in recreational and in amateur sport. The extent of this phenomenon was clarified for special populations (like e.g. bodybuilders) and for special substances (mostly for anabolic steroids). Doping is present in sportsmen and women; the reasons why may be many and various. The aim of this study is to discover the gender disparity of drugs addiction as doping practice and breakdown by sport bodies and gender. The data show the anti-doping test took place on Italian professional athletes during the last years: from 2007 to 2017. Data showed are originated from the report commissioned by the Italian Ministry of Health. About checked doped athletes there are significant gender differences in doping attitude and/or in doping profiling. First of all, males seem to be more exposed to doping than females. The prohibited substances most frequently used by females athletes are diuretics and masking agents (10 athletes in 2014), cannabinoids (5 in 2007) and stimulants (5 in 2011) compared to males athletes who use mostly anabolic agents (27 in 2017), cannabinoids (20 in 2012) and diuretics and masking agents (17 in 2011 e 2014). The addiction of doping substances, depends on various factors related to gender, but what drives men and women is the sense of gratification and ego orientation. Nowadays a significant number of women joined official and Olympic competitions. Doping to enhance female sport performances took importance from the two last decades of the past century.

**Key words:** *drugs, illicit substances, sport, gender, anti-doping controls, anti-doping programme*

## Introduction

Since ancient times, men have tried to improve their performance. The reasons have changed over time. In the past, in fact, man tried to get better results in hunting. Subsequently, with the birth of fighting and competitions, the goal was to achieve greater economic profits (Mazzeo, 2016).

At the beginning, the substances used had natural or animal origins. Indeed, the Greek wrestlers and the Roman gladiators attempted to improve their own performance by taking mixtures of various types of plants or by eating sheep's testicles (Mazzeo & Raiola, 2018). But over time, artificial substances and methods were also used (Sjoqvist, Garle, & Rane, 2008; Thevis & Scanzer, 2014). In fact, the doping's stakeholders ha-

ve always been able not only to identify new substances and new methods but also to steal the new scientific discoveries aimed at the treatment of diseases, for their illegal purposes (Council of Europe, 1989). Doping is a big dimension problem due to the extensive connections between the people involved in the network. It involves the whole society (Mazzeo et al., 2018): not only elite athletes but amateurs too, their friends and relatives, the medical staff, manager, chemists, biologists and pharmacists, pharmaceutical industries, clandestine laboratories, and criminal organizations (Møller & Dimeo, 2014; Marclay, Mangin, Margot, & Saugy, 2013; Mazzeo et al., 2018). Moreover, it includes "ordinary people" too who dope for recreational or aesthetic purposes (Thevis & Scanzer, 2014).



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In the early 1900s it was realised the doping's dangerousness. In 1928, in fact, the International Association of Athletics Federations became the first International Sport Federation to ban the use of stimulating substances (Valkenburg, de Hon, & van Hilvoorde, 2014) and in 1968 drug tests were introduced at the Olympic Winter Games in Grenoble and in Olympic Games in Mexico (Kayser, Mauron, & Miah, 2005; Botrè, 2008). The ban on doping substances and the introduction of anti-doping tests have certainly represented an important tool for the fight against doping but this was not enough (Dvorak et al., 2014). It was necessary create an independent organization with the sole purpose to defeat the doping in the sport (WADA, 2010; Mazzeo et al., 2018; Overbye, Knudsen, & Pfister, 2013). For this reason, in 1999, it was created the World Anti-Doping Agency (WADA), an international organization, with the aim to promote, coordinate, and monitor the fight against doping in sport in all its forms (Mazzeo et al., 2018; Santamaria, 2016).

In accordance with the WADA Code doping is the presence of a prohibited substance or its metabolites or markers' banned; the use or the attempted use of a prohibited substances or a prohibited method; the refusing or the failing, without compelling justification, to submit to sample collection; the violation of applicable requirements regarding athlete availability for out-of-competition testing; the tampering or the attempting to tamper with any part of doping control; the possession of prohibited substances and prohibited methods; the trafficking or the attempted trafficking in any prohibited substance or prohibited methods; the administration or the attempted administration to any athlete of any prohibited methods or prohibited substances, or the assisting, the encouraging, the aiding, the abetting, the covering up or any other type of complicity involving an anti-doping rule violation or any attempted anti-doping rule violation (WADA, 2010). Moreover, WADA has officially listed the banned substances and practices. This list is constantly updated (Mazzeo et al., 2018).

In last years, it is evident that prevalence of studies on doping, focus on recreational and in amateur sport, taking into consideration only certain substance classes or special sport populations. This studies can only provide limited estimates of the prevalence within the total population (Frenger, Pitsch, & Emrich, 2016).

The early years of the twentieth century are generally represented as a period of triumph for women's sports, with the eventual acceptance of a significant women's programme in the Olympics in 1924 and the proliferation of national organisations for women's sport (Heggie, 2010). So, the desire to win apparently became so pressing for some nations that deliberate and systematic cheating took place in both the men's and women's events. Therefore, doping is present in sportsmen and women; the reasons why may be many and various but doping and gender fraud became central concerns in the late 1950s

and 60s, resulting in the eventual introduction of systematic testing for both at international sporting events in the late 1960s (Heggie, 2010; Mazzeo et al., 2018).

In Italy, doping is banned according to the national Law no. 376/2000 "Regulation of health standards in sports activities and the fight against doping" too. The law established a particular Committee, "Committee for the Monitoring and Control of Doping and the Protection of Health in Sporting Activities", with the main aim of identifying the classes of prohibited substances and the competitions to be monitored, determining the conduct of anti-doping controls, promoting information campaigns for the protection of health in sporting activities and prevention of doping. Since 2003, every year the above mentioned Committee, elaborates and transmits a report containing detailed data on the spread of doping in Italy as well as activities to prevent and combat the phenomenon (Mazzeo et al. 2016a).

The aim of this study was to assess the gender disparity of drugs addiction as doping practice and breakdown by sport bodies and gender.

Methods

The data show of the anti-doping controls carried out by the Ministry of Health from 2007 to 2017 (www.salute.gov.it). The authors have firstly analysed the data of Italy Anti-doping official website of each single report of the above mentioned Ministry, then they have extrapolated and combined the information on the consumption of doping substances in male and female athletes.

Results

In Italy, Ministry of Health every year commissions the anti-doping test. Italian legislation provides for only urine tests on athletes (Strano & Botrè, 2011; Mazzeo et al., 2018). Since 2007 to 2017, 13896 athletes have been checked and 458 were doped corresponding to 3.5% of the total analysed of which approximately 61 women and 358 men. The majority of controls was carried out in men's competitions. The Commission justified this prevalence with 3 reasons: 1) controls were carried out on minor categories and some sports are practiced by women only in the higher categories; 2) some sports are mainly male; 3) often in the calendars of the federations do not appear the place and date of the events and it is therefore difficult to carry out checks (Ministero della Salute, 2008-2018).

As shown in Figure 1, the highest percentage of them is recorded for men in 2010 with 6.3% and for women in 2015 with 1.9%. The highest number of doped men is recorded in 2010 while for women in the years 2007, 2011, 2012 and 2014. But the difference is considerable, in fact we are talking about 50 men against 8 women.

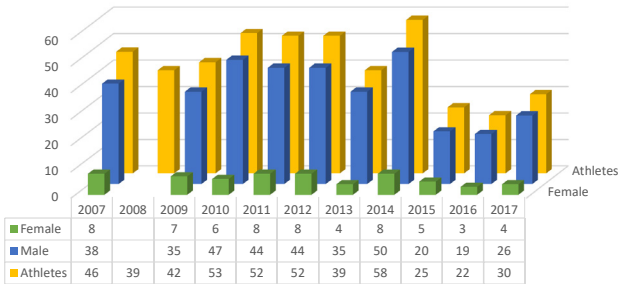


Figure 1. Number of doped athletes from 2007 to 2017 breakdown by gender

As regards the spread of doping in the various sports analysed, results has shown (Table 1) that cycling is the sport most affected and in particular by men. In reality, in 2011 and 2013, 25 and 19 men were listed against only 2 women. Football and rugby also record relatively high numbers. In fact, the men

doped in the aforementioned sports amount to 7 respectively in 2007 and 2012. The number of women doped in various sports, in the various years is insignificant. The highest number is 2 recorded in cycling (2011, 2012, 2013), in track and field (years 2011 and 2016) and in rugby (year 2012) (Table 1).

**Table 1.** Number of doped athletes from 2007 to 2017 breakdown by sport bodies and gender

Sports Bodies 2007-2017	7		8-10		11		12		13		14		15		16		17	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
AICS	2	0																
ASI	1	0																
ACI - Car racing	0	-																
C.N.S. Libertas	0	1																
CSEN - CrossFit																	3	0
FASI - Climbing	1	0					0	0	0	0			0	0	0	0	0	0
FCI - Cycling	6	0		25	2	11	2	19	2	0	0	11	1	9	0	11	1	
Fcrl - Cricket																		
FGL - gymnastics	1	0					0	0	0	0	0	0	1					
FIB - bowls																		
FIBa - Badminton	0	0																
FIBBN Am Body Nat				1	0			1	0	1	1						0	0
FIBiS - Biliards	0	0																
FIBS - Baseball & Softball	0	1		2	0	3	1	0	0	0	0	2	0	0	0			
FIC - Rowing	0	0						1	0	1	0	0	0	0	0	1	0	
FICK - Canoe Kajak	0	0		0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
FICSF canoe seat fixed	0	-													0	0	0	0
FIDAF - Amer.Football							1	0	1	0	0	0						
FIDAL - track and field	1	1		0	2	2	0	0	0	3	1	1	1	2	2	4	1	
FIDS - Dance Sport	0	0						0	0	0	0				1	0		
FIG - Golf	1	0					2	0	0	0	1	1						
FIGC - Football	7	1		2	0	5	1	1	0	0	0	0	0	2	0	3	0	
FIGH - Handball	4	0		1	1	1	0	3	0	0	0	1	1	0	0	0	0	
FIGMMA (Marti. Arts..)							1	1			0	1			0	0		
FIGS - Squash								0	0	0	0				0	0	0	0
FIH - Hockey	1	-		1	0	1	0	0	0									
FIHP Hockey & Skating	0	-									1	0			0	0		
FIJLKAMJ	2	1					1	0			0	0	1	0	1	0	0	0
FIKB FIKBMS Kick Box	0	-					0	1	2	1	0	0						
FIM - speedboat racing	0	-																
FIN -Swimming	0	0		1	0	1	0	1	0	2	1	0	0	1	0	0	0	
FIP - Basketball	0	1					1	0	0	0	0	0	2	0	1	0	1	0
FIPAV - Volleyball	0	1		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
FIPE - FIPCF Weights...				2	1	0	0	1	0	0	1						0	0
FIPL - Powerlifting																	0	1
FIPM -Modern Pentathlon															0	0		
FIPSAS - Game fishing	1	0		0	0			0	0	0	0				1	0		
FIR -Rugby	2	-		2	0	7	0	1	0	1	0	2	0	1	0	1	0	
FIS -Fencing	0	0		0	0	0	0	0	0	0	0	0	0				1	0
FISB -Bowling	0	-						0	0									
FISE - Equestrian sports	0	0						0	0				0	0				
FISG - Ice Sports	1	0		1	0	1	0	4	0	0	0	0	0	0	0	0	0	
FISI - winter Sports	0	0		3	0	1	0	0	1	0	1	0	0					
FISN - Water skiing	0	0																
FIT -Tennis	2	0		1	0	3	2	0	0	0	0	0	0	0	0	0	0	0
FITA - Taekwondo				0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
FITARCO -Arkery	0	1		1	1	0	0	0	0	3	0	0	0				1	0
FITAV	0	-								0	0	0	0					
FITeT - Table tennis	0	-		0	0	0	0	0	0									
FITRI -Triathlon	1	0		0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
FIV - Sailing	1	-						0	0	0	0	0	0					
FIWuK - Wushu Kung Fu	0	-											0	0				

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Sports Bodies 2007-2017	7		8-10		11		12		13		14		15		16		17	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FMI – Motorcycling	1	-																
FPI -Boxing	0	-							0	0	0	0	0	0			0	0
UISP (Italian Sport for all)	1	0			0	0					0	0						
UITS - shooting gallery	1	0									4	0						
U.A. ACLI					1	0												
WABBA – world amat. BB															0	1		

As concern the consumption of prohibited substances, over the year there is a difference between men and women. First of all, the data show a high consumption of doping substances in men instead of in women. In particular, men take more cannabinoids, stimulants, diuretics and other masking agents,

anabolic agents and hormones. In 2017 there was the highest number of men who took a substance: 27 athletes, in fact, took anabolic steroids. Different speech for women. In fact, for them there are irrelevant data with the exception of 2014 in which 10 women took diuretics (Table 2).

**Table 2.** Number of doped athletes from 2007 to 2017 breakdown by substance and by gender

Sports Bodies 2007-2017	7		8-10		11		12		13		14		15		16		17	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Cannabinoids	17	5	12	2	20	1	9	1	2	1	5	0	4	0	3	0		
Stimulants	11	1	8	5	9	4	4	0	16	0	5	0	4	0	10	0		
Diuretics and masking agents	5	4	17	3	7	6	6	0	17	10	2	4	2	3	4	1		
Anabolic agents	3	0	14	2	5	1	20	1	23	0	14	0	3	2	27	1		
hormones and related substances	3	0	3	0	7	1	11	0	16	0	3	0	4	0	2	0		
Corticosteroids	2	0	8	2	3	0	5	1	5	3	3	3	7	0	3	2		
beta blockers	1	0					1	0			4	0						
beta agonists			4	0	1	0	1	1	2	1	1	0	2	1	2	1		
Narcotics											1	0						
Hormonal and metabolic modulators													0	1	0	1	2	0

**Discussion**

The athletes can improve the effectiveness of using unconventional methods to improve sports performance in a Team Sport (Montesano & Mazzeo, 2018). The physical abilities of athletes-distinguished in coordination and conditioning abilities-are always evaluated according to their performance and their success both as individual and as a team (Montesano, Tafari, & Mazzeo, 2013).

Therefore, Doping or taking substances for the purpose of enhancing sports performance has a long history. Drug use has always been associated with men. Lots of researches demonstrate that in the past the consumption of drugs by women experienced more severe social disapproval from men. In the early era of modern sport scholars and practitioners are paying an increasing attention to gender diversity. The injection of drugs by men was even tolerated (Buccelli, Della Casa, Paternoster, Niola, & Pieri, 2016; Bobzean, DeNobrega, & Perrotti, 2014; Mazzeo et al., 2018).

Therefore, there are lots of studies based on the male population, as well as anti-doping tests mainly focus on males. But, over time, a wide use of drugs has also been observed in women. In fact, the 2015 European Drug Report of the European Monitoring Centre for Drugs and Drug Addiction indicated that approximately one in four users entering treatment are women and one out of every five drug-related-deaths is female (Buccelli et al., 2016; Calatayud, Alcaide, Zurian, & Benavent, 2007; Striegel, Ulrich, & Simon, 2010).

However, gender differences in drug intake depend on several factors: genetics, physiology, anatomy, and sociocultural expectations and experiences (Badoud et al., 2011; Mazzeo, 2016; Santamaria, 2016). Moreover, gender also influences the course and treatment of substance use disorder. Gender differences are in personal and psychological characteristics.

Women, unlike men, tend to pass more quickly from occasional consumption to addiction than men, they are looking for increasingly high doses of drugs, especially during periods of abstinence, tend to fall into recidivism, and are less likely to seek treatment (Stella et al., 2003).

At any rate, the effect gratification linked to the intake of drugs associates men and women (Heggie, 2010). Drugs, in fact, give pleasant sensations or help the subject in his activity. Moreover, people (equally men or women) with an ego orientation don't want to improve their self but only give the appearance of improvement (Tavani et al., 2012); they are aware that only with their own abilities can't excel over others. They, also, hate defeat and therefore, look for the victory in any way (Duda, Chi, Newton, Walling, & Catley, 1995; Duda, & Nicholls, 1992).

The International Olympic Committee (IOC) established a Medical Commission (IOC-MC) which had the task of designing a strategy to combat the misuse of drugs in Olympic Sport (Mazzeo et al., 2016). Moreover, in sportsmen and women, the first step to prevent the recourse to the doping is to extend the knowledge on it and in particular on its dangerous effects on health (Altavilla, Mazzeo, D'Elia, & Raiola, 2018; D'Elia, Mazzeo, & Raiola, 2018; Mazzeo & Raiola, 2018). Studies, should be carried out in order to improve our knowledge of the safety profile of drug use in male or female athletes, due to conflicting outcomes between gender differences.

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**Conflict of Interest**

The authors declare that there are no conflicts of interest.

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