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Availability of Sports Facilities does not explain the Association between Economic Environment and Physical Inactivity in a Southern European city

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***Abstract*—**This paper evaluates the association between economic environment in the districts of Madrid (Spain) and physical inactivity, using income per capita as indicator of economic environment. The analysis included 6,601 individuals aged 16 to 74 years. The measure of association estimated was the prevalence odds ratio for physical inactivity by income per capita. After adjusting for sex, age, and individual socioeconomic characteristics, people living in the districts with the lowest per capita income had an odds ratio for physical inactivity 1.58 times higher (95% confidence interval 1.35 to 1.85) than those living in districts with the highest per capita income. Additional adjustment for the availability of sports facilities in each district did not decrease the magnitude of the association. These findings show that the widely believed assumption that the availability of sports and recreational facilities, as a possible explanation for the relation between economic environment and physical inactivity, cannot be considered a universal observation.

***Keywords*—**Economic environment, physical inactivity, sports facilities, districts, Madrid, Spain

I. Introduction

VARIOUS studies have shown that, in addition to individual characteristics, different characteristics of the area of residence are also related with physical inactivity [1-10]. One characteristic of the area of residence that has been studied is the socioeconomic environment. It has been observed that individuals who live in more deprived areas have the highest prevalence of physical inactivity [6-10]. The authors of most of these studies attribute the results to the fact that these areas have fewer services, such as green spaces or infrastructure for sports and recreational activities. In a previous work we evaluated the association between socioeconomic environment in the province of residence and physical inactivity at the beginning of the 21st century in Spain, using per capita income as indicator of socioeconomic environment of the province [11]. Our findings showed that Spanish people who lived in provinces with the lower per capita income had the higher prevalence of current physical inactivity. However, contrary to what is stated by most authors, the availability of sports and recreational facilities in each province did not explain the results found.

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It is possible that the province is not the most appropriate level of data aggregation for evaluation of the association between socioeconomic environment and physical inactivity. It may be necessary to study smaller areas to know whether the proximity of structures for health promotion to the place of residence is responsible for that association. Because of this, the objective of this work is to evaluate whether this association is explained by the availability of sport facilities using the districts of the city of Madrid.

II. Methodology

A. Measure of physical inactivity

Physical inactivity was estimated from the 2005 City of Madrid Health Survey conducted in a representative sample of the non-institutionalised population aged 16 and older. Individuals were selected by two-stage cluster sampling, with stratification of the census sections, which were the first-stage units. Census sections were selected with a probability proportional to population size, while persons to be interviewed in each section were selected by simple random sampling. In the analysis persons over age 74 were excluded since the probability of being institutionalised after that age is relatively high.

In the questionnaire, information on physical inactivity was collected based on the question: "Which of the following possibilities best describes the frequency with which you do physical activity in your free time?" The possible replies were: (1) None; (2) Moderate activity several times a month (walking, cycling, gardening, light exercise, activities requiring moderate effort, etc. (3) Moderate activity several times a week; (4) Intense activity several times a month (tennis, jogging, cycling, team sports, swimming, etc.) and (5) Intensive activity several times a week. These replies were used to create a binary variable, grouping respondents into two categories: those who said they did some type of physical activity (options 2, 3, 4 and 5), and those who reported doing no physical activity in their free time (option 1).

B. Measure of socioeconomic environment

The indicator of socioeconomic environment was per capita income in each one of the 21 district of Madrid. This estimate

was obtained from the Statistics Institute of Madrid. We then elaborate a categorical variable based on the quartiles of the distribution of per capita income.

C. Availability of sports facilities

Information on the number of sports facilities in each district was obtained from the last Census of Sports Installations, carried out in 2005 [12]. For this study, we counted the number of conventional sports facilities – tennis courts, swimming pools, multi-sport courts, etc. -- and the number of unconventional sports areas – those whose dimensions are not regulated but required a financial investment, such as a fitness circuit – in each of the 21 districts of Madrid. We estimated the number of sports facilities per 10,000 population in each district.

D. Individual socioeconomic characteristics

The following characteristics of respondents were considered adjustment variables in the different analytical models: age, sex, highest educational level completed, and social class. Individuals were assigned to one of four categories based on the information on educational level: no education or less than primary education; primary education; first or second level of secondary education; and tertiary or university education. Also respondents were assigned to a social class based on the occupation of the head of household: professionals, managers and intermediate professions (I), self-employed workers and service industry workers (II), skilled manual workers (III), and unskilled manual workers (IV).

E. Statistical analysis

To evaluate the association of per capita income with physical inactivity we used the odds ratio estimated by logistic regression. We first estimated the sex and age-adjusted association. Then we determined whether the magnitude of the sex and age-adjusted association decreased after adjusting for individual socioeconomic characteristics. Finally, we included the number of sports facilities per 10,000 population in each district in the model.

III. Results and Discussion

Table I shows the characteristics of the study subjects and the number of sports facilities according to the quartiles per capita income of the area of residence. Distribution of subjects according educational level and social class and availability of sports facilities were significant.

Table II shows the association of income per capita of the districts with physical inactivity. Subjects living in the districts with the lowest per capita income had an age and sex-adjusted odds ratio 2.06 times higher (95% confidence interval (CI) 1.77 to 2.39) than those living in districts with the highest per capita income. After adjusting for individual socioeconomic characteristics, the magnitude of the odds ratio was reduced to 1.58 (95% CI 1.35 to 1.85). Additional adjustment for number of sports facilities did not decrease but increased the magnitude of the association between per capita income and physical inactivity showing an odds ratio of 1.71 (95% CI 1.43 to 1.52).

Our results using districts confirm the results we previously found using provinces: the more deprived areas have the highest prevalence of physical inactivity. Likewise, these findings show that the widely believed assumption that the availability of sports and recreational facilities, as a possible explanation for the relation between economic environment and physical inactivity, cannot be considered a universal observation.

Some authors have pointed out that the availability of resources cannot be an indicator of their use. For example, Giles-Corti and Donovan [9] found higher spatial access to recreational facilities in disadvantaged than in advantaged areas, but residents in disadvantaged areas were less likely to use many recreational facilities compared with those living in advantaged areas. On the other hand, several investigations have concluded that availability of sports installations are associated with the practice of physical activity [10;13-15]. In contrast, other studies have not found such a relation [16-19].

Perhaps that inconsistency in the results explains why availability of sports and recreational facilities cannot be considered in any time and place a pathway involved in the association between the context of the area of residence and health behaviours are complex.

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TABLE I
SAMPLE SIZE, INDIVIDUAL CHARACTERISTICS AND AVERAGE OF SPORT FACILITIES BY QUARTILES OF INCOME PER CAPITAL

	Income per capita				
	Quartile 4 (the richest)	Quartile 3	Quartile 3	Quartile 1 (the poorest)	p value for trend
n (sample size)	**1546**	**1901**	**1562**	**1592**	
Men (%)	45.4	45.9	48.1	45.8	0.556
Average age (year)	44.1	44.3	44.0	43.8	0.481
High educational level (%)	45.5	32.7	25.4	14.9	<0.001
Non-manual social class* (%)	47.3	36.6	25.3	16.2	<0.001
Average of sport facilities (by 10,000 population)	23.4	24.1	15.6	12.9	<0.001

* Professionals, managers and intermediate professions (I), and self-employed workers and service industry workers (II)

TABLE II
AGE-ADJUSTED PREVALENCE OF PHYSICAL INACTIVITY AND ASSOCIATION BETWEEN INCOME PER CAPITA AND PHYSICAL INACTIVITY. ODDS RATIO (OR) AND 95% CONFIDENCE INTERVAL (95% CI)

	Prevalence	Model 1		model 2		model 3	
Income per cápita		OR	95% CI	OR	95% CI	OR	95% CI
Quartile 4 (the richest)	28.2	1.00		1.00		1.00	
Quartile 3	30.5	1.12	0.97 - 1.31	1.01	0.87 - 1.18	1.04	0.88 - 1.22
Quartile 3	36.5	1.53	1.31 - 1.78	1.28	1.10 - 1.50	1.34	1.13 - 1.57
Quartile 1 (the poorest)	44.6	2.06	1.77 - 2.39	1.58	1.35 - 1.85	1.71	1.43 - 1.52

Model 1: Adjustment for sex and age
Model 2: Adjustment for sex, age, educational level and social class
Model 3: Adjustment for sex, age, educational level, social class, and availability of sport facilities