ECONOMIC DISCUSSION PAPERS
3/2024

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Available online at: https://economia.uniovi.es/investigacion/documentos

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Abstract

Previous research has demonstrated the correlation between demographic, economic, and lifestyle factors and leisure choices. Despite adjustments in work-life balance and the distribution of household tasks, the gender gap in sports participation remains highly persistent. Health-enhancing physical activity plans should increasingly target key factors behind the gap. We aim to identify such factors by decomposing gender differences into those resulting from observable characteristics and those arising from other sources of disparity between genders. The paper utilizes data from the 2021-2022 Survey on Cultural Habits and Practices, encompassing information from 14,524 individuals. Among the observed characteristics, we specifically examine capital, education, employment, marriage, childcare, family responsibilities, and leisure choices. First, we estimate a two-part logit model with separate equations to examine the determinants of participation and frequency of participation. Second, we use the Oaxaca-Blinder method to decompose gender differences in participation and frequency rates. The results reveal that the largest portion of the gender gap is unexplained by observable characteristics. However, differences in childcare duties, age, and education affect women's sports participation and frequency differently. This decomposition is particularly valuable as it helps identify opportunities for action. The implications of the results extend to research, public administrations, and private initiatives aiming to tailor physical activity programs to reduce the gender gap.

Keywords: sport participation, gender, logit, Oaxaca-Blinder decomposition, policy

JEL Code: D12, J16, I10, Z20, Z28

Funding: The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Conflict of interest: The authors have no relevant financial or non-financial interests to disclose.

1. Introduction

How to spend our free time is a meaningful decision, as we spend a substantial part of our lifetime engaging in leisure activities (Bittman and Wajcman, 2000; Glorieux et al., 2010), which can even determine quality of life (Lee et al., 2014). In fact, some leisure practices have psychological, health, sociological, environmental, and economic benefits (Sullivan, 2001; Ball et al., 2007; Vandelanotte et al., 2009; Zhou and Peng, 2018). Not all leisure options are equally beneficial (Vandelanotte et al., 2009; Glorieux et al., 2010; Kremer et al., 2014). Physically active leisure choices are associated with better health (Roy and Orazem, 2021), and leisure-time physical activity has been shown to reduce the risk of all-cause mortality (Arem et al., 2015). However, health issues arising from sedentary jobs and lifestyle continue to grow (Tudor-Locke et al., 2011; Carr et al., 2016; Friedenreich et al., 2021) and, specifically women, tend to exhibit lower levels of participation in leisure physical activity (see, e.g., Mielgo-Ayuso et al., 2016).

Despite work-life balance adjustments and household task distribution, women continue to perform most of the household tasks and childcare (Álvarez and Miles-Touya, 2019; Blau et al., 2020) which may impact not only labor decisions (Le Barbanchon, Rathelot, and Roulet, 2021; Goldin, 2014; Herrarte, Moral-Carcedo, and Sáez, 2012), but also free time allocation. Although international organizations implement projects and coordinate health-enhancing physical activity plans with a focus on gender equality (Commission, 2023; Talleu, 2016; WHO, 2018), the "leisure gender gap" (Beck and Arnold, 2009; Hochschild and Machung, 1989) in sports practice is highly persistent (Lera-López and Suárez, 2019). We argue that such projects and plans should increasingly target groups that lag behind (Manrai and Manrai, 1995; Tepper, 2000; Bittman and Wajcman, 2000; Downward et al., 2014; Kremer et al., 2014; Zhou and Peng, 2018) by addressing the underlying factors behind the gap. Much research is needed to decompose the gender gap, assess the relative influence of specific factors on observed differences, and assist policy efforts.

We use Oaxaca (1973) and Blinder (1973) method to decompose the gender gap into the part that can be explained by different characteristics between men and women, and the part explained by different coefficients, meaning how the effect of different variables translate into distinct participation decisions. To do so, we use data from 14,524 individuals (7,096 men and 7,428 women) who took part in the 2021-2022 Survey on Cultural Habits and Practices (SCHP) in Spain. First, we study sports habits by estimating a two-part logit

model separately for men and women, in which we first examine the probability of participating in sports activities, and then, for the participants, we analyze the frequency of participation. Second, we employ the Oaxaca-Blinder method to decompose the observed gender differences in both sports participation and frequency rates. While this method has often been used to analyze wage inequality and discrimination in the labor market (e.g., Blau and Kahn, 2017), we use the properties of the model to identify drivers of the gender gap in sports participation (Rahimi and Hashemi Nazari, 2021).

Consistent with previous research, the results show that women are less likely to participate in sports (e.g., Eberth and Smith, 2010; Lera-López and Suárez, 2019) and we observe substantial differences by gender. For example, we find that age, childcare duties, and employment status affect women and men differently. Other leisure options such as reading, watching films/series, and digital activities, are rather complementary to sports participation. According to the decomposition, the largest part of the gender gap in sports participation is unexplained by observable characteristics or leisure preferences (3.6% of the gap). Policies and campaigns aimed at bridging the gender gap in sports practice should engage women generally, and occasionally, target specific groups or include measures that can alleviate work and household responsibilities.

The rest of the paper is structured as follows: Section 2 reviews the literature on the factors that correlate with higher levels of sports participation and alternative leisure activities. Section 3 describes the data and provides some descriptive statistics. Section 4 explains the methodological approach. Section 5 reports the estimation results, and Section 6 discusses the main findings, practical implications, and the limitations and challenges for future research. Finally, Section 7 concludes the paper.

2. Literature Review

Leisure activities are a predictor of quality of life (Lee et al., 2014). Activities such as reading books or practicing physical exercise have advantages over other leisure practices, like watching TV, partly because of social connectedness (Toepoel, 2013). The reasons why people choose certain leisure activities have received much research attention, particularly the choices of women and men.

As explained by Avital (2017), gender influences participation in leisure activities (Janke et al., 2006; Van Tuyckom and Scheerder, 2010). Women have less leisure time (Bittman and Wajcman, 2000) and participate

in activities they are more interested in (Janke et al., 2006; Ball et al., 2007). Men, however, participate more in leisure activities because they have more free time and economic resources (Tuyckom et al., 2013; Haller et al., 2013). This relationship also differs by type of activity, typically finding women participating more in cultural activities (Coulangeon, 2013; Suarez-Fernandez and Boto García, 2022; Suarez-Fernandez et al., 2022) and men in physical activities (Breuer and Wicker, 2008; Hovemann and Wicker, 2009; Eberth and Smith, 2010; Lera-López and Suárez, 2019).

Regarding sports practice, there are several literature reviews on the theoretical approaches, the main empirical results and/or the methodologies applied (e.g. Cabane and Lechner, 2015; Downward and Muñiz, 2019). From a theoretical point of view, most studies take neoclassical models of rational choice as their starting point. In this framework, individuals decide about their optimal consumption and allocation of time seeking to maximize their utility conditional on their monetary and time constraints. In this framework, physical activity is analyzed as a leisure activity with either a positive impact on individual welfare or an indirect impact because of health. Therefore, differences in sports participation may be due to different tastes, time constraints, or economic conditions. However, other authors consider sociological or psychological theories that focus on how individual preferences are formed (Downward, 2007; Downward and Riordan, 2007). Also, the interdisciplinary ecological model considers a wide range of physical and environmental attributes in which individuals make their decisions (Hoekman et al., 2017; Sallis et al., 2006).

Previous studies find conclusive evidence that gender plays a significant and consistent role in participation; men are more likely to engage in sports activities than women in most European countries (Van Tuyckom et al., 2010). The evidence is also extensive in Spain (García et al., 2011; Kokolakakis et al., 2012; Muñiz et al., 2014; Lera-López and Suárez, 2019). However, the gender gap in participation may even be reversed when analyzing specific types of exercise, such as walking (e.g., García et al., 2016), and the evidence is mixed in the analysis of the frequency of practice conditional on participation.

Research also finds other demographic factors playing a significant role but showing inconsistent dynamics across settings and specifications. While low income may prevent from participating (Breuer and Wicker, 2008; Downward and Rasciute, 2011; Muñiz et al., 2014; Wicker et al., 2009), some studies do not find an influence on the frequency (Gratton and Taylor, 2000). Labor status is also complex since work competes with leisure in the time-allocation process. Some find being employed harms participation (Breuer and Wicker,

2008; Downward and Riordan, 2007; Eberth and Smith, 2010), and others find an opposite influence (Wicker et al., 2009). Regarding family situation, married people tend to participate less in sports (Downward and Riordan, 2007; Eberth and Smith, 2010; Hovemann and Wicker, 2009). Regarding education, a positive relationship is typically observed; higher education levels correlate with higher participation figures (Breuer and Wicker, 2008; Downward and Riordan, 2007; Downward and Rasciute, 2011; Eberth and Smith, 2010; Hovemann and Wicker, 2009; Wicker et al., 2009).

Most research shows a negative impact of age on the probability of participating in sports. Another demographic factor whose influence is consistent across settings and specifications is nationality. Individuals with a foreign background are less likely to participate in sports (van Bottenburg et al., 2005; Johnston et al., 2007; Higgins and Dale, 2013; van Haaften, 2019), and face entry barriers (Nesseler et al., 2019; Gomez-Gonzalez et al., 2021).

The characteristics of the cultural participant have also been widely analyzed in the literature (Perez-Villadoniga and Suarez-Fernandez, 2019; Suarez-Fernandez et al., 2020; De la Vega et al., 2020; Suarez-Fernandez and Boto-García, 2022; Suarez-Fernandez et al., 2022). However, little is known about how participation in other leisure and cultural activities influences the likelihood of practicing sports. A few exceptions exist as some research incorporates leisure-related variables in the estimations or jointly analyzes participation in sports and culture.

In particular, Downward (2007) studies the correlates of the probability of sports participation and includes a dummy to measure participation in other arts and leisure activities (such as reading, painting, watching TV, or listening to the radio) as an additional explanatory variable. He finds a positive influence on participation. Also, Downward and Rasciute (2016) show a positive effect of the number of other leisure activities –including culture and other types of leisure- on physical activity participation. Munñiz et al. (2011), Hallmann et al. (2017), and Suarez Fernandez and Muñiz (2021) applied a different approach, consisting of the joint estimation of the probabilities of cultural and sports participation, allowing for unobservable factors that may influence both decisions. The three studies report a significant positive correlation coefficient between sports and cultural participation. These results suggest that there is no substitution effect between cultural and sports participation, but, on the contrary, there may be some complementarity, in the sense that the consumption of culture does not reduce sport participation, but rather the opposite.

3. Database

The database used in this paper is the Survey on Cultural Habits and Practices (SCHP), conducted in Spain between 2021 and 2022[1]. The primary advantage of using this survey is that it enables us to analyze the potential interdependencies among various alternative uses of leisure time, whether it be dedicated to sports or other forms of entertainment, such as watching TV or reading a book. The sample is a cross-section containing 14,524 individuals aged 15 and over, and it is produced on a three-year basis (División de Estadística y Estudios, 2022)[2].

The SCHP includes the following question regarding sports participation: "Do you usually participate in sports?". Accordingly, we consider "participants" those declaring positive participation in sports and "non-participants" those who do not. Participants were also asked about the frequency of their participation, specifically, "How often do you usually participate in sports?". Table 1 displays the reported frequency of sports participation by gender. Considering the frequency rates, we classified individuals into two groups: those participating daily (high frequency) and the rest (low frequency). It highlights that more than half of the women in the sample, almost 55%, never participate in sports, compared to less than 45% of non-participation in the case of men, as it is common in the literature (see, for example, Downward and Rasciute, 2011).

Table 1: Frequency of sports participation by gender.

Frequency	Men		Women		Total	
(0) Never	3,137	44.21%	4,074	54.85%	7,211	49.65%
(1) Monthly or less	184	2.59%	100	1.35%	284	1.96%
(2) Each week	1,915	26.99%	1,719	23.14%	3,634	25.02%
(3) Daily	1,860	26.21%	1,535	20.67%	3,395	23.38%
N	7,096		7,428		14,524	

Table 2 summarizes the descriptive statistics of all variables included in the empirical analysis. Regarding the variable Responsibilities, it is worth noticing that individuals were not explicitly asked about their reasons for not participating more in sports due to family responsibilities. However, they were asked, "Could you tell me the reason that most influences why you do not attend cultural activities more frequently?"

[1] This survey is prepared by the Division for Statistics and Studies, General Technical Secretariat Ministry of Culture and Sport in Spain, with the collaboration of the Spanish National Statistics Institute (INE).

[2] Please note that this wave of the survey is affected by the impact of the COVID-19 crisis, which occurred during the reference period. However, it's important to highlight that the activities analyzed in this article could be practiced at home and were not as restricted during the lockdown compared to activities such as attending theaters, cinemas, or visiting museums, which require in-person attendance. For example, when comparing the frequencies of reading and watching TV between the waves from 2018-2019 and 2021-2022, both activities only show a reduction of 1-4%.

with one of the alternative answers being, "I find it difficult to leave the house (childcare, elderly, etc.)".[3] We assume that these responsibilities may also correlate with fewer sports participation opportunities. As regards the variable capital, given the lack of information on earnings, we approximate family wealth by using an index of cultural capital at home.[4] We also include the quadratic term of this variable to account for possible non-linearities. Finally, both equations include regional control dummies for NUTS-2 (autonomous communities), although they do not appear in the table.

Regarding socio-demographic characteristics, on average, women tend to have a higher level of education, a higher probability of family responsibilities, and a lower employment rate. As for the variables accounting for participation in leisure activities, as is typically found in the literature, more women engage in reading, 51%, compared to 42% of men (Suarez-Fernandez and Boto-García, 2022). However, the differences in participation in the remaining leisure activities are minimal.

Table 2: Descriptive characteristics by gender: full sample and subsample of participants.

		Full sample		Participants	
Variable	Description	Men	Women	Men	Women
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Sport	Frequency of sport participation	1.35 (1.28)	1.09 (1.27)	2.42 (0.58)	2.43 (0.55)
Age	Age of the respondent	48.58(18.41)	50.77(19.14)	44.33(17.29)	46.67(17.54)
Primary	Dummy primary education	0.42 (0.49)	0.43 (0.49)	0.33 (0.47)	0.33 (0.47)
Secondary	Dummy secondary education	0.37 (0.48)	0.33 (0.47)	0.40 (0.49)	0.37 (0.48)
Tertiary	Dummy tertiary education	0.22 (0.41)	0.24 (0.43)	0.26 (0.44)	0.31 (0.46)
Capital	Household capital index	0.03 (0.90)	-0.03 (0.91)	0.24 (0.85)	0.21 (0.85)
Injury	Dummy severe injury	0.02 (0.15)	0.03 (0.18)	0.01 (0.11)	0.02 (0.13)
Illness	Dummy long-term illness	0.20 (0.40)	0.26 (0.44)	0.14 (0.35)	0.19 (0.39)
Spanish	Dummy Spanish nationality	0.93 (0.26)	0.94 (0.25)	0.94 (0.24)	0.94 (0.23)
Children 0-9	Number of children aged 0-9	0.13 (0.39)	0.13 (0.40)	0.23 (0.61)	0.22 (0.60)
Children 10-14	Number of children aged 10-14	0.21 (0.60)	0.22 (0.58)	0.14 (0.41)	0.16 (0.43)
Teenagers 15-18	Number of teenagers aged 15-18	0.12 (0.37)	0.13 (0.39)	0.15 (0.40)	0.16 (0.43)
Married	Dummy married	0.59 (0.49)	0.56 (0.50)	0.55 (0.50)	0.56 (0.50)
Single	Dummy single	0.38 (0.49)	0.40 (0.49)	0.43 (0.50)	0.42 (0.49)

[3] The activities considered are attending classical music concerts, popular music concerts, ballet, opera, Spanish operetta, theatre, circus, cinema, museums.

[4] This method has been applied to mitigate the effect of missing income variables in similar studies, see, for example, (Borowiecki and Prieto-Rodriguez, 2015; De la Vega et al., 2020; Suarez-Fernandez et al., 2022). Following Fernández-Blanco and Prieto Rodríguez (2009), we conducted a Factor Analysis for cultural capital to proxy household income. We included the number of CDs, audio equipment, DVDs, visual equipment and computers, and dummies for having music, camera, video camera, video, memory and playing equipment. The coefficient for the first factor is positive for all considered variables and, consequently, first factor analysis predicts that the cultural capital is positively correlated with the variables that we contemplate. The eigenvalue of the first factor is 2.919 and the Kaiser-Meyer-Olkin measure of sampling adequacy is 0.8411, meaning that the adequacy is meritorious (Kaiser, 1974). The results of the factor analysis for cultural capital are available upon request.

Responsibilities	Dummy family responsibilities	0.07 (0.25)	0.11 (0.32)	0.05 (0.22)	0.09 (0.28)
Employed	Dummy employed	0.56 (0.50)	0.48 (0.50)	0.62 (0.49)	0.54 (0.50)
Unemployed	Dummy unemployed	0.09 (0.28)	0.10 (0.31)	0.09 (0.29)	0.11 (0.31)
Retired	Dummy retired	0.25 (0.43)	0.23 (0.42)	0.17 (0.37)	0.16 (0.36)
Disabled	Dummy disabled	0.01 (0.11)	0.01 (0.09)	0.01 (0.08)	0.01 (0.07)
Student	Dummy student	0.08 (0.27)	0.09 (0.28)	0.12 (0.31)	0.11 (0.31)
House	Dummy house chores	0.01 (0.07)	0.08 (0.27)	0.01 (0.11)	0.08 (0.27)
Reading	Dummy reading	0.42 (0.49)	0.51 (0.50)	0.49 (0.50)	0.62 (0.49)
TV	Dummy watching TV	0.86 (0.35)	0.87 (0.34)	0.84 (0.37)	0.85 (0.35)
Films	Dummy watching series or films	0.76 (0.43)	0.74 (0.44)	0.82 (0.39)	0.82 (0.39)
Digital	Dummy videogames, internet, PC	0.86 (0.35)	0.82 (0.39)	0.92 (0.27)	0.90 (0.30)
N	Observations	7,096	7,428	3,775	3,254

4. Methodology

4.1. Two-part model

Considering that the question about sports participation in the survey asks about regular participation, we have specified a two–part model for the participation and frequency variables. This specification assumes that all zeros can be understood as non-potential participants, and no zeros are related to corner solutions, which could be the case if the question was about practicing sport during the last week, for instance. This assumption discards specifications like the double hurdle or zero-inflated models, which consider the possibility of both types of zeros. We also prefer the two-part model to the sample selection model, which considers zeros associated with non-potential participants because the frequency equation refers to the population of sports participants, not the overall population.

Therefore, the final estimation corresponds to two separate binary models: one for participation (Participation) using the whole sample (N=7,096 for men and N=7,428 for women) and the other one for the frequency variable (Frequency), with the subsample of sports participants (N=3,775 for men and N=3,254 for women). We have reduced the frequency variable to two categories because some values in the original frequency variable were not much represented, as indicated in Table 2. Furthermore, we opt for Logit models because its statistical performance is better than the Probit models, although the results do not differ much between both specifications.

4.2. Oaxaca-Blinder decomposition

Since the participation and the frequency rates are significantly different between males and females, as shown in Table 2, we run separate estimates for both genders. This could help us to explain whether the observed gender differences between the rates could be explained by either the different characteristics of both subsamples - in terms of the explanatory variables- or the different coefficients associated with these variables. This is what the Oaxaca-Blinder decomposition does for a linear regression model, where one wants to decompose the difference of the mean values of the dependent variable. 5 But in this case, we have a binary discrete choice model where the probability of being a sports practitioner is not a linear function of the explanatory variables.

Nevertheless, one of the properties of the Logit model, which the Probit model does not satisfy, is that the mean value of the adjusted probabilities of choosing one of the alternatives equals the proportion of the observations in the sample choosing that alternative. Consequently, we can write the difference in the sports participation (frequency) rates between males (M) and females (F) in the Logit model as follows:

$$\bar{Y}_M - \bar{Y}_F = \overline{F\left(X_M'\hat{\beta}_M\right)} - \overline{F\left(X_F'\hat{\beta}_F\right)} \quad (1)$$

where Y is a dummy equal to 1 for sports participants (or daily frequency) and equal to 0 otherwise, $\bar{Y}_M$ is the proportion of males in the sample who are sports participants (or whose frequency is daily) and similarly for females ($\bar{Y}_F$), F is the distribution function of a logistic distribution, X is the vector of explanatory variables, $\hat{\beta}$ is the vector of estimated coefficients and $F\left(X_M'\hat{\beta}_M\right)$ is the probability of a male being a sports participant (or practicing sports daily), and similarly for females.

By adding and subtracting $\overline{F\left(X_M'\hat{\beta}_F\right)}$, we can rewrite equation (1) as:

$$\bar{Y}_M - \bar{Y}_F = \underbrace{\overline{F\left(X_M'\hat{\beta}_F\right)} - \overline{F\left(X_F'\hat{\beta}_F\right)}}_{\text{A}} + \underbrace{\overline{F\left(X_M'\hat{\beta}_M\right)} - \overline{F\left(X_M'\hat{\beta}_F\right)}}_{\text{B}} \quad (2)$$

where component (A) is that part of the difference in the participation (or frequency) rates between males and females, which can be explained by differences in the characteristics of both genders, and (B) is that part explained by differences in the coefficients.

The decomposition in (2) is particularly interesting in this context since the part of the gender differences in participation (frequency) rates explained by differences in the coefficients (component B) can be linked to

the domains or characteristics to which policies should be directed to promote sports participation. Coefficients can be understood as the way characteristics are "translated" into the probability of sports participation (or the frequency). Therefore, if the coefficient for a particular variable differs between males and females, there is room for policy measures to reduce the gap in the participation (frequency) rate.

Then, one would be interested in finding the contribution of each variable (or group of variables) into the two components of the total difference in participation (frequency) rates. By using the command oaxaca in Stata (Jann, 2008), we take advantage of the proposal by Yun (2004) to work out the detailed decomposition of both components. In particular, and based on a first-order Taylor series expansion to linearize the characteristics and the coefficient effects, we end up with:

$$\bar{Y}_M - \bar{Y}_F = \sum_{k=1}^{K} W_{\Delta X}^{k} \left[\overline{F\left(X_M'\hat{\beta}_M\right)} - \overline{F\left(X_F'\hat{\beta}_M\right)}\right] + \sum_{k=1}^{K} W_{\Delta\beta}^{k} \left[\overline{F\left(X_F'\hat{\beta}_M\right)} - \overline{F\left(X_F'\hat{\beta}_F\right)}\right] \quad (3)$$

where K is the number of explanatory variables in the corresponding model and $W_{\Delta X}^{k}$ and $W_{\Delta\beta}^{k}$ are the proportion of the component A and component B, respectively, which can be associated with the k-th explanatory variable (or group of explanatory variables). The expressions according to the approximation by Yun (2004) are very simple and intuitive:[5]

$$W_{\Delta X}^{k} = \frac{(\bar{X}_M^k - \bar{X}_F^k)\beta_M^k}{(\bar{X}_M - \bar{X}_F)'\beta_M} \quad (4)$$

$$W_{\Delta\beta}^{k} = \frac{\bar{X}_F^k(\beta_M^k - \beta_F^k)}{\bar{X}_F'(\beta_M - \beta_F)} \quad (5)$$

where $\sum_{k=1}^{K} W_{\Delta X}^{k} = \sum_{k=1}^{K} W_{\Delta\beta}^{k} = 1$.

5. Estimation Results

This Section presents the results of the econometric analysis. Table 3 displays the results for the logit equation regarding participation (columns 1 and 2) and the frequency of sports practice (columns 3 and 4) for men and women. Then, Table 4 presents the Oaxaca-Blinder decomposition of the differences between genders.

[5] Similar decompositions for the Probit model have been used by some other authors (Yun, 2000; Gang et al, 2002).

5.1. Logit models for participation and frequency

Table 3 shows that demographic factors and leisure choices are correlated with sports participation (columns 1 and 2). Positive signs indicate that the variable is correlated with participating in sports. We observe that age, having experienced serious injuries or long-term illnesses, and family responsibilities negatively impact the probability of both men and women participating in sports. On the contrary, we find that the level of household capital (although its effect is decreasing), having Spanish nationality, having higher education levels compared to primary education or lower, and engaging in other leisure activities such as reading, watching series or films, and digital entertainment are positively correlated with sports participation.

The relations mentioned above are consistent for men and women, although the magnitude slightly differs for some variables. However, we find two family characteristics that greatly differ by gender. On the one hand, the number of children aged 0 to 9 at home does not significantly influence men but correlates with lower chances of women participating in sports. On the other hand, we find that the number of teenagers aged 15 to 18 does not significantly influence sports participation for women, but it makes men more likely to practice sports. In general, the employment situations considered do not have a statistically significant different effect (only being disabled has a negative correlation with women's participation in sports).

Table 3 also presents the results for the frequency of participation once individuals are participants (columns 3 and 4). A positive sign indicates a higher probability of engaging in sports daily, rather than engaging with lower frequency. In general, our results show weaker correlations and more disparities by gender. We observe that age increases the frequency of sports practice, but only for women, and the same applies to being Spanish, but only for men. The number of children aged 0-9 and 10-14 penalizes men's daily participation rates significantly, while marriage significantly reduces participation frequency for women. Compared to lower levels of education, women achieving a tertiary education level show a negative correlation with practicing sports daily. Regarding labor situations, having a job or being a student correlates with a low frequency of sports practice for women. Being employed also correlates with a low rate of sports practice in men, although the significance is weaker. Regarding other leisure choices, watching TV and digital activities are correlated with a low participation frequency for both genders.

Table 3: Logit models.

	Participation in sports				Frequency of practice			
	Men (1)		Women (2)		Men (3)		Women (4)	
Age	-0.0204***	(-9.23)	-0.0097***	(-4.66)	-0.0007	(-0.25)	0.0114***	(3.62)
Capital	0.2952***	(7.81)	0.3273***	(9.03)	-0.0806	(-1.53)	-0.0068	(-0.12)
Capital x Capital	-0.1058***	(-3.60)	-0.1360***	(-4.56)	-0.0178	(-0.45)	-0.0107	(-0.23)
Serious injury	-0.5100***	(-2.62)	-0.3524**	(-2.05)	0.0930	(0.28)	-0.0498	(-0.17)
Long term illness	-0.4020***	(-5.61)	-0.2926***	(-4.46)	-0.0084	(-0.08)	-0.1385	(-1.36)
Being Spanish	0.3359***	(3.32)	0.1902*	(1.83)	0.2982**	(2.02)	-0.1287	(-0.80)
Children 0-9	-0.0171	(-0.38)	-0.1811***	(-3.87)	-0.1560**	(-2.49)	-0.0532	(-0.81)
Children 10-14	-0.0618	(-0.91)	-0.0084	(-0.13)	-0.2087**	(-2.39)	-0.0005	(-0.01)
Teenagers 15-18	0.1627**	(2.08)	0.0094	(0.14)	-0.0533	(-0.58)	-0.0850	(-0.92)
Married	-0.0356	(-0.58)	-0.0297	(-0.53)	-0.0460	(-0.55)	-0.2048**	(-2.45)
Family responsibilities	-0.2363**	(-2.17)	-0.1850**	(-2.20)	0.1413	(0.89)	-0.0172	(-0.13)
Education level: reference category primary education or lower								
Secondary	0.2360***	(3.81)	0.1283**	(2.05)	0.1251	(1.49)	-0.0307	(-0.33)
Tertiary	0.5245***	(6.99)	0.3809***	(5.32)	0.0318	(0.33)	-0.1865*	(-1.79)
Employment status: reference category house chores or other labor situation								
Employed	0.0857	(0.38)	-0.0997	(-1.01)	-0.5694*	(-1.78)	-0.4838***	(-3.26)
Unemployed	0.0327	(0.14)	-0.0478	(-0.41)	-0.1659	(-0.49)	0.0373	(0.21)
Retired	0.1435	(0.62)	-0.0717	(-0.68)	0.2604	(0.79)	0.1915	(1.15)
Disabled	-0.5516	(-1.64)	-0.5625*	(-1.81)	-0.8707	(-1.63)	0.2651	(0.51)
Student	0.2622	(1.03)	-0.1003	(-0.70)	-0.0698	(-0.20)	-0.4091**	(-1.99)
Leisure activities:								
Reading	0.3192***	(5.72)	0.4285***	(8.13)	0.0636	(0.90)	0.0004	(0.01)
TV	0.0689	(0.90)	0.0268	(0.36)	-0.1727*	(-1.84)	-0.0677	(-0.64)
Movies	0.2850***	(4.41)	0.3251***	(5.10)	-0.1139	(-1.24)	0.1356	(1.35)
Digital	0.2099**	(2.28)	0.1571*	(1.80)	-0.3005**	(-2.06)	-0.2786*	(-1.90)
Constant	0.1596	(0.53)	-0.2414	(-1.09)	0.8220**	(1.96)	0.4696	(1.40)
Observations	7,096		7,428		3,775		3,254	

Notes: a. t statistics in parentheses * p < .10, ** p < .05, *** p < .01. b. Region fixed effects are included in all models.

5.2. Oaxaca-Blinder decomposition of gender differences

The Oaxaca-Blinder decomposition helps us identify the portion of differences in sports participation explained by distinct characteristics between men and women, and the portion explained by how these characteristics translate into different participation rates for men and women. Table 4 provides the results of the Oaxaca-Blinder decomposition for gender differences in both participation and the frequency of sports practice. According to the upper panel of Table 4, the differences in sports participation between women and men are statistically significant: while almost 56% of men participate in sports, this proportion is roughly 11 percentage points lower for women.

As Table 4 shows, these differences in the sports practiced by men and women (0.1064) are not due to their different characteristics, as the explained part (0.0038) is not significantly different from zero, accounting for only 3.57%. On the contrary, differences in coefficients account for 96.33% of the participation gap. Therefore, the gender gap is primarily attributable to the differential effect (distinct coefficient) of age between genders and, above all, due to the constant term (0.1464), which encompasses all intrinsic aspects of being male or female not captured by our variables. These inherent aspects may include social context, education, habits developed in childhood, or inherited from parents, and they are the main source of the gender gap.

Regarding sports participation frequency, once being a participant in sports, the observed gap is much lower, around two percentage points. In fact, we observe that the explained part, i.e., the characteristics, contributes to narrowing the gender gap (-0.0115). Therefore, this gap would be even greater if not for the socioeconomic characteristics of the surveyed men and women influencing the observed differences. Due to these characteristics narrowing the gap, the observed disparity in favor of a greater frequency of sports in men is mainly explained by different coefficients and the constant term, contributing to a 154% higher frequency for men. This means that, if it were only for their observed characteristics, women would participate with a higher frequency, but the contribution of the coefficients (particularly, the constant term) more than compensates for that potential outcome.

Panels A and B in Table 4 display the decomposition of these gender differences by variables or groups of variables. First, Panel A shows the differences explained by different observed characteristics. We find that education and leisure habits narrow the gender gap in sports participation, while age, capital, and health stretch the gap; however, the overall effect of the characteristics is offset by the different signs of these variables. As for participation frequency, both labor and age contribute to reducing gender disparities.

Second, Panel B shows the contribution of the differences in coefficients to gender differences (i.e., the portion being unexplained by different characteristics).[6] We find that age coefficients play a significant role in the observed differences for both participation and frequency. The negative sign of age implies that there would be an even greater gender difference if age would affect the participation of both groups equally. We also find that being Spanish has a positive sign, meaning that nationality is more influential in men's frequency of practice.

[6] We use as reference the coefficients of women.

Notably, the family characteristics of individuals do not contribute significantly to the gender gap in Table 4. This is because the effect of being married is negative for both women and men, and the difference between these two negative coefficients is not significantly different between genders. Therefore, a sports policy aimed at promoting sports among married individuals would have an incremental effect on sports for both genders, even though its impact would be greater for women, as can be observed by examining the coefficients of the variable "married" in Table 3.

Finally, in both equations, the constant term has the highest effect on the gender gap, being the factor that most contributes to the differences in sports participation and frequency among genders. The constant captures the effect of intrinsic differences between women and men and the effect of unobserved variables, such as social and cultural habits, lifestyles, or inherited routines, that are not accounted for with the variables included in the analysis. Therefore, any policy or information campaign targeting or encouraging women specifically to engage in sports practice will likely help reduce the observed gender gap.

Table 4: Oaxaca-Blinder decomposition.

	Participation		Frequency	
Overall differences				
Men	0.5579***	(94.97)	0.4927***	(60.57)
Women	0.4515***	(78.05)	0.4717***	(53.96)
Difference	0.1064***	(12.90)	0.0210*	(1.76)
Explained	0.0038	(1.01)	-0.0115**	(-2.19)
Unexplained	0.1025***	(12.52)	0.0325***	(2.62)
Panel A. Explained by characteristics				
Age	0.0032**	(2.13)	-0.0061***	(-3.03)
Capital	0.0035**	(2.04)	-0.0001	(-0.29)
Health	0.0027**	(2.27)	0.0016	(1.38)
Spanish	-0.0002	(-1.19)	0.0001	(0.40)
Education	-0.0007*	(-1.68)	0.0015	(1.58)
Family	0.0015	(1.57)	0.0008	(0.55)
Labor	-0.0015	(-1.36)	-0.0077***	(-2.63)
Leisure	-0.0048***	(-3.74)	-0.0014	(-0.51)
Region	0.0002	(0.33)	-0.0003	(-0.15)
Panel B. Unexplained due to coefficients				
Age	-0.1145***	(-3.51)	-0.1306***	(-2.82)
Capital	0.0052	(0.70)	-0.0054	(-0.54)
Health	0.0239	(0.89)	-0.0281	(-0.55)
Spanish	0.0138	(1.01)	0.0455**	(1.96)
Education	-0.0030	(-1.21)	-0.0010	(-0.46)
Family	0.0151	(1.05)	-0.0265	(-1.09)
Labor	0.0112	(0.66)	0.0339	(1.12)
Leisure	0.0072	(0.52)	-0.0299	(-1.16)
Region	-0.0028	(-0.79)	0.0056	(1.04)
Constant	0.1464***	(2.83)	0.1690*	(1.92)
N	14,524		7,029	

Note: t statistics in parentheses * p < .10, ** p < .05, *** p < .01

6. Discussion

We find a gender gap of about 11 percentage points in sports participation, which is consistent with previous research (Van Tuyckom et al., 2010; García et al., 2011; Kokolakakis et al., 2012; Muñiz et al., 2014; Lera-López and Suárez, 2019). Several factors similarly influence participation rates for men and women. As previous research, our proxy for income has a significant influence on participation (Breuer and Wicker, 2008; Downward and Rasciute, 2011; Muñiz et al., 2014; Wicker et al., 2009), but we do not find any effect on frequency rates, which is consistent with Gratton and Taylor (2000) 's findings. Additionally, we find a positive relationship between education and sports participation, which is typically reported in the literature (Breuer and Wicker,

2008; Downward and Riordan, 2007; Downward and Rasciute, 2011; Eberth and Smith, 2010; Hovemann and Wicker, 2009; Wicker et al., 2009).

Our results show that being Spanish is associated with higher participation rates, although the effect is more substantial for men whose participation frequency also increases. This result supports previous findings in other countries (van Bottenburg et al., 2005; Johnston et al., 2007; Higgins and Dale, 2013; van Haaften, 2019) and highlights the need for actions that can bridge the gap between locals and migrants in sports practice. We also observe that engaging in cultural activities is positively associated with sports participation, which aligns with previous studies (Downward and Rasciute, 2016; Muñiz et al., 2011; Hallmann et al., 2017; Suárez Fernández and Muñiz, 2021). The association between reading and watching series/films with sports practice is more robust for women. A significant influence is not observed on frequency, which decreases when individuals watch TV or engage in digital activities.

We find mixed and insignificant results regarding the influence of being employed on participation. However, we observe a significant and negative impact of being employed and being a student on the frequency of participants, which is larger for women. Previous studies find that employed individuals are less likely to participate in sports (Breuer and Wicker, 2008; Downward and Riordan, 2007; Eberth and Smith, 2010), which is expected since the time at work reduces leisure time. As expected, being injured or sick has a negative influence. Similarly, age also has an expected negative influence on the probability of participation, but it is more pronounced for men. In fact, older women are more likely to participate more often in sports activities.

There are also gender differences when we look at childcare duties. As happens with other labor outcomes, e.g., earnings (Adda, Dustmann, and Stevens, 2017; Bertrand, Goldin, and Katz, 2010; Ejrnæs and Kunze, 2013), women having small children (aged 0-9) fall behind and are significantly less likely to practice sports. We do not find any effect for men, who are more likely to practice sports when parenting teenagers (aged 15-18). Children also negatively influence the frequency of participants, but the effect is only significant for male participants with children aged 0 to 14. Family responsibilities related to the household are correlated with lower participation rates for both men and women, and marriage has a negative impact, which is consistent with previous research (Downward and Riordan, 2007; Eberth and Smith, 2010; Hovemann and Wicker, 2009), but it is only significant for women's participation frequency. Overall, these findings align with previous studies showing that marriage and parenthood have a penalty for women regarding labor, household work, and leisure

time (Kleven et al., 2019; Rubiano Matulevich and Viollaz, 2019). The Oaxaca-Blinder decomposition helps identify the part of the gender gap attributed to observable characteristics of men and women in the sample and the part attributed to different coefficients. From a managerial perspective, this exercise is informative because we can quantify the contribution of specific variables or groups of variables to observed inequality and provide policymakers with detailed information about potential action areas (Rahimi and Hashemi Nazari, 2021). Decomposing gender differences is an effort to inform policy in transforming specific variables in sports practice.

In this case, our covariates' contribution in explaining the large observed gap is small, but we identify some relevant factors. Differences between men and women in age, capital, and health issues broaden the gap in sports participation. On the contrary, we find that group differences in education and leisure habits, e.g., reading, help reduce the gap. Regarding the gap in frequency, which is much smaller than in participation, we observe that only age and employment status differences help bridge the gap. Administrations and organizations can influence by shaping and directing specific policies towards these factors. The unexplained part of the decomposition, i.e., the part associated with differences in coefficients, is the most relevant. We also find that the constant term has the greatest effect on participation and frequency. We associate this result with the direct contribution of group membership, i.e., differences related strictly to gender or to unobserved factors that we could not control for. Policies aimed at reducing the gender gap in sports participation in Spain should consider general campaigns for women. Additionally, specific policies should target factors that negatively influence participation (frequency) rates and affect women more prominently, such as caring for small children, capital, and being employed or married. For example, sports programs that secure help for women with children or foster active breaks at work may provide additional benefits in closing the gender gap in sports participation (frequency) rates.

The study has several limitations related to the self-reported nature of our data and the questions in the survey. For example, we analyze general sports participation with no distinction between type of activity or intensity. Additionally, our sample is restricted to Spanish individuals, so our analyses and recommendations are bound to neglect cultural differences. The allocation of tasks in the households, employment level, or childcare could affect the sports participation of men and women differently in different places. Finally, our

analysis cannot shed more light on the unexplained part of the gender gap, either driven by unobservable or gender-related intrinsic factors. This "black box" plays a crucial role, and much research is needed to open it.

7. Conclusions

This paper examines the determinants of sports participation and frequency rates with particular attention to the gender gap. We rely on a two-part model for participation and frequency variables, assuming all zeros associated with non-participants are zeros of non-potential participants. First, we estimate two binary logit models to examine the determinants of sports participation and frequency rates for men and women separately. Then, we apply the Oaxaca-Blinder decomposition to delve into the reasons that explain gender differences.

This paper uses data from the 2021-2022 Survey on Cultural Habits and Practices in Spain. This survey allows us to examine the influence of demographic factors and other leisure choices simultaneously. We find a gender gap in sports participation of around 11 percentage points, whereas the gap in the frequency of participation is much lower –around two percentage points.

We observe the expected influence of several demographic factors on participation, such as age, capital, health, and education. We also notice some disparities by gender related to having children, being married, or being employed that deserve the attention of policymakers. Women's sports habits generally seem weaker and more sensitive to busy schedules and responsibilities. Additionally, we do not find any substitution effects with other leisure or cultural choices such as reading, watching films/series, or using connected devices.

We use the Blinder-Oaxaca decomposition further to disentangle differences in participation and frequency between men and women that could direct policy efforts toward relevant drivers. However, only a tiny portion of the gap is explained by differences in the characteristics of men and women. In other words, the differences between women's and men's sports participation (frequency) cannot be explained by their different socioeconomic characteristics or leisure habits. As discussed, generic policies aimed at making sports practice more attractive to women and specific policies aimed at alleviating work and household responsibilities can help bridge the participation gap.

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