ISMJ

International SportMed Journal

Original research article

Walking among older adults in Spain: Frequency and gender roles

[1]*Professor Vicente Romo-Perez, PhD, [2]Dr Andiara Schwingel, PhD, [2]Professor Wojtek Chodzko-Zajko, PhD

[1] Faculty of Education and Sports Sciences, University of Vigo, Spain
[2] Department of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Il, USA

***Corresponding author. Address at the end of text.**

Abstract

Background: This study compared walking frequency and associated variables between older males and females living in Spain. **Type of study:** Cross-sectional analysis. **Methods:** Logistic regression was used to determine differences in various intensities and durations of walking. The sample consisted of 1,504 people over 60 years of both genders. **Results:** For low frequency of walking, there were no significant differences between males (68.2%) and females (68.4%). When the frequency increased to five days per week, the differences were significant: males (51.5%), females (43.5%). Level of education was found to be associated with the likelihood of walking: males (OR=1.9), females (OR=1.4) and perceived physical condition males (OR=3.0), females (OR=4.6). **Conclusion:** Overall, the probability of walking, at a faster pace with the purpose of maintaining or improving fitness, was the same for males and females. However, the males walked more frequently than the females. Moreover, females with low self-rated physical fitness levels were most unlikely to walk on a daily basis. Physical inactivity was associated with low levels of education, particularly among males. These data suggest that the older adult Spanish population is insufficiently active and that females and those with low levels of education were the least likely to walk on a daily basis.

Keywords: walking, elderly, gender, physical activity, frequency

***Professor Vicente Romo-Perez, PhD**

Professor Romo-Perez research focuses on elderly people and recommendations of physical activity. Professor Romo-Perez is a Head of Department in the Faculty of Education and Sport Sciences at the University of Vigo (Spain)

Professor Andiara Schwingel, PhD

Professor Schwingel's research focuses on how cultural, national, and international factors impact the process of growing older around the world. Dr Schwingel's research has also examined the impact of transnational migration on a wide variety of health and quality of life outcomes. Andiara Schwingel is a professor at the University of Illinois at Urbana-Champaign (USA).
Email: andiara@illinois.edu

Professor Wojtek Chodzko-Zajko, PhD

Professor Chodzko-Zajko's primary research interests are in the area of aging and physical activity. For the past twenty-five years he has focused on the effect of exercise and physical activity on health and quality of life in old age. Professor Chodzko-Zajko is a Head of Departament of Kinesiology and Community Health at the University of Illinois at Urbana-Champaign (USA). Professional affiliations American Kinesiology Association, American College of Sports Medicine, National Academy of Kinesiology, Gerontological Society of America. Professor Chodzko-Zajko was President of the International Society for Aging and Physical Activity, the international academic association of scholars in the area of aging and physical activity from 1999- 2009., and served as founding editor of the Journal of Aging and Physical Activity, the first journal dedicated to the scientific study of exercise

and physical activity in older adult populations. He currently serves on the Editorial Board of the journal.
Email: wojtek@illinois.edu

Introduction

In the coming years Europe will experience a substantial increase in the older adult population. This is already occurring in Spain. In regions like Galicia, it is estimated that older adults comprise over 20% of the total population[1]. Along with an increased proportion of older adults, there come issues related to the costs of providing social programs and services for seniors. These programs are needed to address the many health problems seen commonly in old age such as physical disability and the development of chronic diseases.

The direct costs of physical inactivity are huge and have been estimated to cost approximately 10% of the national health budget[2] and inactivity is associated with large increases in medical expenditures[3]. In contrast, regular physical activity has many health benefits[4,5] and is associated with reductions in health care spending[6,7]. Increasingly, physical activity is promoted as a strategy for maintaining and improving the health of the population[8].

Organisations such as the World Health Organization (WHO)[9] and initiatives such as The Toronto Charter for Physical Activity[10], have made an urgent appeal to increase the physical activity (PA) levels of the population. Regular PA is essential for older people. Walking is an ideal activity to implement these recommendations[3]. Walking is also appropriate as a gentle start-up PA for the sedentary, including inactive older adults with limited mobility. This group is an important target for public health interventions[11]. Numerous studies have shown that one strategy to reduce the burden of chronic disease and rising health care costs is as simple as walking every day. The importance of walking is widely recognized to as a public health strategy[3], the reasons being mainly that walking is an aerobic and low-impact activity [12]. It is also inexpensive, can be done almost anywhere, and requires no special equipment.

Several governments and organisations recommend at least 30 minutes of PA per day for a minimum of 150 minutes of moderate intensity PA per week[13,14]. Generally, it is recommended that PA be performed every day or almost every day. Therefore, the frequency of PA is an important aspect of meeting PA recommendations. PA recommendations for males and females do not differ[15]. However, many studies have indicated that females are less active than males[16-18]. Although several studies have examined the prevalence of walking[19,20] and other have explored gender differences in walking[21], relatively few have examined both gender and frequency of walking [22]. The aim of this study was to compare walking frequency and associated variables in a nationally representative sample of older males and females living in Spain. Based on previous research in Spain and other countries we hypothesised that many older adults in Spain would fail to meet national and international PA guidelines and that older women would be found to be less active than older males.

Methods

These authors' empirical analysis was based on data drawn from the 2005 National Survey of Sport Habits among Spaniards (EHDE-2005). This national survey, conducted by the National Center of Sociological Research (CIS) of the Spanish government, was supported by the Spanish Sport Council (CSD). 8,070 face-to-face interviews were conducted between March and April 2005. The questionnaires targeted subjects between 15 and 74 years of age. The sampling was conducted in 289 cities (municipalities) in all provinces of Spain. More details on the sampling are published in the CIS website (http://www.cis.es).

Sample

This cross-sectional study employed a representative sample of the Spanish population, and consisted of 8,070 interviews. For this manuscript, data from individuals aged 60-74 years of age were used, totalling 1 504 interviews. Of these, 47.2% (710) were males and 52.8% (794) were females. The average age for the sample was 68-years-old (+-SD 0.18). These authors' goal was to examine PA behaviour among the older Spanish population, since there is no consensus about the age at which old-age begins[13] .It was decided to select all persons over the age of 60-years-old in order to provide a 15-year cohort of participants to study. Had the

authors selected 65-years-old as the minimum age, the statistical power of the study would have been substantially reduced.

The population for the EHDE-2005 study was selected by using a stratified sampling technique, with randomised, proportional sampling of the primary (municipalities) and secondary units (sections) and true random selection of the final units (individuals) by gender and age. The strata were formed by taking into account the 17 autonomous regions in Spain, and the size of the cities, ultimately dividing the sample into 7 categories. The questionnaires were completed by conducting personal home interviews.

Variables

The dependent variables were walking (several frequencies), dichotomised into binary answers, similar to the classification used in other studies[22]. The main questions asked were, "Do you usually walk at a fast pace with the purpose of maintaining or improving your fitness?" and "How often do you usually walk?". To know how effective the independent variables were for each level of walking frequency, these authors created three dummy dependent variables: a) Walk=1, Not Walk=0, b) Walk 2-3 days per week or more=1, Walk less 2-3 days per week=0, c) Walk every day or almost every day=1, Walk less than every day=0, dichotomised into "yes" or "no" for the logistic regression (Figure 1). The group that walked most frequently was selected as the referent group performed because daily or almost daily PA is recommended for older adults[12] to meet PA [13, 23].

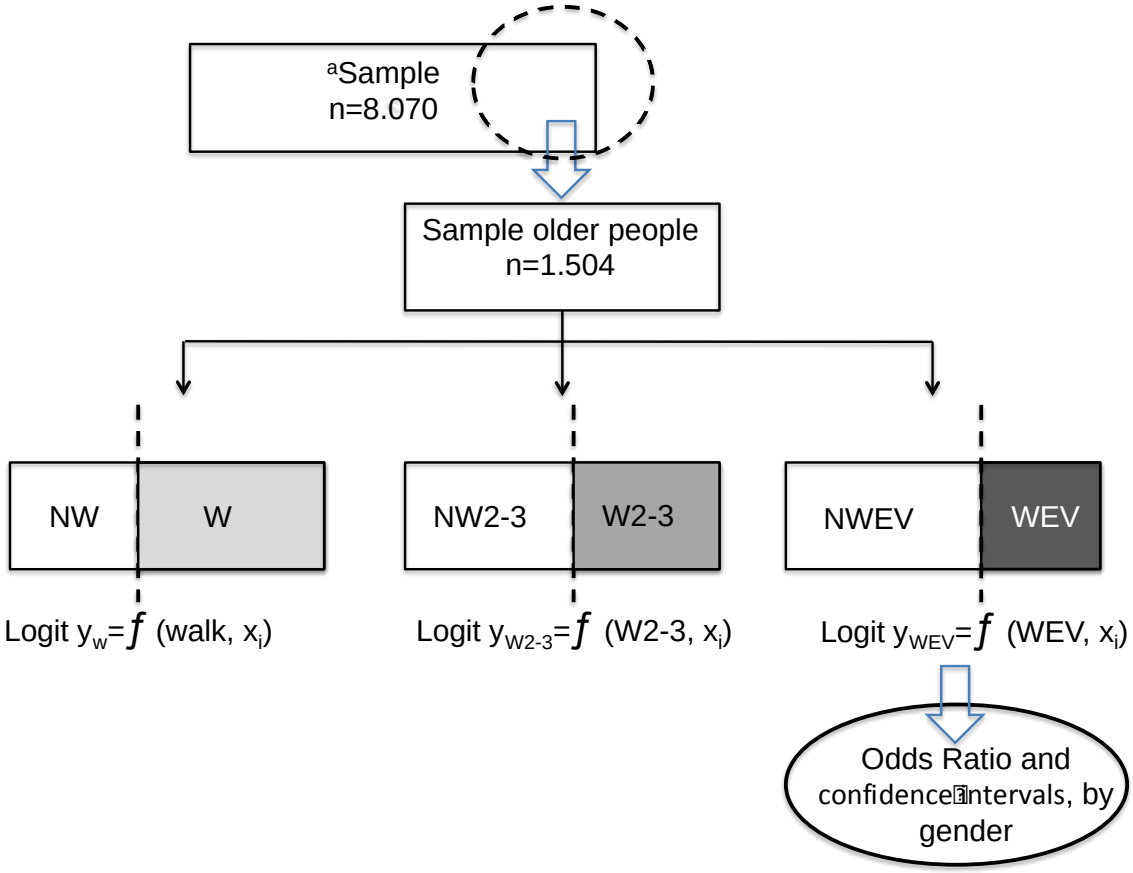

Figure 1: Sample description of several groups with respect to walking frequency

NW: Not walking; W: Walking; NW2-3: Walking less than 2-3 days per week; W2-3: Walking 2-3 days per week or more; NWEV: Not walking every day; WEV: Walking every day.
[a]Sample of National Survey of Sport Habits among Spaniards

Several independent variables were included in the study: 1) gender[21]; 2) age[22]; 3) education level divided into: no formal education, grade school level of education, secondary or post-secondary education; 4) rural environments[2], separated into two

categories: subjects living in municipalities of over 10,000 people (Urban) and less than 10,000 people (Rural); 5) self-rated physical condition, divided into three categories: bad, normal, good; 6) sports practice; 7) whether the sport was practiced in the past. The characteristics of the variables are shown in Table 1.

Table 1: Descriptive statistics. Construction of variables and coding

Variable	n	Descriptions	Mean or %	SD	(95%CI)
[a]**Walk** (Dependent variable) Walking		1=walk, 0=no walk	0.678	0.012	(0.65-0.70)
[a]**Walk 2-3** (Dependent variable) walking 2-3 days per week		1=walk 2-3 days or more, 0= walk less than 2-3 days per week	0.600	0.012	(0.57-0.62)
[a]**Walk ED** (Dependent variable) walking every day or almost every day	708	1=walk every day, 0=not walk every day	0.470	0.012	(0.44-0.49)
Male	710	1=male, 0=female	0.472	0.012	(0.45-0.49)
Age		Age in years	68.0	0.181	(67.6-68.3)
Age male		Male age in years	68.2	0.262	(67.6-68.6)
Age female		Female age in years	67.9	0.250	(67.4-68.4)
Increment of age					
Dummy variables					
60-64	524	1=60-64 years old	0.35	0.012	(0.32-0.37)
65-69	413	1=65-69 years old	0.27	0.011	(0.25-0.29)
70-74	567	1=70-74 years old	0.38	0.012	(0.35-0.40)
Education level					
Dummy variables					
No formal education	367	1=no formal education, 0=other	0.24	0.011	(0.22-0.26)
Grade level education	898	1=grade level education,0= other	0.60	0.012	(0.57-0.62)
Secondary or post-secondary education	239	1=secondary or post-secondary education, 0=other	0.16	0.009	(0.14-0.18)
Rural environment	518	1=less than 10.001, 0=more than 10.000	0.34	0.012	(0.32-0.36)
Physical fitness (Self-reported)					
Dummy variables					
Bad	382	1=bad, 0=other	0.25	0.011	(0.23-0.28)
Normal	642	1=normal, 0=other	0.43	0.012	(0.40-0.45)
Good	480	1=good, 0=other	0.32	0.012	(0.30-0.34)
Sport practice	260	0=not, 1=yes	0.18	0.009	(0.16-0.19)
Previous exercise	323	0=not, 1=yes	0.22	0.010	(0.20-0.24)

SD=Standard Deviation
[a] Dummy variables for each level of frecuency

Statistical analysis

An analysis of PA by gender and frequency was conducted. Contingency tables with percentages of PA by walking were developed. The chi-squared test ($\chi 2$) was used to test for differences at the <0.05 level of significance. This study's first analysis focused on the interaction between gender and the frequency of walking each week.

The second analysis focused on the explanatory models of frequency of walking (times per week with dummy variables). Logistic regression analysis was performed to evaluate the strength of the association with each independent variable, in order to establish the relationship between the dependent variables (Table 1). For the explanatory or independent variables, we used the logistic regression model because the dependent variable was dichotomous.

Finally, a logistic regression model was used with one dependent variable (walking every day versus walking less than every day) and several independent or explanatory variables. To analyse the association between the dependent and independent variables, a bivariate analysis was performed. Adjusted odds ratios (OR) and confidence intervals (CI

95%) were obtained using logistic regression (Figure 1).
The analysis was applied to the population as a whole and divided by gender (male-female). Statistical analysis using STATA was made with Mac, version 11.0 (State Corp., Texas, USA). Statistical significance was set at p <0.05.

Results

In the sample, the mean age was 68-years-old. There were no differences between males (68.2 years) and females (67.9 years) and the proportion of males and females was similar (47.2% were male). Table 1 presents the descriptive statistics: means and proportions of the sample grouped by age, education level, living environment, perceived levels of physical fitness, current and past sport practice.

There were no gender differences in the percentage of people who reported walking with the purpose of improving or maintaining physical fitness: female (68.4%) and male (68.2%). But when subjects were classified according to the weekly walking frequency, gender differences appeared. When the frequency increased to 2-3 days a week or more, differences became more apparent: female (59.4%) and male (61.6%). Table 2 shows the largest difference between male and female was when the frequency increased to walking every day: female (43.5%), male (51.5%), with p-value (p=0.002). The chi-squared analysis revealed significant differences between males and females in the age groups 65-69 and 70-74 years old. Table 2 reveals that when the frequency for walking increased per week, the differences between males and females widened, and these differences were statistically significant.

Table 2: Percentages of men and women who walk in different frequencies

	Walk			**Walk 2-3 days per week or more[b]**			**Every day/week[b]**		
	Female	Male	Chi [2]	Female	Male	Chi [2]	Female	Male	Chi [2]
60-64	72.1	68.9	$\chi2$=0.6602 *p*=0.416	64.1	58.0	$\chi2$=1.6923 p=0.193	45.4	48.1	$\chi2$=0.4077 *p*=0.523
65-69	73.1	71.9	$\chi2$=0.0837 *p*=0.772	61.2	66.6	$\chi2$=1.3622 *p*=0.243	45.1	55.6	$\chi2$=4.4767 *p*=0.034
70-74	60.3	65.0	$\chi2$=1.2291 *p*=0.268	53.0	61.1	$\chi2$=3.4957 *p*=0.062	40.1	51.9	$\chi2$=7.3737 *p*=0.007
All	68.4	68.2	$\chi2$=0.0086 *p*=0.926	59.4	61.6	$\chi2$=0.7387 *p*=0.390	43.5	51.5	$\chi2$=9.3770 *p*=0.002

[a] Walk at a faster pace with the purpose of maintaining or improving your fitness (yes or not)
[b] Frecuency expressed as days per week

Table 3 presents the results of the logistic regression analysis for the three groups (walk, more than 2-3 days per week, every day per week) by frequency. Each model explained a low proportion of the variance: walking (R^2=6.3%), walking 2-3 days per week or more (R^2=6.0%), and walking every day (R^2=5.3%). The significant variable in the three models was physical fitness. Moreover, in the highest frequency analysis (walking every day), education and physical fitness were found to be statistically significant.

Table 3: Explanatory models of practice of walking of different frequencies

Explanatory variable	Variables included	β	z	*p*	PR^2
Walk	Constant	-0.021	-2.29	0.011	0.063
	Gender	-0.211	-1.71	0.087	
	Age	-0.012	-1.69	0.091	
	Education	0.179	1.74	0.082	
	Physical fitness	0.691	8.25	0.000	
	Practice sport	0.369	2.03	0.042	
	Size city	0.098	0.79	0.432	
	Practice before	0.182	1.17	0.243	
2-3 days per week or more	Constant	-1.441	-5.01	0.000	0.060
	Gender	-0.072	-0.61	0.540	
	Age	-0.024	-0.36	0.720	
	Education	0.202	2.07	0.039	
	Physical fitness	0.706	8.83	0.000	
	Practice sport	0.218	1.32	0.187	
	Size city	0.142	1.19	0.235	
	Practice before	0.034	0.24	0.814	
Every day/week	Constant	-2.172	-7.56	0.000	0.053
	Gender	0.192	1.69	0.091	
	Age	0.051	0.78	0.433	
	Education	0.256	2.69	0.007	
	Physical fitness	0.659	8.42	0.000	
	Practice sport	-0.026	-0.17	0.865	
	Size city	0.009	0.08	0.932	
	Practice before	0.014	0.10	0.920	

PR^2: Pseudo R square
[a] Likelihood Ratio.

Table 4 shows the adjusted odds ratio for the logistic regression for the variables by gender and frequency for walking every day. The probability of a male walking is OR=1.2 ($p<0.05$) more than a female. There were important differences by age. In the 70-74 age group, the OR was 0.8 for females (influence negative) and the OR was 1.4 for males (influence positive). Also, education level was an important predictor for probability for walking every day for males.

Table 4: Logistic regression for all elderly, female, and male walking every day

Variable	All OR (95%)	Female OR (95%)	Male OR (95%)
Gender			
Female	1	--	--
Male	1.2 (1.0-1.5)*	--	--
Age			
60-64 years	1	1	1
65-69 years	1.3 (1.0-1.7)*	1.1 (0.7-1.6)	1.5 (1.0-2.3)*
70-74 years	1.1 (0.8-1.4)	0.8 (0.6-1.2)	1.4 (1.0-2.0)*
Education			
No formal education	1	1	1
Grade level education	1.3 (1.0-1.8)*	1.1 (0.7-1.6)	1.7 (1.1-2.5)*
Secondary or post-secondary education	1.6 (1.1-2.5)*	1.4 (1.0-1.8)	1.9 (1.1-3.3)*
Physical fitness			
Very bad/bad	1	1	1
Normal	1.9 (1.4-2.5)*	2.4 (1.6-3.5)*	1.4 (0.9-2.2)
God/very good	3.7 (2.7-5.1)*	4.6 (2.9-7.1)*	3.0 (1.9-4.6)*
Practice sport			
No	1	1	1
Yes	0.9 (0.7-1.3)	1.1 (0.6-1.7)	1.0 (0.6-1.5)
Rural environment			
No	1	1	1
Yes	1.0 (0.8-1.1)	1.0 (0.7-1.4)	1.0 (0.7-1.4)
Previus exercise			
No	1	1	1
Yes	1.0 (0.7-1.3)	0.9 (0.7-1.3)	0.9 (0.6-1.3)
PR^2	0.055	0.060	0.049
$\chi 2$	110.92	63.16	46.45
(*p*)	(0.000)	(0.000)	(0.000)

PR^2, Pseudo R square; *p<0.05

The self-perception of physical fitness contributed to the probability of walking every day. For those who perceived normal self-rated physical fitness, the OR was 2.4 for females and 1.4 for males (p<0.05). When the elderly had a good perception of self-rated physical fitness, the probability of walking increased: female (OR=4.6, p<0.05), male (OR=3.0, p<0.05). Furthermore, the rest of the variables (practice sport, rural environment, previous exercise) had little predictive power. They were not statistically significant and the odds ratios were close to unity.

A global analysis model using logistic regression was used to obtain the general value of Likelihood Ratio (LR)=112.66 (p=0.000). The results were analysed by gender for males (LR=40.97, p=0.000) and females (LR=67.34, p=0.000). This showed that all the coefficients of the independent variables were statistically different from zero. Thus, the outcome indicated that all independent variables were relevant to explain the dependent variable. All LR's were statistically significant.

Discussion

The purpose of this study was to explore the prevalence of walking frequency and associated variables among older males and females living in Spain. The results showed that 67.8% of the population walk with the purpose of improving or maintaining physical fitness and did not differ much when compared to other studies. Eyler et al.[22] found 72.8% of the group older than 65 years old walked and another study by Fitzhugh and Thompson[24] showed 65.4% (60-69-years-old) and 62.6% (70-79-years-old) walked regularly. On the other hand, only 17.6% of the population over 60-years-old practiced sports. These data suggest that walking may be the most feasible and appropriate way for older adults to meet PA recommendations[23, 24]. In the discussion the authors compare and contrast the findings of this study to previously published research that has examined either walking behaviour specifically or PA in general. Although walking is the single most popular and frequently reported form of physical activity among older adults, numerous studies have examined multiple forms of PA including structured exercise programmes, sports participation, and

lifestyle PA, such as walking and gardening. These authors believe that it is instructive to compare the PA behaviour of the older Spanish population with existing findings for both other walking studies as well as studies that examined PA more broadly.

This study's results were similar to other studies that have found that males walk more frequently than females[22]. When the frequency of walking was low; there was a higher percentage of females walking when compared to males. However, when the frequency of walking increased, there was a greater difference between genders. The males had a higher frequency because elderly females (30%) were more sedentary than the males (21.9%)[16]. Also, the levels of PA were more stable with increasing age for males than for females[16]. When the frequency of walking was higher, the difference between genders was larger. Azebedo et al.[18] found that the males walked more frequently than the females. Our results are consistent with Carlson et al.[25] who found that when PA frequency increased, the differences in gender increased: insufficiently active (female 21.8%, male 18.4) and highly active (female 24.2%, male 33.0%). Lee et al.[21] also found that males walked more frequently, with longer durations, and for longer distances compared to females.

Logistic regression revealed that being a male increased the probability of high-frequency walking (walking every day). Another study[26] of elderly Brazilian people aged 60-years and over, showed even greater gender differences than this present study (male 56.9, female 34.1). One possible reason to explain such a difference may be due to female's fear of walking alone in Brazil. Fear can be an important barrier to PA[26,27]. In addition, another possible factor is a woman's health: pain or fatigue[28]. There is another study that found no differences between men and women in the frequency of walking[22]; however, data from this study were not disaggregated by age, so the comparisons have to be taken with caution. Walking behaviour is clearly affected by the environment[29], which can be a very influential factor in PA choices[19,30,31]. However, in most instances walking is a cheap and low-risk activity that is an adequate PA stimulus and is appropriate for all age groups[23,29].

Self-rated PA level is closely correlated with the actual health status of the individual[32]. Self-rated health has been shown to be a barrier for walking. Although one study found females to have lower self rated health than males[18], other have found no differences between genders [21].

When the level of education decreases, the probability of walking also decreases. When separated by gender, the influence is higher for males than females. The results of this present study are similar to the findings of Walsh et al.[33]. Another study[24] found the proportion walking is less for less well educated individuals 47.1% and high for those with higher education levels 56.4%.

For subjects with previous sport experience but with no current practice of sport, results showed no significant association with the probability of walking. This is similar to another research study that analysed how this variable may be a predictor of PA[21]. Moreover, this present study did not find an association between living in a rural environment versus living in an urban environment. However, other studies have found a difference[22]. The reason could be due to differences in the definition rural versus urban between United States and Europe.

The present study has several limitations. For quantifying the level of PA, this study used frequency of walking per week because this is how PA was assessed in the National Survey of Sport Habits among Spaniards. This study would have been stronger if PA had been assessed by a widely recognised PA questionnaire, e.g. International Physical Activity Questionnaire (IPAQ) or if a more specific variable (minutes walked/week) was known. However, to the best of these authors' knowledge, this National Survey is the only dataset available in Spain to study sport and PA. Another shortcoming is the data set employed in this present study did not include any older adults above the age of 74-years-old. No information is available about the PA behaviour of the growing segment of Spanish society that are 75-years or older. The strengths of this study include that the sample is large and is representative of the country. For this reason, the results can be generalised for the entire Spanish population of older adults.

The conclusions of this study suggest that the probability of walking, at a faster pace with the purpose of maintaining or improving fitness, was similar for males and females. However, when the frequency of walking was increased,

the males had a higher probability to walk than compared to females. Moreover, when the frequency of walking was high (walking every day) and the self-perceived physical fitness level was poor, the probability of walking decreased, especially in females. Low levels of education affected the probability of walking every day. This affected males more than females.

Acknowledgement:
Lisa Tran Nguyen for the critical reading of this paper.

Address for correspondence:
Professor Vicente Romo-Perez, University of Vigo, Faculty of Education and Sports Sciences, Campus a Xunqueira s/n, 36005 Pontevedra, Spain
Tel.: 0034986801700
Fax: 0034986801701
Email: vicente@uvigo.es

References

1. Instituto Nacional de Estadistica (INE). Demografía y población. Available at: URL: http://www.ine.es/inebmenu/mnu_cifraspob.htm. Accessed 15 July 2011.
2. Colditz GA. Economic costs of obesity and inactivity. Med Sci Sports Exerc 1999;31:S663-S667.
3. Lee I, Buchner D. The importance of walking to public health. Med Sci Sports Exerc 2008;40:S512-S518.
4. Yancey A, Fielding J, Flores G, et al. Creating a robust public health infrastructure for physical activity promotion. Am J Prev Med 2007;32:68-78.
5. Luepker R, Johnson S, Breslow L, et al. Physical activity and cardiovascular health. JAMA 1996;276:241-246.
6. Roux L, Pratt M, Tengs T, et al. Cost Effectiveness of Community-Based Physical Activity Interventions. Am J Prev Med 2008;35:578-588.
7. Martinson BC, Crain AL, Pronk NP, et al. Changes in physical activity and short-term changes in health care charges: a prospective cohort study of older adults. Prev Med 2003;37:319-326.
8. Lee IM, Buchner DM The importance of walking to public health. Med Sci Sports Exerc 2008;40:S512-S518.
9. World Health Organization (WHO). Global Strategy on Diet, Physical Activity and health. Avaliable at: URL: http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf. Accessed 12 January 2011.
10. Bull F, Gauvin L, Bauman A, et al. The Toronto Charter for Physical Activity: A Global Call for Action. Journal of physical activity health 2010;7:421-422.
11. Morris J, Hardman A. Walking to health. Sports Med 1997;23:306-332.
12. Shibata M, Shimura M, Shibata S, et al. Determination of the optimal walking speed for neural relaxation in healthy elderly women using electromyogram and electroencephalogram analyses. Eur J Appl Physiol 1997;75:206-211.
13. Chodzko-Zajko W, Proctor D, Singh M, et al. Exercise and Physical Activity for Older Adults. Med Sci Sports Exerc 2009;41:1510-1530.
14. Garber C, Blissmer B, Deschenes M, et al. Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise. Med Sci Sports Exerc 2011;43:1334-1359.
15. Hawkes J, Holm K. Gender differences in exercise determinants. Nurs Res 1993;42:166-172.
16. Varo J, Martinez-Gonzalez M, de Irala-Estevez J, et al. Distribution and determinants of sedentary lifestyles in the European Union. Int J Epidemiol 2003;32:138-146.
17. Nomaguchi K, Bianchi S. Exercise time: Gender differences in the effects of marriage, parenthood, and employment. J Marriage Fam 2004;66:413-430.
18. Azevedo M, Araujo C, Reichert F, et al. Gender differences in leisure-time physical activity. Int J Public Health 2007;52:8-15.
19. Inoue S, Ohya Y, Odagiri Y, et al. Association between Perceived Neighborhood Environment and Walking among Adults in 4 Cities in Japan. J Epidemiol 2010;20:277-286.
20. Landi F, Russo A, Cesari M, et al. Walking one hour or more per day prevented mortality among older persons: Results from ilSIRENTE study. Prev Med 2008;47:422-426.
21. Lee Y. Gender differences in physical activity and walking among older

adults. J Women Aging 2005;17:55-70.
22. Eyler A, Brownson R, Bacak S, et al. The epidemiology of walking for physical activity in the United States. Med Sci Sports Exerc 2003;35:1529-1536.
23. World Health Organization (WHO). Golbal recommendations on physical activity for health. Avaliable at: URL: http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/index.html. Accessed 22 January 2011.
24. Fitzhugh E. Leisure-Time Walking and Compliance With ACSM/AHA Aerobic-Related Physical Activity Recommendations: 1999-2004 NHANES. J Phys Act Health 2009;6:393-402.
25. Carlson S, Fulton J, Schoenborn C, et al. Trend and Prevalence Estimates Based on the 2008 Physical Activity Guidelines for Americans. Am J Prev Med 2010;39:305-313.
26. Salvador E, Reis R, Florindo A. Practice of walking and its association with perceived environment among elderly Brazilians living in a region of low socioeconomic level. Int J Behav Nutr Phys Act 2010;7:67.
27. Dawson J, Hillsdon M, Boller I, et al. Perceived barriers to walking in the neighborhood environment: A survey of middle-aged and older adults. J Aging Phys Act 2007;15:318-335.
28. Cooper K, Bilbrew D, Dubbert P, et al. Health barriers to walking for exercise in elderly primary care. Geriatr Nurs 2001;22:258-262.
29. Gomez L, Parra D, Buchner D, et al. Built Environment Attributes and Walking Patterns Among the Elderly Population in Bogota. Am J Prev Med 2010;38:592-599.
30. Saelens BE, Sallis JF, Frank LD. Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. Ann Behav Med 2003;25:80-91.
31. Li F, Fisher K, Brownson R, et al. Multilevel modelling of built environment characteristics related to neighbourhood walking activity in older adults. J Epidemiol Community Health 2005;59:558-564.
32. Plotnikoff R, Mayhew A, Birkett N, at al. Age, gender, and urban-rural differences in the correlates of physical activity. Prev Med 2004;39:1115-1125.
33. Walsh JME, Pressman AR, Cauley JA, et al. Predictors of physical activity in community-dwelling elderly white women. J Gen Intern Med 2001;16:721-727.