

# Leisure-Time Physical Activity in a Southern European Mediterranean Country: Adherence to Recommendations and Determining Factors

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**Introduction and objectives.** To determine whether adults in Madrid, Spain adhere to leisure-time physical activity (LTPA) recommendations and to identify factors associated with adherence.

**Methods.** A telephone survey of 12 037 individuals, representative of the Madrid population aged 18-64 years, was conducted. The LTPA level was quantified in metabolic equivalent (MET) hours per week from answers to a questionnaire on the frequency and duration of LTPA. This level was compared with the recommendation to engage in at least moderate activity  $\geq 150$  min/week or vigorous activity  $\geq 60$  min/week. Factors associated with adherence to the recommendation were identified using logistic regression analysis.

**Results.** The mean LTPA level was 17.3 MET-hours/week (95% confidence interval [CI], 16.9-17.7 MET-hours/week) and 28.8% (95% CI, 28-29.7) adhered to the recommendation. The recommended level was achieved more frequently in men than women (odds ratio [OR] = 2.41; 95% CI, 2.20-2.64). In comparison with younger individuals, adherence decreased gradually with age until 60-64 years, when the OR was 0.20 (95% CI, 0.15-0.25). Compared with less well-educated individuals, the university-educated were more likely to meet the recommendation (OR=2.28; 95% CI, 1.82-2.87). Obese individuals achieved it less frequently (OR=0.49; 95% CI, 0.40-0.61) than normal-weight individuals. Those whose job involved low-intensity physical activity achieved it more frequently than those with sedentary occupations (OR=1.21; 95% CI, 1.10-1.34).

**Conclusions.** The majority of adults in Madrid did not achieve the recommended LTPA level. Adherence was lower in women, older individuals, the less well-educated and the obese, while it was greater in those with a job involving low-intensity physical activity.

**Key words:** Leisure-time physical activity. Lifestyle. Recommendations. Madrid.

## Actividad física de tiempo libre en un país mediterráneo del sur de Europa: adherencia a las recomendaciones y factores asociados

**Introducción y objetivos.** Examinar en adultos de la Comunidad de Madrid la adecuación de la actividad física en tiempo libre (AFTL) a las recomendaciones e identificar factores asociados.

**Métodos.** Encuesta telefónica a 12.037 personas, representativa de la población de 18-64 años de Madrid. La AFTL se calculó en MET-h/semana mediante un cuestionario de frecuencia y duración de AFTL. Se comparó con la recomendación de realizar actividad al menos moderada  $\geq 150$  min/semana, o vigorosa  $\geq 60$  min/semana. Los factores asociados al cumplimiento se identificaron mediante regresión logística.

**Resultados.** La media de AFTL fue 17,3 (intervalo de confianza [IC] del 95%, 16,9-17,7) MET-h/semana y un 28,8% (IC del 95%, 28-29,7) alcanzó la recomendación. La AFTL recomendada fue más frecuente en varones que en mujeres (odds ratio [OR] = 2,41; IC del 95%, 2,20-2,64). Comparando con los más jóvenes, la adherencia disminuyó gradualmente con la edad hasta los 60-64 años, donde la OR fue 0,20 (IC del 95%, 0,15-0,25). Respecto a los sujetos sin estudios, los universitarios siguieron más frecuentemente la recomendación (OR = 2,28; IC del 95%, 1,82-2,87). Las personas obesas tuvieron menos probabilidad que los normopesos de realizar la AFTL recomendada (OR = 0,49; IC del 95%, 0,40-0,61). Las personas con actividad laboral de baja intensidad se adhirieron a la recomendación con más frecuencia que las de ocupación sedentaria (OR = 1,21; IC del 95%, 1,10-1,34).

**Conclusiones.** La mayoría de los adultos de Madrid no siguió la recomendación de AFTL. La adherencia fue menor en mujeres, al aumentar la edad, con menor nivel de estudios y en obesos, mientras que fue mayor en personas con ocupaciones que requieren baja intensidad física.

**Palabras clave:** Actividad física en tiempo libre. Estilos de vida. Recomendaciones. Madrid.

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## ABBREVIATIONS

ACSM: American College of Sports Medicine  
 AHA: American Heart Association  
 BMI: body mass index  
 CDC: Centers for Disease Control and Prevention  
 CI: confidence interval  
 LTPA: leisure time physical activity  
 MET: metabolic equivalent  
 NCDRFSS: Non-communicable Disease Risk Factor Surveillance System  
 OR: odds ratio  
 WHO: World Health Organization

## INTRODUCTION

Physical activity is included in recommendations and health guidelines because of the benefits it produces. It reduces all-cause mortality<sup>1,2</sup> and the risk of many diseases, including cardiovascular disease,<sup>3</sup> some types of cancer,<sup>4</sup> diabetes mellitus, hypertension, obesity, and depression.<sup>5,6</sup> Many health agencies have developed recommendations for physical activity. The recommended intensity, frequency, and duration of the physical activity varies, depending on whether the target is health promotion, primary or secondary cardiovascular prevention, rehabilitation, or weight control, among others.<sup>5</sup> Of all the proposals and from a general health perspective, those produced in 1995 by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) are probably the most well-known.<sup>7</sup> They state that all adults should accumulate at least 30 minutes of physical activity of moderate or greater intensity, preferably on every day of the week. A cut point of 5 days/week has been established for the development of indicators. Other countries<sup>8-10</sup> and the World Health Organization (WHO)<sup>11</sup> adopted similar recommendations.

On the basis of new scientific evidence, the ACSM and the American Heart Association (AHA) have recently adapted their recommendations to combine the duration, frequency and intensity of activity and now recommend that "all healthy adults aged 18 to 65 years need moderate-intensity aerobic physical activity for a minimum of 30 minutes on 5 days each week or vigorous-intensity aerobic activity for a minimum of 20 minutes on 3 days each week."<sup>12</sup> Combinations of the 2 types of activity are also acceptable.

Leisure-time physical activity (LTPA) refers to exercise, sports or recreation that is not related to regular work, housework, or transport activities.<sup>5</sup> It may be easier to apply the recommendations in a leisure context, because it is possible to build regularity and routine into LTPA. However, information on adherence to these guidelines in Mediterranean populations of Southern Europe, such as Madrid, is lacking. These populations have an acceptable diet but have undergone a significant increase in overweight and obesity in recent decades which is similar to that observed in most industrialized countries.<sup>13</sup>

This study aimed to determine whether adults in Madrid adhere to the ACSM/AHA recommendations on LTPA and to identify the factors associated with adherence.

## METHODS

### Design and Study Population

This was a cross-sectional study performed in the Madrid region between 2000 and 2005 within the Non-communicable Disease Risk Factor Surveillance System (NCDRFSS). The system records the health and preventive practices of non-institutionalized adults aged 18 to 64 years.<sup>14</sup> Approximately 2000 individuals are selected annually in the region from households with a fixed telephone line (94.8% of total households).<sup>15</sup> Stratified proportional sampling is used to ensure that the sample is representative of the population structure by age, sex, and geographic area. One person per household is interviewed. A total of 12 037 computer-assisted telephone interviews (CATI) were performed over a 1-week period each month, except August.

### Study Variables

The LTPA were measured using a structured questionnaire to recall activity over the previous 2 weeks. Physical activities covered included walking (light and intense), running, biking (light and intense), swimming (light and intense), tennis, racquetball, squash, paddle, other racquet sports, football, basketball, handball and other ball sports, skiing, martial arts, aerobics/gym-jazz-dance, weightlifting/work-outs with apparatus, maintenance work-outs, and a section on "other" activities not included above. The frequency and duration of each activity was recorded. The methodology was similar to that used in validated questionnaires in Spain.<sup>16</sup>

The type of activity together with the frequency and duration of the session were used to calculate

metabolic equivalents (METs) based on the proposal by Ainsworth et al.<sup>17</sup> One MET is 1 kcal/kg body weight/h and a consumption of 3.5 mL of oxygen/kg body weight/min. Consumption of MET-h/week was calculated by multiplying the METs for each LTPA by its duration (in minutes) and cumulative frequency in the 2 weeks prior to the interview. The result was divided by 60 and by 2 to obtain the per hour weekly accumulated total. The results were then classified for LTPA overall and according to intensity: light (<3 METs), moderate (3-6 MET), and vigorous (>6 MET). To determine whether ACSM/AHA recommendations were met,<sup>12</sup> an indicator was developed that included moderate or vigorous activities performed in sessions of at least 10 min duration. We considered that the recommendations were met when LTPA of at least moderate intensity were performed for  $\geq 150$  min/week or when vigorous LTPA were performed for  $\geq 60$  min/week. Respondents were classified into 3 categories: "inactive," when they did no physical activity, "active" but not meeting the recommendations, and "active" and meeting the recommendations.

Information on physical activity at work was also collected in the following categories: most of workday spent seated (sedentary), standing for most of the time (active, low intensity), doing light manual work (active, moderate intensity), and doing heavy manual work (active, high intensity).<sup>18,19</sup> Other variables analyzed included sex, age (9 categories), educational level (less than primary, lower secondary level, upper secondary, and university), body mass index (BMI) calculated as weight in kg/height in meters squared, from self-report data. Subjects were classified as underweight (BMI, <18.5), normal-weight (BMI, 18.5-24.9), grade I overweight (BMI, 25-26.9), grade II overweight (BMI, 27-29.9), and obese (BMI,  $\geq 30$ ).

### Data Analysis

We calculated mean (standard deviations) and percentiles 25, 50, and 75 for MET-h/week consumed in LTPA. Although the variable was positively skewed, means were used to facilitate comparisons with other studies. Quantitative variables were compared using the Mann-Whitney *U* test (for gender) or the Kruskal-Wallis test (for variables such as age, educational level, BMI, and physical activity at work). Categorical variables were compared using  $\chi^2$ .

Finally, we identified factors associated with adherence to LTPA recommendations using logistic regression models to calculate odds ratios (OR) for prevalence after adjusting for gender, age, educational level, BMI, and physical activity at work.

A *P* value less than .05 was considered statistical significance. Statistical tests were performed with Stata v.9 (StataCorp., College Station, 2005).

### RESULTS

The response rate (completed interviews as a proportion of the total of completed, incomplete, and not-performed interviews) was 65.3%. The study sample was similar in age and sex structure to the population aged 18 to 64 years in the Madrid region.<sup>20</sup>

Table 1 shows the distribution of LTPA in terms of MET-h/week. Mean metabolic expenditure was 17.3 MET-h/week, and was higher in men (20.8) than in women (14) ( $P<.001$ ). A nonlinear relationship was observed between age and MET-h/week, with maximum expenditure in younger age groups. Consumption decreased in middle age and increased again in the 60-64 age group ( $P<.001$ ). Energy expenditure was also lower in lower educational categories ( $P<.001$ ). Distribution by BMI was not homogenous ( $P<.001$ ): low weight individuals and particularly overweight and grade II obese individuals reported lower energy expenditure in leisure activities. No significant differences were observed with respect to physical activity at work.

More MET-h/week were consumed in light activities (41.2%) than in moderate (32.5%) or vigorous (26.3%) activities (Table 2). Compared with women, men performed more moderate and vigorous activities ( $P<.001$ ). In addition, a gradual increase in mean consumption through light activities was observed with age, from 5.2 MET-h/week in the younger age group to 13 MET-h/week in older people. However, this trend was reversed for moderate and vigorous physical activities. A similar pattern was observed by educational level, where metabolic expenditure in light activities was higher in individuals with lower levels of education and higher in moderate and vigorous activities in those with higher levels of education ( $P<.001$ ). In obese individuals, energy expenditure was also greater in light activities ( $P<.005$ ) and lower in moderate and vigorous activities ( $P<.001$ ). Individuals performing low intensity activity at work showed the greatest MET-h/week expenditure in light leisure activities ( $P<.001$ ), while those with high intensity work activity spent the most MET-h/week in moderate activities but the fewest in vigorous leisure time activities ( $P<.001$ ) (Table 2).

Table 3 shows the distribution of study participants according to adherence to the recommendations. Overall, 20.4% did not perform any type of leisure activity, the majority (50.8%) performed some physical activity during leisure time but did not comply with the recommendations,

**TABLE 1. Distribution of Leisure Time Physical Activity**

Study Variables	Subjects, n	MET-h/Week				
		Mean	SD	P <sub>25</sub>	P <sub>50</sub>	P <sub>75</sub>
Total	12 037	17.3	22.4	2.5	10.5	23.5
Sex						
Male	5850	20.8	26.1	3.5	12.8	28.5
Female	6187	14	17.6	1.3	8.8	18.6
P		<.001				
Age, y						
18-24	2025	23.8	29.3	3.8	14	31.5
25-29	1736	19.5	25.5	2.5	11.5	27.8
30-34	1142	16.8	21.9	2.5	10	21.6
35-39	1521	14.7	20.1	1.9	8.8	19
40-44	1521	14.8	18.2	1.9	9.7	19.5
45-49	1170	14.3	18.4	1.3	8.8	19.4
50-54	967	14.4	17.4	1.3	9	19.4
55-59	977	14.4	18.6	0.7	9.4	19.2
60-64	979	17.4	18.6	2.5	14.5	25.3
P		<.001				
Level of education						
Up to primary	1010	12.8	17.2	0	8.4	17.5
Lower secondary	3061	15.1	20.1	0	9	19.9
Upper secondary	4047	19.4	24.5	2.5	12	26.3
University	3817	17.9	22.5	3.8	11.5	24.5
P		<.001				
BMI						
Underweight	395	15.6	22	1.3	8.8	20.9
Normal weight	7087	18.2	23.3	2.5	11.3	24.5
Grade I overweight	2004	18.7	23.2	2.8	12	26.3
Grade II overweight	1620	14.4	17.3	1.3	9.3	19.7
Obese	899	13.6	21.1	0	7.5	17.5
P		<.001				
Occupational physical activity						
Sedentary	5378	17.1	22	2.2	10.4	22.8
Low intensity	5139	17.6	22.6	2.2	11.3	24.5
Moderate intensity	1042	17.8	21.8	1.3	9.8	21.6
High intensity	445	17.3	26.4	0	8.8	23.8
P		.0607				

BMI indicates body mass index; MET, metabolic equivalent (measure of energy expenditure, taking resting situation as reference); SD, standard deviation.

and 28.8% met recommended levels of LTPA. Men were more active than women and compliance with the recommendations in men was 37.1% compared to 21.1% in women ( $P<.001$ ). Although statistically significant differences were observed on all the parameters studied, the distribution tended to be more homogeneous in active individuals who did not achieve recommended levels than in those who did reach the recommended level. As age increased, the odds ratios (OR) for meeting the recommendations decreased gradually and significantly until age 60-64, where the OR was 0.20 (95% CI, 0.15-0.25). People with higher levels of education were more likely to comply with the recommendations, with statistically significant differences. Compared with normal-weight individuals, Grade II overweight individuals and above met the recommendations less frequently

(obese, OR=0.49; 95% CI, 0.40-0.61). Finally, statistically significant differences were only observed for those performing low intensity activities when compared with the group of sedentary individuals (OR=1.21; 95% CI, 1.10-1.34).

## DISCUSSION

The main results of the study show that the majority of adults in Madrid perform LTPA, but in too limited a degree, as only a quarter of them achieve the levels of physical activity recommended by the ACSM/AHA. Adherence to the recommendations is lower in women, in those with lower levels of education, and those who are very overweight or obese. Adherence also decreases with age.

**TABLE 2. Distribution of Leisure Time Physical Activity by Intensity**

Study Variables	Intensity of Leisure Time Physical Activity					
	Light <sup>a</sup>		Moderate		Vigorous	
	% <sup>b</sup>	Mean (SD) <sup>c</sup>	%	Mean (SD)	%	Mean (SD)
Total	41.2	7.1 (10.2)	32.5	5.6 (12.7)	26.3	4.5 (14)
Sex						
Male	33.4	7 (10.7)	33.7	7 (14.7)	32.9	6.9 (17.5)
Female	52.3	7.3 (9.7)	31	4.3 (10.3)	16.8	2.4 (8.9)
<i>P</i>		<.001		<.001		<.001
Age, y						
18-24	21.7	5.2 (8.5)	37.2	8.9 (17.4)	41.2	9.8 (19.2)
25-29	28.1	5.5 (8.4)	35	6.8 (13.6)	36.8	7.2 (18.6)
30-34	39.8	6.7 (9.6)	32.8	5.5 (11.5)	27.4	4.6 (14)
35-39	41.4	6.1 (8.8)	31.8	4.7 (10.7)	26.7	3.9 (12.8)
40-44	45.1	6.7 (9)	31	4.6 (9.9)	23.9	3.5 (11.9)
45-49	50.4	7.2 (10.1)	33.8	4.8 (11.2)	15.7	2.3 (9)
50-54	57.7	8.3 (10.7)	31.6	4.6 (10.9)	10.7	1.6 (7.6)
55-59	68.1	9.8 (12.8)	27.7	4 (12.7)	4.2	0.6 (4.4)
60-64	74.3	13 (14.1)	20.5	3.6 (9.4)	5.2	0.9 (5.5)
<i>P</i>		<.001		<.001		<.001
Level of education						
Up to primary	71.9	9.2 (12.4)	21.5	2.8 (9.3)	6.6	0.9 (4.8)
Lower secondary	52.4	7.9 (11.1)	26.9	4.1 (10.6)	20.7	3.1 (11.1)
Upper secondary	34.1	6.6 (9.9)	33	6.6 (13.7)	31.9	6.2 (16.5)
University	36.7	6.6 (9)	36.4	6.5 (13.4)	26.9	4.8 (14.4)
<i>P</i>		<.001		<.001		<.001
BMI						
Underweight	39	6.1 (8.8)	36.6	5.7 (14.2)	24.3	3.8 (12)
Normal weight	37.2	6.8 (9.6)	33.4	6.1 (13.2)	29.4	5.4 (14.9)
Grade I overweight	40.6	7.6 (10.7)	34.2	6.4 (14)	25.3	4.7 (13.9)
Grade II overweight	54.3	7.8 (11.1)	27.9	4 (9.7)	17.7	2.6 (9.6)
Obese	61.7	8.4 (12.2)	24.6	3.3 (9.3)	13.6	1.8 (13.8)
		<.005		<.001		<.001
Occupational physical activity						
Sedentary	35.9	6.1 (9)	34.5	5.9 (12.6)	29.6	5.1 (14.5)
Low intensity	47.2	8.3 (11.4)	30.3	5.3 (12.4)	22.6	4 (13.8)
Moderate intensity	41.1	6.9 (9.7)	29.4	4.9 (12.6)	29.5	5 (13)
High intensity	33.2	5.8 (9.1)	43	7.4 (17.3)	23.8	4.1 (11.2)
<i>P</i>		<.001		<.001		<.001

BMI indicates body mass index.

<sup>a</sup>Light physical activity: <3 METs; moderate intensity: 3-6 METs; and vigorous: >6 METs.<sup>b</sup>Percentage of MET-h/week in relation to the total.<sup>c</sup>Mean MET-h/week consumed.

The median (10.5) and mean (17.3) MET-h/week observed would represent a weekly expenditure of approximately 630 or 1038 kcal, respectively, for a person weighing 60 kg. It is difficult to compare the amount of physical activity in METs between different studies, because of differences in methodology, such as the inclusion of different activities, differences in the way metabolic equivalents are quantified, or the use of usual frequency versus activities performed over a given period in data collection. Nevertheless, taking into account these limitations, the median MET-h/week

and interquartile range were very similar to data for Spain (8) obtained in a European study which used similar methods towards the end of the 1990s.<sup>21</sup> The values are also similar to those observed in many other southern European countries, but considerably lower than those for central and northern Europe.<sup>21</sup>

One in 5 people did not perform any LTPA, a finding which was similar to that for Catalonia in 2002 (21.7%).<sup>22</sup> The majority of active individuals performed low to moderate intensity activities, with more vigorous activities being performed less



**TABLE 3. Adherence to Recommendations for Leisure Time Physical Activity. Compliance With ACSM/AHA Recommendations**

Study Variables	Sedentary, %	Active, Not Meeting Recommendations, %	Active, Meeting Recommendations			
			%	aOR	95% CI	P
Total	20.4	50.8	28.8			
Sex						
Male	17.3	45.6	37.1	2.41	2.20-2.64	<.001
Female	23.2	55.7	21.1	1 <sup>a</sup>		
P	<.001	<.001	<.001			
Age, y						
18-24	16.3	35.9	47.8	1		
25-29	18.3	42.6	39.1	0.64	0.56-0.74	<.001
30-34	17.4	53.2	29.3	0.43	0.36-0.51	<.001
35-39	20.8	52.8	26.4	0.38	0.32-0.44	<.001
40-44	22.3	51.7	26	0.39	0.34-0.46	<.001
45-49	22.9	54.7	22.4	0.32	0.27-0.38	<.001
50-54	23.9	57.9	18.2	0.27	0.22-0.33	<.001
55-59	24.3	62.1	13.5	0.21	0.17-0.27	<.001
60-64	21.3	66	12.7	0.20	0.15-0.25	<.001
P	<.001	<.001	<.001			
Level of education						
Up to primary	33.2	55.6	11.2	1		
Lower secondary	25.6	53.5	20.9	1.33	1.03-1.67	<.005
Upper secondary	18.8	46.5	34.7	2.00	1.59-2.51	<.001
University	14.3	52.4	33.3	2.28	1.82-2.87	<.001
P	<.001	<.001	<.001			
IMC						
Underweight	23.5	49.1	27.3	0.78	0.61-0.99	<.005
Normal weight	19.1	48.7	32.2	1		
Grade I overweight	17.7	52.4	29.9	0.96	0.85-1.08	.543
Grade II overweight	23.6	55.1	21.3	0.69	0.60-0.80	<.001
Obese	27.8	57.5	14.7	0.49	0.40-0.61	<.001
P	<.001	<.001	<.001			
Occupational physical activity						
Sedentary	18.3	49.9	31.8	1		
Low intensity	21.2	52.9	25.9	1.21	1.10-1.34	<.001
Moderate intensity	23.5	48.9	27.5	1.01	0.86-1.19	.822
High intensity	27.4	41.1	31.5	1.04	0.83-1.31	.706
P	<.001	<.001	<.001			

ACSM/AHA indicates American College of Sports Medicine/American Heart Association; aOR, odds ratios adjusted for the remaining variables using multivariable logistic regression; BMI, body mass index; CI, confidence interval.

<sup>a</sup>Reference category.

frequently, as observed in earlier studies in Spain.<sup>23</sup> About 3 in 4 people did not meet the recommendations. Males were more active in leisure time than women, both in terms of meeting the recommendations as well as in terms of MET-h/week total expenditure. These results are consistent with studies in other regions.<sup>21,24-28</sup> Furthermore, the differences between men and women increased with the intensity of physical activity and was greatest for vigorous activity, where values for men were twice those of women.<sup>23,29</sup>

The lower level of compliance in older age groups is in line with results from other studies.

Although there are variations in the form of the relationship according to the definition used,<sup>30,31</sup> in many studies the relationship is linear, especially in the case of moderate or intense activities.<sup>25,26,29,32</sup> In our study, when light intensity activities are included, the MET-h/week total consumption increases and linearity is lost. This increased activity during leisure time with loss of low-intensity activity was also highlighted by Evenson et al<sup>33</sup> in their comparison of retirees with a working population of the same age. The differences were likely due to greater availability of time or a long-term health perspective. Slingerland

et al reached similar conclusions in the GLOBE study.<sup>34</sup>

In terms of educational level, our results indicated a positive linear association, with those with higher levels of education more frequently complying with recommendations on LTPA. This relationship is also consistent with the literature.<sup>25,26,32,35</sup> Although the factors underlying the relationship are not well understood, some determinants reported in the literature include psychosocial factors, family size (number of children in the house), material resources, and presence of illness or poor perceived health.<sup>36,37</sup>

The relationship between physical activity and obesity is complex due to the problem of bi-directionality, as it is not clear whether lack of physical activity is the cause or the consequence of overweight and obesity. The cross-sectional nature of the present study meant it was impossible to determine the nature of the association. Nevertheless, the inverse relation between obesity and LTPA is well-established.<sup>29,31,32,38</sup> In the case of overweight individuals, some authors have observed positive associations,<sup>29,32,38</sup> though this is not always the case.<sup>31</sup> This may be because, as in our study, the association between LTPA and grade I overweight is weak but stronger in the grade II overweight group. The strength of the association tends to diminish when the groups are combined.

With regard to physical activity at work, we found no association with increased compliance with LTPA recommendations, other than a slightly higher adherence in those performing low-intensity activities. Some studies have linked decreased leisure time activity with increased energy expenditure at work<sup>39</sup> or manual labor.<sup>32,40</sup> In a joint study carried out in Estonia, Latvia, and Lithuania, results were discordant between the participating countries.<sup>41</sup> In Estonia, those in sedentary occupations were also more sedentary during leisure time, whereas in the other 2 countries the opposite was true.

Some methodological considerations affecting the interpretation of results require comment. First, the self-report questionnaires used in NCDRFSS may have limited validity and reliability. Likewise, the precision of estimates may be affected by recall bias, a tendency to exaggerate the amount of activity performed, or the fact that the time period covered may not be representative.<sup>5,42</sup>

In our questionnaire, which was intended to cover LTPA, activities of daily living, particularly housework or getting around, were not systematically included. These do not usually reach the intensity threshold of 3 MET.<sup>17</sup> Additionally, activities such as climbing stairs and traveling to the workplace generally do not require more than 10 min. However, if these or other activities (home

repairs, gardening activities, etc) were considered leisure activities by the interviewee, then they would have been included in our study.

Another difficulty in assessing compliance with the recommendations is that they incorporate the dimension of regularity, ie, sessions of moderate or vigorous activity should last at least 10 min and should sum to 30 min or 20 min respectively (30 if a combination of both) during the day. However, in most recall exercises for a given time period only the frequency with which the activity was performed is recorded, rather than the day on which it was performed. The average is then taken to determine whether the individual performs over 150 min/week for moderate activity (either alone or combined with vigorous activities) or 60 min/week for vigorous activity, where sessions last at least 10 minutes. This approach overestimates compliance with recommendations when compared with indicators that also include regularity (the latter requires collecting information regarding the day on which the activity was performed). In a US study into adherence with CDC/ACSM recommendations, it was found that compliance was 22.7% when measured as those who performed 3 or more MET for 30 min each day on 5 days of the week. However, compliance increased to 38.4% when it was measured simply as those achieving an overall total of 150 min per week.<sup>43</sup>

Finally, this study was based on a large representative sample of the adult population of Madrid with interviews being conducted throughout the year to control for possible seasonal variations. The MET estimation used in the study questionnaire has also shown an acceptable level of reproducibility (intraclass correlation coefficient =0.65).<sup>44</sup>

## CONCLUSIONS

The majority of adults in Madrid did not achieve the recommended LTPA level, which constitutes an important public health problem, and distribution was influenced by sociodemographic and anthropometric factors. Adherence was lower in women, older individuals, the less well-educated and the overweight or obese, while it was greater in those with a job involving low-intensity physical activity.

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