


O R I G I N A L
Research

Milena Nasi, BSc, PhD, Roberta D'alisera, BD,
Andrea Cossarizza, MD, Emanuele Guerra, MD,
Gustavo Savino, MD, and Anna Vittoria Mattioli, MD, PhD 



Sex Difference in Access to Sports: A 1-Year Retrospective Study

Abstract: Purpose. Regular physical activity is a cornerstone in the prevention and treatment of cardiovascular disease thanks to its anti-inflammatory effects. Thus, favoring the access to sports is of importance for promoting well-being. The aim of the present study was to investigate how the practice of different sports is distributed among different age groups and between men and women, by taking a picture of the medical certificate request in 2017 for sports in the population of the province of Modena, Italy. Methods. We analyzed the difference in distribution of requested medical certificate from 18874 males and 7625 females stratified for age (<18 years, 18–40 years, and >40 years) and for different sporting disciplines (athletics, football, bike, swimming, basketball, volleyball, tennis, other team sports, other individual sports, and disabled sports). Results. Men requested medical certificates more than women (more than 2.5 times). The distribution of requested certificates differs significantly (*chi-square test* $P < .0001$) at different ages and between males and females of same age. Certificate for men aged less than 18 years were 7550 and for women were 4131 and

the difference increase with age. Conclusions. In order to decrease the imbalance between men and women access to sports, it is mandatory to promote a healthy lifestyle and reduce, as consequence, cardiovascular risks, mostly in women after 40 years.

Keywords: sport; life style; prevention; age; sex-differences

hypertension, stroke, metabolic syndrome, type 2 diabetes, and several chronic diseases.^{2–4} Regular physical activity is a cornerstone in the prevention and treatment of CVD due to its effects on reducing body weight, systolic and diastolic blood pressure, blood glucose, triglycerides, low-density lipoprotein cholesterol (LDL-C), and improving high-density lipoprotein cholesterol

 . . . mortality risk reduction is greater in women than in men for any given level of physical activity. 

An emerging body of evidence has highlighted the anti-inflammatory effects of exercise training, intended as physical activity for a specific purpose.¹ The proposed mechanisms of anti-inflammatory effects of exercise are the reduction of visceral fat mass, the increased production and release of anti-inflammatory cytokines from contracting skeletal muscle, and/or the reduced expression of Toll-like receptors (TLRs) on monocytes and macrophages.²

Several studies have demonstrated that regular physical activity reduces all-cause mortality, cardiovascular disease (CVD),

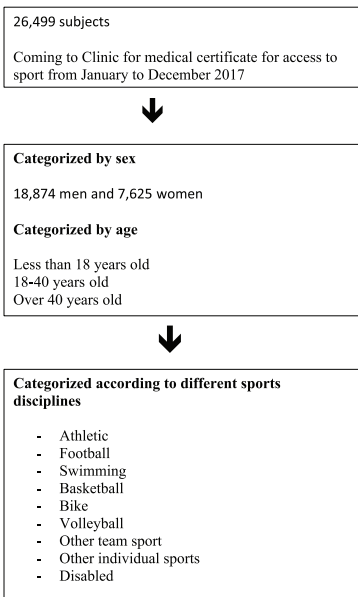
(HDL-C). We defined physical activity any body movement that increases oxygen consumption and can be performed during leisure activities or during work time. Exercise is defined as the physical activity that improves health or causes gains in performance benefits.^{2,3,5}

Physical activity is inversely associated with all-cause mortality in both genders, although the relationship is stronger in women than in men after adjustment for risk factors. In addition, mortality risk reduction is greater in women than in men for any given level of physical activity. The American College of Sport

DOI:10.1177/1559827620911610. From Department of Surgery, Medicine, Dentistry and Morphological Sciences, University of Modena and Reggio Emilia, Modena, Italy (MN, AV); National Health Service, Unit of Sports Medicine, Department of Public Health, AUSL Modena, Modena, Italy (RD, EG, GS); and Department of Medical and Surgical Sciences for Children and Adults, University of Modena and Reggio Emilia, Modena, Italy (AC). Address correspondence to: Anna Vittoria Mattioli, MD, Department of Surgery, Medicine and Dentistry, University of Modena and Reggio Emilia, Via Campi, 287–41124, Modena, 41100, Italy; e-mail: annavittoria.mattioli@unimore.it.

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Figure 1.**Participant flowchart**

Medicine (ACSM) recommends that most adults engage in “moderate-intensity cardiorespiratory exercise training for ≥ 30 min/day on ≥ 5 day/week for a total of ≥ 150 min/wk, or vigorous-intensity cardiorespiratory exercise training for ≥ 20 min/day on ≥ 3 day/week (≥ 75 min/wk).”⁵⁻⁷

The aim of the present study was to investigate how the practise of different sports is distributed among different age and between men and women, by taking a picture of the medical certificate request for sports in the population of the province of Modena, Italy.

Methods

Subjects

In this study, we analyzed the requested medical certificates from a total of 26 499 subjects for different sporting disciplines: athletics, football, bike, swimming, basketball, volleyball, tennis, other team sports, other individual sports, and disabled sports. In particular, we analyzed the request from 18 874 males and 7 625 females stratified

Table 1.

Number of Medical Certificates Requested in 2017 in the Province of Modena (Italy) by Males and Females, Stratified for Age and for Different Sporting Disciplines.

Sports	Males			Females		
	<18 y	18-40 y	>40 y	<18 y	18-40 y	>40 y
Athletics	222	713	917	188	213	303
Football	3607	2896	652	124	126	21
Biking	636	398	1162	34	55	76
Swimming	266	239	139	278	120	55
Basketball	692	231	45	156	59	1
Volleyball	623	416	165	1602	507	46
Tennis	379	298	427	436	88	57
Other team sports	518	336	65	156	75	3
Other individual sports	454	609	535	945	291	152
Disabled sports	153	435	21	212	70	3
Total	7550	6571	4128	4131	1604	717

for age: <18 years, from 18 to 40 years, and >40 years.

Design and Methodology

This is a retrospective and anonymous study; aggregate data were collected from private and public clinics in the province of Modena (Italy), during 2017. We collected data from the public clinics that examined about the great majority of subjects playing sports. Then we contacted private clinics for release of such certificates and collected data from their subjects. All data were rigorously anonymous and aggregate. We have no access to clinical data, just to age, sex, and sport discipline (see Figure 1 for a flowchart of the study).

Inclusion criterion was having a clinical certificate related to sport request.

Exclusion criterion was subject refusal to give information for statistical analysis of anonymous data.

Statistical Analysis

Categorical variables were compared between groups by chi-square test. A

P value <.05 was considered statistically significant. All data shown in the figures are represented as the mean. Statistical analyses were performed using Prism 6.0 (Graphpad Software Inc, La Jolla, CA, USA).

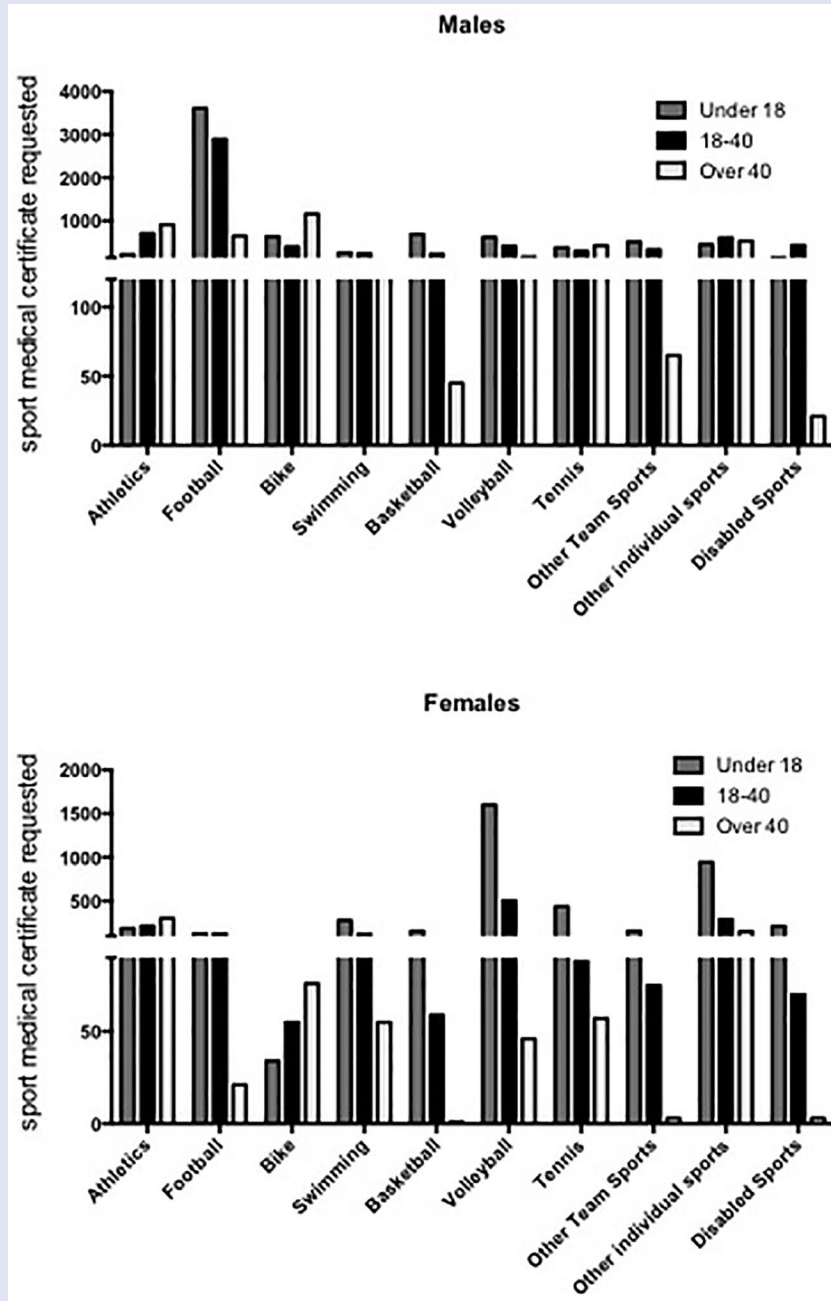
Results

Table 1 shows the number of requested medical certificates stratified for age (<18, 18-40, and >40 years), sex (males and females), and for different sports. The same data are reported as bar graph representation in Figure 2. As expected, the distribution among sports at different age and between males and females of same age differs significantly (chi-square test *P* < .0001). Certificates for men aged less than 18 years were 7550 and for women were 4131 and the differences increased with age leading to 4128 versus 717 for those older than 40 years.

Figure 3 shows the total medical certificates requested in 2017 in the province of Modena (Italy) by males and

Figure 2.

Bar graph representation of medical certificates requested by males and females, stratified for age and for different sporting disciplines.



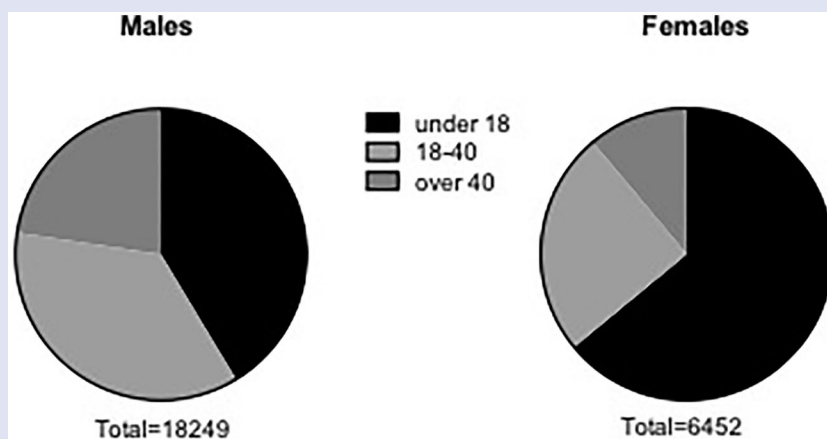
females, stratified for age. In this case also the distribution differs significantly between males and females (chi-square test $P < .0001$).

In addition, certificate requests for athletics has paradoxical results, increasing with age of subjects. In contrast, all other disciplines tend to

reduced requests except for biking, which is the most popular sports performed among men older than 40 years in our country.

Figure 3.

Pie chart of total medical certificates requested in 2017 in the province of Modena (Italy) by males and females, stratified by age. The distribution differs significantly between males and females (chi-square test $P < .0001$).



Discussion

The first point is that requests for sports certificates in 2017 are greater, almost triple, by males compared with females. In both sexes, the requests decrease with age but some substantial differences were observed: The decrease among males is quite progressive, losing 5.4% from age group “<18” to “18-40” and a 13.4% from “18-40” to “>40.” Conversely, in females, we observed a sharp drop, losing 39.1% from age group “<18” to “18-40” and 13.8% from “18-40” to “>40.”

Analyzing the different sports, the number of certificate requests for athletics is quite similar among age groups and between males and females. Males and females have the same trend for football, basketball, and other team sports, with a decrease among age groups. With regard to age, male requests are similar for sports such as swimming, volleyball, tennis, and biking, while females experienced a decrease in the first 3 sports. Biking is the only sports for which females requested more certificates with increasing age. The trend for disabled sports is the same among males and females. Figure 3 shows clearly that the decrease in certificate requests is dramatic after 18

years and this indicates a particularly serious trend considering that cardiovascular risk prevention in women is linked to age. Indeed, as recently published, this highlights the lifestyle paradox that exists in the prevention of cardiovascular risk factors in women.⁸ Physical activity is also gendered; among teenagers there is a sharp reduction in physical activity in girls but not in boys, and this difference continues into adulthood.⁹ Norms, rules, or expectations of behavior considered appropriate in a given culture, underlie these gendered behaviors. For example, some societies place explicit restrictions on women’s but not men’s freedom of movement and these restrictions may inhibit physical activity and promote sedentary behavior.

It is well known that physical exercise is recommended during life but it is of particular importance in women after menopause in order to reduce the effects of estrogen reduction on cardiovascular system.⁹ The lifestyle paradox refers to the increase in women’s work, social and family burden in developed countries in which cardiovascular diseases are the primary cause of mortality in women.⁸

There is a direct relationship between time spent sitting, physical activity, and CVD risk in postmenopausal women,

independent of leisure-time physical activity. Prolonged sitting time determines many detrimental adaptations, such as increased energy intake and reduction of skeletal muscle lipoprotein lipase activity that might explain its effect on cardiovascular risk factors.¹⁰⁻¹²

Women are generally more inactive than men. During menopause, most women tend to reduce their physical activity levels and together with the reduction in basal metabolic rate, they experience loss of skeletal muscle mass and bone mineral density, with a negative change in the ratio of fat-to-lean mass. Unfortunately, during perimenopause period, fat deposition shifts to visceral depot that, in addition to the decreased protective effect of estrogen, contributes to endothelial dysfunction, insulin resistance, and inflammatory state, all of which contribute to the development of atherosclerosis.¹³ Finally, a chronic low-grade inflammatory status, typical of the aging, also contributes to the onset of other comorbidities such as physical and cognitive disability, frailty, and premature death.¹⁴

The major limitation of the study is the retrospective design. We collected data from a local database that

registered the great majority of medical certificate requests related to sports. Another limitation is the lack of systematic information about spontaneous physical activity. These limitations lead to a possible underestimation of subjects performing sports and physical activity.

Practical Applications

In light of these data, it is mandatory to promote a call of action for women mostly after 40 years, in order to decrease the imbalance between men and women access to sports, favoring a healthy lifestyle and reduce, as a consequence, cardiovascular risks.

Conclusions

These data warn us and help us to understand that there is, and it is real, a difference between men and women, even of different ages, in access to sports, even in developed countries. It is therefore necessary to promote women's and girls' participation in sports.

Author Contributions

MN, AVM, and GS contributed to the study's concept. RDA and EG performed the collection of data. MN performed the statistical analyses. MN, AVM, and GS contributed toward the collection and interpretation of the data. MN, AVM, and AC contributed to writing the article. All authors contributed to the critical review of the article.

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Ethical Approval

Local Ethical Review Board approved study.

Informed Consent

Participants signed an informed consent.

Trial Registration

Not applicable, because this article does not contain any clinical trials.

ORCID iD

Anna Vittoria Mattioli  <https://orcid.org/0000-0003-1487-9530> 

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