Prevalence of physical activity during leisure time in the European Union

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ABSTRACT

MARTINEZ-GONZALEZ, M. A., J. J. VARO, J. L. SANTOS, J. DE IRALA, M. GIBNEY, J. KEARNEY, and J. A. MARTINEZ. Prevalence of physical activity during leisure time in the European Union. *Med. Sci. Sports Exerc.*, Vol. 33, No. 7, 2001, pp. 1142–1146. **Purpose:** To estimate the prevalence of physical activity during leisure time in adults from the 15 member states of the European Union and the relationship with sociodemographic variables. **Methods:** A representative sample, with approximately 1000 adults, aged 15 and upward, was selected from each member state to complete a questionnaire on attitudes to physical activity, body weight, and health by a face-to-face interview, summing a total of 15,239 subjects. The amount of leisure-time physical activity was quantified by assigning metabolic equivalents (METs) to each activity. Multiple linear regression models with MET-h·wk^{-1} as the dependent variable were fitted. **Results:** Northern European countries showed higher levels of physical activity than southern ones. The highest prevalence (91.9%) was found in Finland, and the lowest (40.7%) in Portugal. A higher percentage of men practiced any leisure-time physical activity and also showed higher mean of MET-h·wk^{-1}. In both genders, the multivariate models showed a significant trend to higher leisure time activity in participants with higher educational levels and in nonsmokers. Also, an inverse association between body mass index and leisure-time physical activity was found. **Conclusion:** The prevalence of any physical activity during leisure time in the adult European population was similar to the U.S. estimates. Nevertheless, the amount of activity is low, and a wide disparity between countries exists. To our knowledge, this is the first study determining the prevalence and amount of leisure-time physical activity, which is the first step to define strategies to persuade populations to increase their physical activity. **Key Words:** SEDENTARISM, EXERCISE, METABOLIC EQUIVALENTS, SURVEY, BODY MASS INDEX

Lifestyle is a determinant of health with a major influence on the morbidity and the mortality of populations (11,24). Thus, smoking and a sedentary lifestyle are the two most important causes of death in America (6). Therefore, the promotion of regular exercise among adult populations is considered a crucial step for preventing a wide range of chronic diseases, such as diabetes, obesity, hypertension, coronary heart disease, osteoporosis, colon cancer, breast cancer, and even some psychiatric disorders (9,19,21).

Social habits adopted during the last century have triggered an important decrease in the amount of physical activity. In this context, leisure-time physical activity has emerged as an important preventive action against chronic diseases, especially taking into account the high prevalence of sedentary professional occupations. For this reason, various consensuses have established the necessity to persuade the general population to increase their physical activity patterns (12,18,21). Following the same purpose, one of the aims of the U.S. Department of Health and Human Services for the year 2010 is to increase the proportion of adults who engage regularly in moderate physical activity for at least 30 min·d^{-1} (22).

In spite of the negative impact of sedentary lifestyle on public health, international studies determining the prevalence of physical activity in the European Union (E.U.) are scarce. Some studies have focused on relatively young people (13,20), but no available comparative studies exist on the adult population of the 15 member states. Therefore, the aim of this survey was to estimate the prevalence of leisure-time physical activity among the citizens of the E.U. The distribution of the amount of physical activity according to gender, age, education, body mass index, weight change in the last 6 months, marital status, and smoking status was also assessed.

METHODS

The methods used to conduct this cross-sectional study have been previously described elsewhere (10). Briefly, a questionnaire on attitudes to physical activity/exercise, body-weight, and health was developed by a project management group (PMG), composed of experts in the field of physical activity/exercise and obesity and market researchers from the industry. In this PMG, there were representatives from each of the 15 member states of the E.U. Subjects were assumed to give their informed consent when they agreed to be interviewed and answer the questionnaire.

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The questionnaire included several close-ended questions to assess the patterns of sedentary and nonsedentary activities, attitudes, and beliefs toward body weight and physical activity, sociodemographic characteristics, as well as self-reported weight and height. It was decided to use the terms "physical activity" and "exercise," instead of the term "sport," which is much more limited. The questionnaire was translated into all relevant European languages, and these translations were verified by piloting the questionnaire on 20 subjects in each member state, to ensure that the original meaning had been maintained.

Approximately 1000 adults, aged 15 yr and upward, were selected from each member state to complete the interview-assisted face-to-face questionnaire. Overall, 15,239 subjects in the E.U. participated in this survey. To ensure national representative samples, quotas were applied in each country according to demographic factors (gender, age, town size) using the most recent census data. The interviews were carried out as a part of Eurobus, an international group of market research organizations offering social research in each member state for conducting intercountry surveys. Interviews in all countries were completed between February and April 1997. Participants were classified according to gender, age, marital status, size of household, and the highest level of education achieved. In addition, for each subject we calculated the body mass index (BMI) as the weight in kilograms divided by the squared height in meters ($kg \cdot m^{-2}$). We applied the WHO criteria for the definition of overweight and obesity.

By using the Compendium of Physical Activities and the Paffenbarger's questionnaire (2,16), the leisure-time physical activity for each subject was evaluated by asking them to report their participation in the following sports, exercises, or physical activities: athletics, cycling, dancing, equestrian sports, fishing, football, gardening, golf, hill-walking, climbing, keeping fit, aerobics, jogging, martial arts, racquet sports, rowing, canoeing, skiing, skating, swimming, team sports, walking, and water sports. Participants expressed the number of hours a week they practiced each activity. The exact wording of the questions inquiring about each of these activities was: "How many hours approximately would you spend on . . .(activity). . . per week?"

Metabolic equivalents (METs) assigned to each activity were used to quantify the amount of leisure-time physical activity (16). These METs represent the ratio of energy expended during a physical activity to the metabolic rate of sitting quietly. To calculate the weekly leisure-time physical activity (MET-hours), we multiplied the number of hours dedicated to each activity by the specific MET score of each activity (2). The sum of MET-hours for all activities during the week yields the MET-$h \cdot wk^{-1}$ for each participant in the study.

As the distribution of physical activity (MET-hours) was highly skewed, medians instead of means and their 95% confidence intervals were calculated following the method suggested by Campbell and Gardner (4) for large samples. It is important to note that confidence intervals for medians can be asymmetric and one or even both of their limits may lie just in the point estimate. Multiple regression models using leisure time MET-$h \cdot wk^{-1}$ as the dependent variable were fitted. With these models, we estimated the independent contribution of gender, age, education, BMI, weight change in the last 6 months, and marital or smoking status to explain the variability in leisure-time physical activity (MET-$h \cdot wk^{-1}$). All statistical analyses were carried out using the SPSS version 9.0 statistical package.

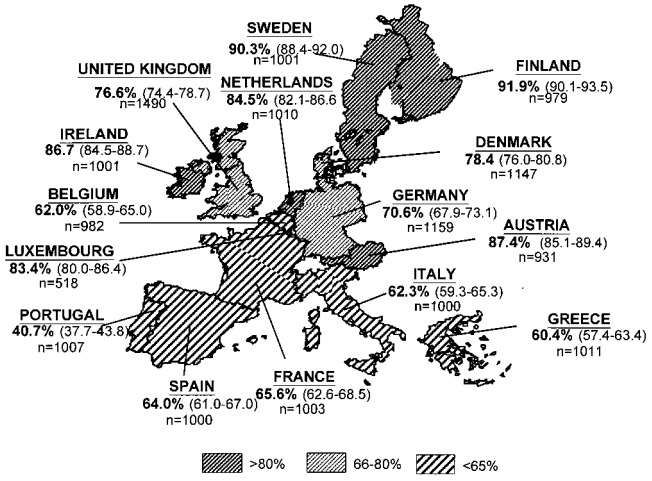

FIGURE 1—Percentage of adult population practicing any leisure-time physical activity.

RESULTS

Figure 1 shows a map with the estimated prevalence (expressed as percentage) of the adult population practicing any leisure-time physical activity in each of the fifteen countries of the E.U. We found a wide variability in the prevalence of leisure-time physical activity among European countries. According to our estimations, Finland and Sweden had the highest prevalence of leisure-time physical activity, with proportions slightly above 90%. Austria, Ireland, and The Netherlands also showed high prevalences ranging from 84.5% to 87.4%, followed by United Kingdom (76.6%) and Germany (70.6%). Meanwhile, Belgium and most Mediterranean countries had point estimates between 60 and 66%. Finally, Portugal presented the lowest prevalence of leisure-time physical activity (40.7%). In Figure 2, we show the medians (25th and 75th percentiles) of MET-$h \cdot wk^{-1}$ in leisure time. As expected, the distribution of MET-$h \cdot wk^{-1}$ by country followed a similar geographical pattern than the distribution observed for the prevalence of leisure-time physical activity.

Table 1 reports the overall percentage of the adult population in the E.U. who practiced any leisure-time physical activity and the median of MET-$h \cdot wk^{-1}$ spent in leisure time. Prevalences and medians were also calculated for different subsets of the population after stratifying by gender, age, education, BMI, weight change in the last 6 months, and marital or smoking status. A significantly higher percentage of men practiced any leisure-time physical activity (75.8%) compared with women (71.1%) ($P <$

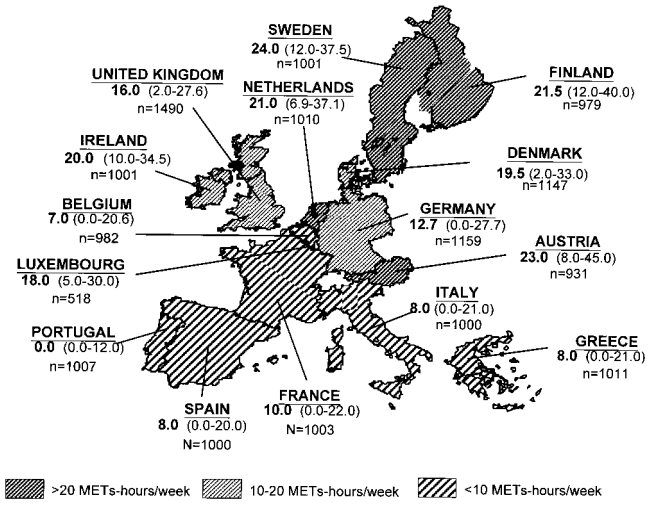

FIGURE 2—Medians (25th–75th percentiles) of MET-h·wk^{-1} during leisure time.

0.001). Likewise, men showed a notably higher median of MET-hours a week (18 MET-h·wk^{-1}) than women (12 MET-h·wk^{-1}).

Multiple regression analyses were carried out using MET-h·wk^{-1} in leisure time as the dependent variable. Gender, age, education, BMI, weight change in the last 6 months, and marital or smoking status were used as independent factors by means of indicator (dummy) variables for those variables with more than two categories. Statistically significant product-terms for effect modification were found between gender and age, and between gender and smoking status. Therefore, we report separate estimations of the regression coefficients for men and women.

Adjusted regression coefficients for the association between MET-h·wk^{-1} and the independent variables are separately presented in Table 2 for men and in Table 3 for women. In men, a significantly higher amount of physical activity was found among 15- to 24-yr-old participants (reference group) with respect to all other age groups. On average, the adjusted physical activity of participants 15- to 24-yr-old was 7.06 MET-h·wk^{-1} higher than that of individuals aged 25- to 34-yr-old, and 10.08 MET-h·wk^{-1} higher than for people older than 65 yr. Among women, only the group of subjects aged 25–34 yr old and the group of people older than 65 yr showed significantly lower MET-h·wk^{-1} than the reference group (15–24 yr). No significant associations were found between MET-h·wk^{-1} and marital status among men. In contrast, women grouped in the categories "married/cohabiting" and "widowed/divorced" exhibited lower physical activity levels than single women, after adjusting for confounding variables.

Both in women and men, inferential analysis supported the well-known inverse association between age or BMI and physical activity: each 1-unit increase in BMI was significantly associated with having a lower leisure-time physical activity (−0.27 MET-h·wk^{-1} among men and −0.33 MET-h·wk^{-1} among women). Likewise, those who lost weight in the last 6 months had significantly higher levels of physical activity when compared with people who maintained the same weight. In both genders, a significant trend to lower activity (−5.25 MET–h·wk^{-1} in men and −4.96 MET-h·wk^{-1} in women) was observed among participants with educational levels lower than high school (reference group: educational level greater than high school). Finally, lower physical activity levels were observed in current smokers for both men and women.

DISCUSSION

The present survey represents the first attempt to estimate leisure-time physical activity in nationally representative samples from the adult population of the E.U. Our overall results indicate a high percentage of citizens of the E.U. who practice any kind of leisure-time physical activity (73.1%). A recent study (17) indicated that 29.9% of the adult population of the U.S. reported inactivity or no physical activity during the past month. This estimate is roughly similar to the results obtained in this survey. Another transnational study regarding the prevalence of leisure-time physical exercise was previously conducted in 21 European countries (20). However, the sample used in this study was not rep-

TABLE 1. Percentage of adult population in the E.U. practicing any leisure time physical activity and median (95% C.I.) of MET-hours a week according to a selection of sociodemographic and lifestyle factors.

	N	Percentage Practicing any Leisure-Time Activity % (95% C.I.)	MET-h in Leisure Time (Median; 95% C.I.)[a]
All	15,239	73.1 (72.4–73.8)	15.0 (14.0–16.0)
Gender			
Female	8077	71.1 (70.1–72.1)	12.0 (11.8–12.0)
Male	7155	75.8 (74.8–76.8)*	18.0 (16.3–18.3)
Age (yr)			
15–24	2634	82.8 (81.4–84.2)*	21.0 (19.8–22.8)
25–34	3079	73.2 (71.7–74.8)	14.0 (12.5–16.0)
35–44	2917	74.2 (72.6–75.8)	15.0 (13.5–16.0)
45–54	2526	71.7 (69.9–73.5)	12.0 (11.5–15.0)
55–64	2165	70.4 (68.4–72.3)	12.0 (11.5–15.0)
65+	1914	64.5 (62.3–66.7)	8.0 (7.5–11.8)
Education			
< High school	4768	64.1 (62.7–65.5)	8.3 (7.5–10.0)
High school	7777	76.2 (75.2–77.1)	16.0 (15.8–20.0)
> High school	3234	81.4 (79.9–82.8)*	19.5 (17.8–20.0)
Marital status			
Single	4794	80.2 (79.0–81.3)*	20.0 (19.5–20.0)
Married/cohabiting	8763	71.4 (70.5–72.4)	12.3 (11.8–14.0)
Widowed/divorced	1675	63.7 (61.4–66.0)	8.0 (7.0–10.0)
Smoking status			
Smoker	5159	69.8 (68.5–71.0)	12.0 (11.8–13.5)
Ex-smoker (<1 yr)	341	77.1 (72.4–81.3)	16.0 (12.0–20.0)
Ex-smoker (> 1 yr)	1579	77.5 (75.3–79.5)*	17.3 (15.8–18.5)
Nonsmoker	8108	74.6 (73.6–75.5)	16.0 (15.5–16.0)
BMI (kg·m^{-2})			
<20	1650	75.4 (73.3–77.4)	16.0 (14.5–18.0)
20–24.99	7354	75.7 (74.7–76.6)*	16.3 (15.8–17.5)
25–29.99	4651	71.8 (70.4–73.0)	13.8 (11.5–14.8)
>30	1416	65.6 (63.1–68.0)	8.0 (7.5–11.0)
Weight change during the last 6 months			
Gained weight	3357	73.0 (71.5–74.5)	14.0 (11.5–16.0)
Lost weight	2423	75.7 (73.9–77.3)*	16.0 (14.8–17.5)
Same weight	9123	73.5 (72.5–74.4)	16.0 (14.8–16.0)

[a] C.I., confidence interval; confidence intervals for medians were estimated using the method described in reference number 4.

* $P < 0.001$; adjusted for all other variables showed in the table using logistic regression.

TABLE 2. Multiple regression coefficients for variables associated with MET-h·wk^{-1} (dependent variable) in E.U. men.

	Multiple Regression Coefficients		
	Coefficient	(95% C.I.)	P*
BMI (kg·m^{-2})	−0.27	(−0.43 to −0.12)	0.001
Age (yr)			
15–24	0 (ref.)		
25–34	−7.06	(−8.87 to −5.25)	<0.001
35–44	−6.87	(−8.84 to −4.89)	<0.001
45–54	−9.99	(−12.10 to −7.88)	<0.001
55–64	−9.06	(−11.23 to −6.88)	<0.001
65+	−10.08	(−12.36 to −7.81)	<0.001
Education			
> High school	0 (ref.)		
High school	−1.86	(−3.27 to −0.44)	0.010
< High school	−5.25	(−6.83 to −3.67)	<0.001
Marital status			
Single	0 (ref.)		
Married/cohabiting	−0.99	(−2.35 to +0.35)	0.146
Widowed/divorced	−1.59	(−3.99 to +0.81)	0.195
Smoking status			
Nonsmoker	0 (ref.)		
Ex-smoker (>1 yr)	−1.77	(−3.46 to −0.08)	0.040
Ex-smoker (<1 yr)	−1.28	(−4.67 to +2.10)	0.458
Smoker	−6.91	(−8.07 to −5.75)	<0.001
Weight change during the last 6 months			
Same weight	0 (ref.)		
Gained weight	0.79	(−0.60 to +2.19)	0.265
Lost weight	2.26	(+0.68 to +3.84)	0.005

* *P*-value for the *t* statistic.

resentative of the whole population, because it was conducted in students 18–30 yr old belonging to relatively privileged educational segments.

Other studies define sedentarism or physical activity by using algorithms that involve the duration and intensity of their activities, the basal metabolic rate, and the maximum cardiorespiratory capacity (1,3). In this context, the comparison of the results of our survey with these epidemiological studies is complex due to the lack of standardization in the measurement of physical activity. Unfortunately, a more accurate measurement of energy expenditure by means of heart-rate monitoring or accelerometers is not feasible for large studies. For this reason, we used a detailed questionnaire to assess leisure-time physical activity, albeit a possible bias may arise by using this procedure, because a tendency to over report self-assessed physical activity has been reported (14). The questionnaire filled by the participants considered a list of physical activities including both physically demanding sports as well as mild physical activities such as walking or gardening. Only subjects who referred having a total lack of such activities were defined as inactive. However, it must be kept in mind that a high proportion of the people who perform any leisure-time physical activity do not consider it as "regular" physical activity.

Based on the activities reported by the participants in the study, METs were computed as a proxy measurement of the amount of physical activity. The use of METs enabled us to discriminate among subgroups of the population characterized by their different intensity of leisure-time physical exercise.

The present survey confirms previously reported associations such as the inverse relationship between BMI and physical activity, which has been explained in the context of the protective effect of an increased energy expenditure in the prevention of obesity (5,7,15,23). Additionally, it is also believed that people with higher BMIs have more barriers to perform physical exercise as a consequence of their obesity (23,25). In this context, it is important to emphasize that this cross-sectional study was designed to present a picture of the prevalence of active lifestyles in large samples of the European countries, and it is not aimed to identify cause-effect relationships. It has been also described that associations between physical activity and body weight in cross-sectional studies are stronger than that those seen longitudinally (5). The association between physical activity and educational status has been also previously described (7,8). It is possible that such association may be biased because some misclassification may occur in lower income education persons who report low levels of leisure-time physical activity, although they probably perform physically demanding jobs. Our data indicate that a higher proportion of men do any kind of physical exercise when compared with women. On the other hand, the relationship between level of exercise and age is dependent on gender, although inactivity increases progressively with age in both men and women.

In summary, we provide estimates of the prevalence and amount of physical activity during leisure time in adult representative samples of the 15 member states of the European Union. Our estimates can be used for international comparisons as well as baseline levels to monitor future trends and to assess the effectiveness of intervention strategies addressing the promotion of physical activity in Europe.

TABLE 3. Multiple regression coefficients for variables associated with MET-h·wk^{-1} (dependent variable) in E.U. women.

	Multiple Regression Coefficients		
	Coefficient	95% C.I.	P*
BMI (kg·m^{-2})	−0.33	(−0.43 to −0.23)	<0.001
Age (yr)			
15–24	0 (ref.)		
25–34	−2.41	(−3.89 to −0.93)	0.001
35–44	−1.66	(−3.21 to −0.11)	0.036
45–54	−0.61	(−2.22 to +1.01)	0.461
55–64	−0.19	(−1.93 to +1.56)	0.836
65+	−4.33	(−6.17 to −2.41)	<0.001
Education			
> High school	0 (ref.)		
High school	−1.36	(−2.54 to −0.18)	0.024
< High school	−4.96	(−6.29 to −3.62)	<0.001
Marital status			
Single	0 (ref.)		
Married/cohabiting	−2.67	(−3.77 to −1.57)	<0.001
Widowed/divorced	−3.15	(−4.68 to −1.62)	<0.001
Smoking status			
Nonsmoker	0 (ref.)		
Ex-smoker (>1 yr)	1.77	(+0.20 to +3.34)	0.027
Ex-smoker (<1 yr)	−2.16	(−5.17 to +0.85)	0.160
Smoker	−2.74	(−3.70 to −1.79)	<0.001
Weight change during the last 6 months			
Same weight	0 (ref.)		
Gained weight	−0.36	(−1.37 to +0.65)	0.487
Lost weight	1.35	(+0.23 to +2.48)	0.018

* *P*-value for the *t* statistic.

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