

AN ANALYSIS ON DETERMINANTS OF SPORT PARTICIPATION BY CONSIDERING ECONOMIC FACTORS VIA LOGIT/PROBIT MODELS: EVIDENCE FROM TURKEY

Un análisis de los determinantes de la participación en el deporte según factores económicos mediante modelos logit/probit: Evidencia de Turquía

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ABSTRACT: It is required to identify the factors affecting sport participation of targeted population to promote participation in sports. The aim of the study is to investigate the economic and socio-demographic factors that influence sport participation in Turkey. In the empirical analysis, we employ binary Logit and Probit models in order to detect determinants of sport participation. The study is expected to fill the gap regarding economic side of sport participation in Turkey. The main evidence obtained from the analysis is that income level, sports expenditure, membership, availability of free time, and working as tenured have significant effect on participation in sports.

KEYWORDS: Sport participation; profile of participation; Logit model; Probit model; income

RESUMEN: Es necesario identificar los factores que afectan a la participación deportiva de la población objetivo para promover la participación en el deporte. El objetivo del estudio es investigar los factores económicos y sociodemográficos que influyen en la participación deportiva en Turquía. En el análisis empírico, empleamos modelos binarios Logit y Probit para detectar los determinantes de la participación deportiva. Se espera que el estudio llene el vacío existente en relación con el aspecto económico de la participación en el deporte en Turquía. La principal evidencia obtenida del análisis es que el nivel de ingresos, el gasto en deporte, la afiliación, la disponibilidad de tiempo libre y el hecho de trabajar como fijo tienen un efecto significativo sobre la participación en el deporte.

PALABRAS CLAVE: Participación en el deporte; perfil de participación; modelo Logit; modelo Probit; ingresos

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1. Introduction

Sport can be identified as all forms of physical activity which, through casual or organized participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships, or obtaining results in competition at all levels (Council of Europe, 2001). Promoting participation in sport at all levels of the population is one of the crucial government policy target in many countries (Grima et al, 2017, p. 95). The justifications of this target are that significant positive externalities of sport participation are widely expected, which are better health, positive effect on educational achievements, labour market outcomes, increased sociability, and lower crime rates (Strawinski, 2010, p. 55). There is need of implementation long-run policies planned on sport to protect public health by preventing obesity that is one of the most important health problems today and improve both physical and mental well-being of individuals. Profile of sport participation of targeted people should be detected to succeed these policies. Identifying the factors that impact sport participation is essential not only for ensuring public health, but also for understanding the drivers of demand side of sport industry.

There is a growing relevancy among policymakers and public health researchers on the factors effecting sport participation. Though sport has an important economic component, economists give little attention on this topic (Humphreys & Ruseski, 2006, p. 2). In literature, some general evidence is observed regarding determinants of sport participation. Regarding socio-economic factors, firstly, income is observed that has a significant role on sport participation, implying that a high level of income increases the probability of participation in sport. Secondly, the factor occupation can be evaluated as both a measure for income and free time. For the income, it is widely assumed that persons with occupation have more money available than persons without occupation, meaning that being employed has a positive effect on sport participation. However, concerning the available free time, the contrary relation is assumed. Thirdly, the factor education level is seen as another important determinants of participation. Generally, it is found positive association with high level of education and sport participation. The justification of this effect is that a higher educational level increases understanding of the importance of sport. Lastly, time for care of children and relatives affects regular sport activity negatively since the presence of children can limit the time needed for sport activity. Concerning socio-demographic variables, age seems to be a very crucial determinant of sport participation. In general, it is accepted that with increasing age the state of health gets worse. Hence, it is assumed that there is negative relationship between age and sport participation. The effect of gender is documented similarly in literature that men are considerably more likely to take part in sports than women. As for marital status, the research results are not consistent. Some studies conclude that married people tend to take part in sport activities more than singles while some studies obtain opposite result (Hovemann & Wicker, 2009, p. 53-54; Breuer et al, 2010, p. 63-65).

The aim of this study is to investigate the economic and socio-demographic determinants of sport participation for 187 individuals worked in central organization of the General

Directorate of Ministry of Youth and Sports in Ankara, capital city of Turkey. In the empirical analysis, we employ binary Logit and Probit model to reveal the factors effecting sport participation for this sample. Though, there is some studies on the determinants of sport participation in Turkey, there is much little evidence on economic drivers of sport participation. Accordingly, it is expected that this study fills this gap in literature.

The next section presents the literature review on sports participation. Section 3 provides the empirical analysis and obtained findings, and the last section concludes.

2. Literature Review

Table 1 presents the summary of some studies examined the determinants of sport participation. As seen Table 1, both demographic variables, such as age, gender, the presence of children, and socio-economic variables that include income, working status, time, human capital, profession and family status have an important role on sport participation (Breuer vd. 2010, p. 68). On the other hand, it can be stated that the studies regarding economic determinants of sport participation is rather limited (Strawinski, 2010, p. 58). The studies on this topic suggest that economic factors like income have an important role on participation. Besides, working status has also impact on participation.

Table 1. Summary of literature review on sport participation

Author(s)	Country, Period	Positive (+) or negative (-) impact on sport participation
Lera-Lopez and Rapun-Garate (2005)	Spain 2004	Employed (-) Age (+) Female (-) Income (+) Employed (-) Education (+)
Humphreys and Ruseski (2006)	U.S. 2000	Age (-) Female (-) Married (-) Number of children (-) Cold weather months (-) Warm weather months (+) Income (+) Being an employer (+) Being a housekeeper (-)
Downward (2007)	United Kingdom 2002	Men (+) Education (+) Married (+) Children (-) Income (+) Education (+)
Gratton et al. (2008)	England 2007	Age (-) Male (+) Children (-) Free time (+) Owning a house (+) Owning a car (+)

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Hovemann and Wicker (2009)	EU Countries 2004	Employed (-) Education (+) Age (-) Female (-) Married (-) Children (-) Town size (+) Income (+)
Strawinski (2010)	Poland 2008	Education (+) Age (-) Children (+) Town size (+) Income (insignificant) Education (insignificant)
Wicker (2012)	Munich, 2008	Men (+) Availability of swimming pools and parks (+) Working/school time (-) Age (-) Migration background (-) Income (+) Education (insignificant) Age (-) Female (+)
Korkmaz and Deniz (2013)	Turkey 2013	Number of children (-) height (-) Weight (-) Use alcohol (-) Use cigarette (-) Chronic disease (-) Education (+)
Erkan and Uslu (2017)	Turkey 2015	Age (-) Male (+) Married (-) Education (insignificant)
Grima et al (2018)	Malta 2017	Income (insignificant) Male (+) Age (depends on sport discipline)
Bernardelli et al (2020)	Brazil 2015	Income (+) Employed (-) Having children (-) Education of parents
Görner et al (2020)	Slovakia	Economic status of a family Parental employment Consumer Price Index (CPI)
Khanmoradi et al (2021)	Iran 2004-2017	Unemployment rate GDP Sports media

Lera-López and Rapun-Garate (2005) explore the demographic, sociocultural and economic factors involved in sport participation and sport expenditure of Spain population aged 16 to 65, employing ordered Probit and Tobit models. They find that

sports participation is positively associated with age while it is negatively associated with being woman and being employed. Besides, the results show that consumer expenditure on sport is mainly determined by gender, education, and income level. More specifically, being men, being employed, having high level of income and higher levels of education are the factors that increase expenditure on sport.

Humpreys and Ruseski (2006) apply two step Heckman procedure to identify the determinant factors of sport participation in U.S. sample of 175,246 individuals. Their results suggest that the higher level of education and income are associated with a higher probability of participating in sport. In contrast, employed persons, the presence of children and being women decrease the probability of sport participation. In addition, the study reveals that sport participation decline during cold weather months. Dawnward (2007) examines the social and economic characteristics of sport participation in U.K. aged 16 or over. The results of the calculated General Household Survey (GHS) reveal that higher income, being men, higher education level, being an employer or professional promote participation whereas being a housekeeper and having children reduce participation. The results also suggest that being married increases sport participation. Gratton vd. (2008) search economic and demographic determinants of sport participation in England for 363,724 adults aged 16 and more. The findings from Logit model show that owning a car, being younger than 44 years old, being a man, having a good education, and household financial position have positive effect on sport participation while the existence of children negatively impacts sport participation. They conclude that the level of income and the availability of free time are the most essential underlying factors that drives sports participation.

Hovemann and Wicker (2009) investigate the factors that influence sport participation in the European Union of 25 members for 25.000 cases by using Logit model. The results demonstrate that age, being in a relationship, having children, being a woman and being employed have negative effect on sport participation while education years and town size positively influence on it.

Strawinski (2010) investigates the economic and demographic factors that have impact on sport participation in Poland by employing Probit model for 4704 households participating. Considering each sport discipline, the study reveals that sport participation slightly lower with age in almost all sport disciplines. Though the gender effect is not found to be significant, there are some differences between men and woman regarding particular sport disciplines. To be specific, there is significantly higher participation rate in football, weight sports and basketball for men. Besides, the probability of sport participation tends to increase with income, being unemployment or inactive in labour market, education, presence of children, and living in a bigger town. For Munich using multi-level analyses, Wicker et al (2012) detect that working/school time, age, and migration background have a negative effect on sport activity in non-profit sport clubs while probability of practicing sport is found significantly higher for men than for women. The study also captures that time for children/relatives, income, and human capital have no significant impact on sport

participation. Further, the results reveal that availability of swimming pools and parks is especially important for sport activity.

More recently, Grima et al (2018) explore the socio-economic determinants of three different sports practiced in Malta, namely badminton, handball and wrestling. They target the sample of 381 individuals and employ Chi-square test in the analysis. Their obtained findings suggest that both income and educational background are not factors effecting sports participation for three sports discipline. The results also demonstrate that badminton and wrestling attract more mature participants while handball attracts younger participants. Görner et al (2020) investigate the socio-economic factors driving swimming competency of 175 secondary school students. The results of Chi-square test indicate that parents' education level have a significant positive effect on the swimming competency of their children. They examine the impacts of economic status of a family on swimming competency and find that swimming competency is affected by economic status of a family in the case of boys.

Moreover, the study detects that swimming competency declines in the group of boys when fathers were unemployment. Khanmoradi et al (2021) search the socio-economic factors and sports media on sports participation for 28 provinces of Iran. The data used consists of 14 years between 2004 and 2017. They employ two-stage least squares method (2SLS) and conclude that CPI and unemployment rate has a negative and significant effect on sports participation while the influence of GDP on sports participation is weakly positive and significant. In addition, sports media is found to be positive impact on sports participation. Bernardelli et al (2021) examine the socio-economic determinants of participation in physical activity in Brazil by using conventional ordered logistic regression model. The results of the analysis show that income has a positive but very small impact on physical activity while being full-time employed and having children decrease the frequency of physical activity participation for both men and women.

There are limited studies on the determinants of sport participation in Turkey. One of them, Korkmaz and Deniz (2013) identify the relationship between physical activity level and socio-economic factors in Bursa for 501 adults aged 20 to 58. They find that being woman, and level of income are positively associated with physical activity. The study detects the factors that negatively influence physical activity that are age, weight, height, having children, using alcohol and cigarette, and having chronic disease. Erkan and Uslu (2017) investigate the active and passive of sport participation in 28 provinces for Turkey sample of 3555 individuals. They conclude that being men, and education level increase to participation in sports while age and married people have opposite impact on it.

In the related literature, several socio-economic factors affecting sports participation have been detected as above mentioned. In this sense, the participation in sports is found to be positively related to household income, education level, free time, and being a man while, in contrast, being employed, having children, working time, and being a woman have a negative effect. Accordingly, individuals' decisions to allocate time to sport activities are directly link with demographic features, economic conditions and environmental influences. In economic literature, there is two comprehensive theories on sports

participation: neoclassical and heterodox approaches. The neoclassical approach uses a rational-choice framework to model sport participation of individuals. According to this approach, sports participation is as a commodity whose demand is based on the classic economic demand theory. In addition, sport is built on the consumption of time using the income-leisure trade-off model of labour supply. The heterodox approach includes together economic, psychological and sociological approaches and explores the psychological groundwork of consumer choice of economic agents. Through the sociological analysis, individual preferences and sporting styles are related to individual feelings, social pressure and the influence of habitus. Both of neoclassical and heterodox approach emphasize the impact of income (Grima et al, 2018, p. 115-116.)

3. Empirical analysis of participation in sport

3.1. Characteristics of respondents

The sample consists of 187 employees, who were randomly asked to participate in the study, in central organization of the General Directorate of Ministry of Youth and Sports in Ankara, which is capital of Turkey. The questionnaire that consisted of 3 section and 31 closed-ended questions was applied in order to collect data. The interviews were carried out face-to-face for questions in the questionnaire in the year of 2020. In this study, the population who accepted for answer the asked questions consists of mostly have university degree and are aged between 25-34. In this regard, we take into account for this possible bias, and we suggest the results of the analysis by considering for this group.

Table 2 presents the main descriptive statistics of the respondents that was 187 individuals employed in central organization of the General Directorate of Ministry of Youth and Sports in Ankara. As seen Table 2, the respondents take part in sport at 55.29%. The percentage of respondents who is men are at 57.22% while women are at 42.78%. The rate of respondents aged between 25-34 is 59.89% while aged between 35-39 is 20.86%. More than half of the respondents; are single (58.82%), have no child (58.29%), and have 3-5 hours for free-time (55.61%). Concerning education level, a great proportion of respondents (77.54%) have university graduate. The ratio of respondents having foundation degree, and master's degree are 9.09%, and 13.37%, respectively. Also, note that the respondents with 39% are tenured while 61% of it are working under contract. As for economic condition of the sample, many respondents (59.89%) have 5100 TL (Turkish Lira)¹ and over income level. Having income level of 4100-5100 TL and 3100-4100 TL account for 24.06% and 14.44%, respectively. The respondents of 43.85% own on their home. The findings show that most respondents (62.57%) are a not member of sports center or sport courses. Besides, the weights of the most respondents (69.52%) are 61-90 kilograms. The height of respondents of 44.39% have 171-180 cm while of 28.88% have 161-170 cm. The rate of the respondents that never smoked is 50.27% while 40.4% of respondent smokes, and 9.09% of respondent quitted it. The respondents having no chronic diseases constitute a majority with 90.9%.

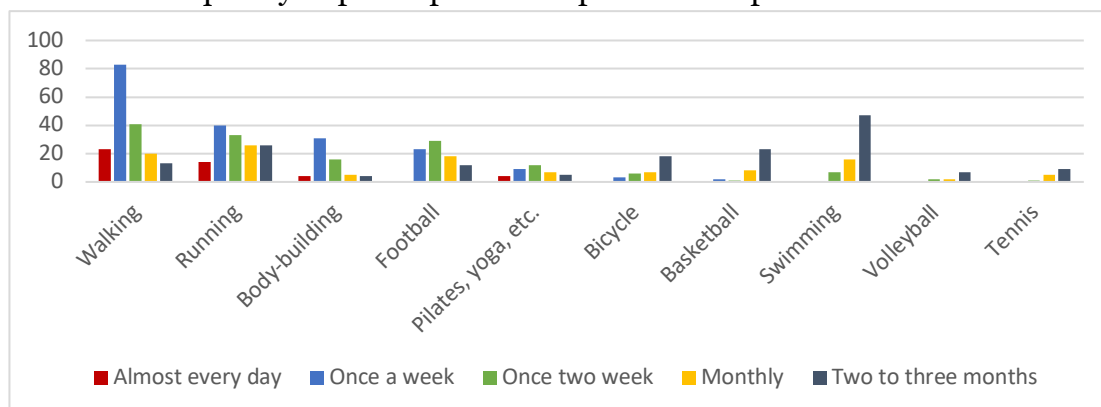
¹ 1 USD Dollar yearly corresponded 8.05 Turkish Lira in the year of 2021.

Table 2. The main characteristics of respondents

Variable	Category	Percentage (%)	Frequency (N)
Participation in Sports	Yes	58.29	109
	No	41.71	78
Gender	Female	42.78	80
	Male	57.22	107
Age	15-24	2.67	5
	25-34	59.89	112
	35-39	20.86	39
	40-44	9.63	18
	45+	6.95	13
Marital Status	Single	58.82	110
	Married	41.18	77
The Presence of Child	Yes	41.71	78
	No	58.29	109
Availability of Free Time	0-2 hours	35,29	66
	3-5 hours	55,61	104
	6-8 hours	9,09	17
	Foundation degree	9,09	17
Education	University	77,54	145
	Postgraduate	13,37	25
	2100-3100 TL	2,14	4
Income	3100-4100 TL	14,44	27
	4100-5100 TL	24,06	45
	5100 TL+	59,89	112
	House Ownership	Yes	43,85
	No	56,15	105
Membership Sports Center/Courses	Yes	36,9	69
	No	62,57	117

Figure 1 presents the sports disciplines that the respondents take part in. Accordingly, the most common sports discipline performed at least once a week is walking at 95.3% followed by running with 28.9%. Body-building is third at 18.7% while football and pilates/yoga are accounted for 12.3% and 6.9%, respectively.

Figure 1. The frequency of participation in sports for respondents



Regarding the watched on TV sports discipline of respondents, football is observed the most watched at 51.34%. It is followed by basketball (14.97%), volleyball (9.62%), tennis (4.91%), running (4.81%), and swimming (3.21%).

Figure 2. Annual spend sports expenditure on sports of respondents

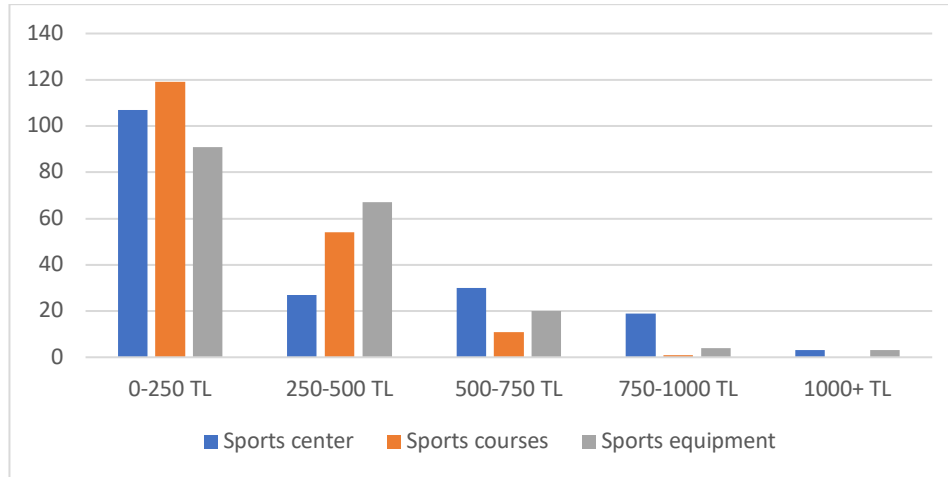
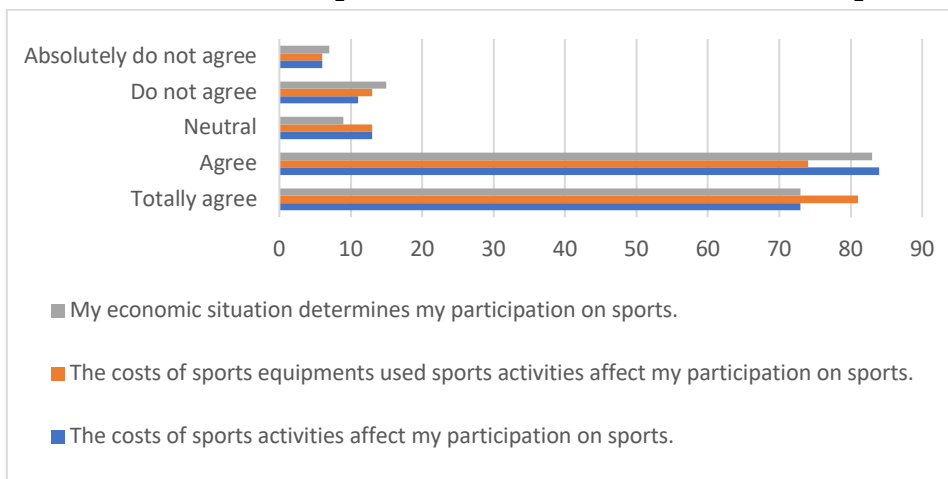


Figure 2 reveal that the level of respondents’ sports expenditure is low. For sports, the respondents mostly spend between 0-250 TL, which mainly consist of sport courses and sport center. It is observed that the respondents who spend between 250-500 TL spend the most on sports equipment. The respondents that spend at least 500 TL is mostly have expenditure on sports center.

Figure 3. The assessments of respondents of economic condition on sports activities



It was required of respondents’ assessments of economic factors on sport participation. As seen in Figure 3, the respondents that have a view of the economic factors are crucial on sport participation constitute a majority at nearly 83%.

3.2. Econometric model and findings

If the dependent variable is binary, this model cannot be estimated by employing the normal least squares method (OLS). Instead, the maximum probability estimate is applied that requires assumptions about the distribution of errors, which often considered the

normal errors in the Probit model and/or the logistic errors in the Logit model (Guner & Durmus, 2020, p. 63). This paper aims to model the factors affecting respondents' sport participation by using simple binary variables taking value of 1 if respondents take in sport activities and 0 if otherwise. Hence, we use both Logit model and Probit model to capture the factors affecting sport participation. The model adapted in this study can be written as follows:

$$S^* = \alpha + \beta'X + \varepsilon \quad (1)$$
$$S = 0 \text{ if } S^* \leq 0; S = 1 \text{ if } 0 < S^*$$

where S^* is individual's choice of participation in sport, which is unobservable dependent variable. α is constant term, β is the vector of coefficients related to the explanatory variables. ε is the error term, which has logistic distribution in Logit model while has normal distribution in Probit model. If the dependent variable takes "0" and "1", the name of the model becomes "Binary Logit" / "Binary Probit" model.

In the analysis, the dependent variable is sport participation that is dichotomized (0=not sport participation, 1=regular sport participation, which means at least once a month). We follow the studies of Humphres and Ruseski (2006;2007) for choosing the dependent variable. The study considers general participation in any sports. Following the related literature, the independent variables are included in the study: the level of income (income; Dummy; 1=more than 5100TL), expenditure on sports (expenditure; Dummy; 1=500 TL and more), membership of sports center/courses (membership; Dummy; 1=the presence of membership), house ownership (1; Dummy; the presence of house ownership), the availability of free time (free time; Dummy; 1=having 5 hours and more), education (Dummy; 1=foundation degree), age (Dummy; 1=20 to 29 aged), gender (Woman; Dummy; 1=woman), marital status (Married; Dummy; 1=married), the presence of children (Children; Dummy; 1=children), the working status (Tenured; Dummy; 1=being tenured), the place lived until 12 aged (Exurban; Dummy; 1=exurban), height (Dummy; 1=181-190 cm), weight (Dummy; 1=70 kilogram and under).

All analysis is performed by employing Stata 10. The reliability coefficient, Cronbach's Alpha, of the survey applied to the respondents is found to be 0.93. Table 3 presents the results of the estimated Logit model and Probit model.

When coding the dependent variable, reference is made to "regular participation at least once a month". It seems a very low frequency to consider that physical activity is practiced regularly. Have any recommendations from international organizations on what would be considered regular sports participation been taken into account? It would be advisable to justify the frequency of once a month on the basis of a study on the research topic.

Table 3. Results of the Logit and Probit model for sport participation

Variables	Logit Model Coefficients	Probit Model Coefficients
Income	1.21*** (0.454)	0.667*** (0.249)
Expenditure	1.842** (0.742)	1.002*** (0.376)
Membership	1.686** (0.757)	0.883** (0.375)
House ownership	-0.629 (0.479)	-0.321 (0.254)
Free time	1.729** (0.858)	0.975** (0.473)
Tenure	1.082** (0.504)	0.654** (0.282)
Education	0.254 (0.748)	0.061 (0.417)
Age	0.191 (0.605)	0.096 (0.308)
Woman	1.089** (0.496)	0.605** (0.282)
Married	0.781 (0.783)	0.462 (0.439)
Children	0.526 (0.823)	0.227 (0.458)
Exurban	1.841*** (0.592)	1.016*** (0.316)
Height	1.163 (0.850)	0.713 (0.478)
Weight	-1.159** (0.529)	-0.654** (0.29)
Constant	-1.52 (0.584)	-0.828** (0.353)
Observations	187	187
Pseudo R ²	0.331	0.324
Wald chi2(14)	36.56	41.33
Prob>chi2	0.0009	0.0002
Log pseudolikelihood	-71.24	-71.965

*** and ** denote significance at 1%, and 5% and levels, respectively. (Robust standard error in parenthesis)

The results of both binary Logit model and binary Probit model show that income, expenditure, free time, gender, urban, and weight have significant effects on probability of respondents' sport participation. From the economic factors, the variable of income is

statistically significant at 1% for both the models. As expected, income level of a household has significant positive effect on participation in sports of an individuals. In other words, an individual with high income household participates to a higher extent in sport than with low income household. Analogically, the more expenditure on sports leads to more participate it. The results reveal that an individual spending 500 TL and more on sports have more probability of participation in sports. This coefficient is significant at 0.05 level for the Logit model while 0.01 level for the Probit model. Also, being membership of sport centers or sports courses increases the likelihood of an individual to participate. The sign of the house ownership is found to be negative but insignificant. A positive impact of availability of free time of a respondents is detected for both the models. Accordingly, having five hours free time promote more participation in sport than having less five hours free time. The variables of membership and free time is significant at 5% for both the models. The results indicate that an individual who is tenured is more likely to participate, which may imply that the working status influence concern of a respondent that impact choices of the participation in sports.

Concerning socio-demographic factors, female respondents is detected have a higher probability to participate in sport than their male counterparts, unlike the common view of the previous studies. The impact of age, education level, marital status, the presence of children and height on participation in sports are found insignificant for the results of the estimated both models. The sign of coefficient of weight is found to be negative, meaning that an individual with 70 kilograms and under is less likely to take in sports. This result provides us to assess the choice of an individual on participate in sport considering the weight had. Interestingly, lived away from urban of an individual until 12 aged is positively associated with sports participation. Though the evidence that town size affects positively sport participation of an individual (Hovemann & Wicker, 2009; Strawinski, 2010) is generally accepted, this positive sign may indicate that being adapted to town size in early age of an individual makes them expose more inactive lifestyle.

4. Conclusion

The purpose of the study is to investigate the economic and socio-demographic factors that influence sports participation for sample of 187 employees worked in central organization of the General Directorate of Ministry of Youth and Sports in Ankara. The main characteristics of the respondents provide some findings regarding their participation in sports. In this context, the respondents of 58.29% state that they take in sports activities. Most of the respondents at 62.57% are not a member of sports center or sport courses though more than half have three to five hours' free time. Walking is the most performed among sports disciplines. The respondents at 95.3% state that they take a walk at least once a week. Concerning passive participation in sports of the respondents, it is observed that the most watched on TV from sports disciplines is football with 51.34%. Besides, the respondents at 83% consider that economic factors influence largely in their decision of participate in sport.

In the empirical analysis, we employ both Logit model and Probit model in order to detect the economic and socio-demographic determinants of sport participation. The results show that economic variables have significant effect on participation in sport of respondents. In this regard, the probability of participation in sport increases with income, sports expenditure, having membership in sports centers/courses, having tenured, and free time. The study also considers the socio-demographic determinants of sport participation. The explanatory variables are used considering the related empirical literature. The estimated coefficients of gender, weight, and urban is found to be statistically significant while the effects of education, age, marital status, the presence of children and height are found insignificant. The estimated binary logistic regression and Probit model reveal that being woman, having 70 kilograms and under, and lived in exurban at early ages are found to be positively related to sport participation. The reason of higher sports participation of women than men may be due to the characteristics of the limited sample selected of our study. As for gender differences, Koca and Bulgu (2005) state that the premium given by the society to physical capacity in sportive activities may lead to differentiation of participation in sports in men and women. More specifically, individuals in the selected sample may have a point of view that biological differences between men and women on physical activities is not an issue effecting sports participation for female.

These results suggest some policy recommendation to promote sport participation. It should be decreased the sensitivity to income of sport participation in that findings obtained from the analysis and assessments of the respondents; economic factors are the main determinants of participation in sports. It should be overcome the perception of the only people with high income are able to access in sports activities. For this, the cost of sport infrastructure may be subsidized, and the costs of membership of sport centers or sports courses should be decreased by supporting financially of individuals having low income. It also should be more given importance by researchers on economic drivers of sport participation for better understanding of economic aspects of participation in sports. In fact, the empirical results obtained from the analyzes represent the low sample of the population of Ankara in Turkey. Since the factors that effects sports participation captured by the study are associated with the selected sample, the authors hope that it will be useful to extend the sample for further research for better understanding the underlying drivers of sports participation.

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