Universidade Nova de Lisboa

Escola Nacional de Saúde Pública

Socio-demographic correlates of physical activity of European adults: A cross-sectional study from the European Social Survey

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Outubro, 2015

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Dissertação apresentada para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Saúde Pública, na especialidade de Promoção e Proteção da Saúde, realizada sob a orientação científica do Professor Doutor Luís Ângelo Saboga Nunes.

Outubro, 2015

ABSTRACT

Background: From a public health perspective, the study of socio-demographic factors related to physical activity is important in order to identify subgroups for intervention programs. **Purpose:** This study also aimed to identify the prevalence and the socio-demographic correlates related with the achievement of recommended physical activity levels. **Methods:** Using data from the European Social Survey round 6, physical activity and socio-demographic characteristics were collected from 39278 European adults (18271 men, 21006 women), aged 18-64 years, from 28 countries in 2012. Meeting physical activity guidelines was assessed using World Health Organization criteria. **Results:** 64.50% (63.36% men, 66.49% women) attained physical activity recommended levels. The likelihood of attaining physical activity recommendations was higher in age group of 55-64 years (men: OR=1.22, $p<0.05$; women: OR=1.66, $p<0.001$), among those who had completed high school (men: OR=1.28, $p<0.01$; women: OR=1.26, $p<0.05$), among those who lived in rural areas (men: OR=1.20, $p<0.001$; women: OR=1.10, $p<0.05$), and among those who had 3 or more people living at home (men: OR=1.40, $p<0.001$; women: OR=1.43, $p<0.001$). On the other hand, attaining physical activity recommendations was negatively associated with being unemployed (men: OR=0.70, $p<0.001$; women: OR=0.87, $p<0.05$), being a student (men: OR=0.56, $p<0.001$; women: OR=0.64, $p<0.01$), being a retired person (men: OR=0.86, $p<0.05$) and with having a higher household income (OR=0.80, $p<0.001$; women: OR=0.81, $p<0.01$). **Conclusion:** This research helped clarify that, as the promotion of physical activity is critical to sustain health and prevent disease, socio-demographic factors are important to consider when planning the increase of physical activity.

Keywords: health promotion; lifestyles; leisure time physical activity; physical inactivity

RESUMO

Introdução: O estudo dos fatores sociodemográficas relacionados com a atividade física é importante, porque permite identificar subgrupos de pessoas para intervenções numa perspetiva de saúde pública. **Objetivo:** O objetivo do estudo foi identificar a prevalência e os fatores sociodemográficos correlacionados com o cumprimento das recomendações para a prática de atividade física. **Métodos:** Com dados do European Social Survey 6, a prática de atividade física e os dados sociodemográficos foram recolhidos de 39278 adultos europeus (18271 homens, 21006 mulheres), com idades entre os 18-64 anos, de 28 países, em 2012. **Resultados:** 64.50% (63.36% homens, 66.49% mulheres) praticavam atividade física suficiente para cumprirem as recomendações. A probabilidade de cumprirem as recomendações da atividade física era significativamente maior entre o grupo etário com 55-64 anos (homens: OR=1.22, p<0.05; mulheres: OR=1.66, p<0.001), os que tinham o ensino secundário (homens: OR=1.28, p<0.01; mulheres: OR=1.26, p<0.05), os que viviam em zonas rurais (homens: OR=1.20, p<0.001; mulheres: OR=1.10, p<0.05), e entre os que viviam com 3 ou mais pessoas (homens: OR=1.40, p<0.001; mulheres: OR=1.43, p<0.001). Por outro lado, o cumprimento das recomendações da atividade física estava negativamente relacionado com estar desempregado (homens: OR=0.70, p<0.001; mulheres: OR=0.87, p<0.05), ser estudante (homens: OR=0.56, p<0.001; mulheres: OR=0.64, p<0.01), estar reformado (homens: OR=0.86, p<0.05) e ter elevados rendimentos financeiros (homens: OR=0.80, p<0.001; mulheres: OR=0.81, p<0.01). **Conclusão:** Este estudo ajuda a perceber que devem ser considerados os fatores sociodemográficos quando se desenham programas de intervenção para a promoção da prática de atividade física.

Palavra-chave: promoção da saúde; estilo de vida; atividade física no lazer; inatividade física

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INTRODUCTION

The health benefits of physical activity are well established [1-3]. Nonetheless, approximately one third of adults worldwide do not exercise enough to benefit their health [4,5]. Studies based on self-reported physical activity in Australia [6], Canada [7], and the United States of America [8] have shown that less than 40% of people are considered not physically active. Opportunities for western adults to be physically active have decreased as a result of changes in lifestyle brought about by industry, and new technologies development, which has enabled people to reduce the physical labour needed to accomplish most tasks. In addition, the use of passive commuting (e.g. car, bus) also contributes to the decrease of physical activity levels and energy expenditure. The long hours needed, in many of today's urban centres, to reach employment niches also has decreased opportunities for people to enjoy leisure time for physical activities. Compared to the prevalence of physical activity in developing countries, the prevalence in developed countries is lower [5,9]. This is consistently demonstrated by research, where urban and wealthier countries have a higher prevalence of physical inactivity [9].

Due to the evidence of physical activity health benefits, and the high prevalence of inactivity, national and international agencies have produced consensus statements on the central role of promoting physical activity in the adult population as part of an effort to reduce premature mortality and morbidity associated with chronic diseases [10-12]. The European Union, the United States Department of Health and Human Services, and Word Health Organization, among other institutions, have recommended that all healthy adults should participate in at least 30 minutes of moderate-intensity aerobic activity, at least 5 days per week, to promote health [10-13]. These recommendations emphasize the benefits of moderate intensity, and provide an innovative aspect related to the accumulation of physical activity throughout the day. Countries are recommended to adapt these recommendations, in a national context, as tools for education, measurement, and policy decisions and interventions, while incorporating physical activity into surveillance methods, and setting national targets for change [14,15]. To promote physical activity through activities of daily living, policy development should be linked to all relevant sectors. Together, these strategies and measures aim to change people's lifestyle, from predominantly sedentary patterns, to active healthy living.

For effective public health surveillance and interventions, it is important to determine not only the proportion of people that participates in physical activity, but also to understand the factors related to the practice of physical activity of those who

meet the physical activity recommended level. This understanding is based in a salutogenic approach to health because it is about behaviours that promote or prevent the development of health. Thus, a better understanding of the contributing factors related to physical activity participation is critical to designing policies and effective interventions because it allows researchers to pay attention to modifying factors. To help identify subgroups for intervention programs, one must study the prevalence of, and socio-demographic variables related to, physical activity as it pertains to: sex, age, education level, living location, partnership status, the presence or absence of children in the home, household number, citizenship, and household income [16-19].

Research questions

Considering the importance of physical activity in public health promotion, it is relevant to ask: what is the prevalence of European adults who attained physical activity recommended levels, according to World Health Organization [12]? Although is it important to identity the physical activity levels, in order to intervene more accurately, with a view to increasing the percentage of the population that achieves the recommended physical activity levels, there is a need to identify subgroups of the population. Thus, what is the prevalence of the attainment of physical activity recommended levels by socio-demographic factors? In addition, what are the socio-demographic correlates of physical activity of European adults? This research does not emphasize dissociates that would underpin a negative relationship between the variables under investigation.

Objectives of the study

Using a representative sample of European adults, the purpose of the current study was to assess self-reported physical activity levels of European adults, according to the World Health Organization physical activity recommendations [12]. Moreover, because quantitative research exploring the socio-demographic correlates of physical activity is still rather limited among representative samples of European adults, this study also aimed to identify the socio-demographic correlates related with physical activity recommended levels.

LITERATURE REVIEW

The literature review is divided into three parts. The first begins by defining the main concepts presented in this document. The second is at aimed at demonstrating the scientific evidence of the relationship between physical activity and health outcomes. The third is about the prevalence of physical activity, mostly in western countries, and the importance of physical activity guidelines as a public health strategy to promote health. Finally, there will be a presentation of the main correlates of physical activity, with an emphasis on socio-demographic factors, because it will allow for the identification of population subgroups for intervention programs.

Key terms

Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure [20]. Often, the term, physical activity, is confusing because it is used interchangeably with the terms, “exercise” and “physical fitness”. Exercise, however, is a subset of physical activity that is planned, structured, repetitive, and carried out to maintain or improve at least one component of physical fitness. Physical fitness, therefore, is an attribute gained through being physically active. Whereas, physical activity is the underlying behaviour [20]. An active person is someone who achieves 30 minutes or more of at least moderate physical activity on 5 or more occasions per week. On the other hand, physical inactivity is defined as an absence of physical activity [12]. Inactive or insufficiently active people are those who achieve less than 30 minutes of at least moderate physical activity on 5 or more occasions per week (accumulated across work, home, transport, or discretionary domains).

Physical activity and inactivity are topics of interest in public health, medicine, and education. The public health and biomedical perspectives of physical activity focus on health promotion and disease prevention. The educational perspective is related to physical education as an important component of health promotion. For the present document, the focus is placed on the public health perspective. This means that physical activity is seen as a positive factor to control or improve health in people, and to prevent non-communicable diseases.

Researchers have attempted to explain and predict physical activity behaviours, as well as to test hypotheses derived from specific theories. These factors are called

correlates, and describe statistical associations, or correlations, between measured variables and physical activity [21].

Many studies on physical activity have findings of significant cross-sectional associations between a variety of personal, social, demographic, and environmental variables, and physical activity. These are mostly correlational studies, and report that a variable, or a set of variables, is associated with physical activity. Such relationships do not support causal inferences, and may not generate hypotheses for further studies. However, researchers used the terms correlates or determinants interchangeably. It is proposed that the term, “correlate” be used because most studies are cross-sectional [21]. Determinants are most appropriately defined as causal factors, and are identified in longitudinal studies when researchers have the purpose of identifying strategies that can influence the outcome of interest [21]. Results from these types of studies allow one to determine cause and effect.

Physical activity and health outcomes

Physical inactivity is the 4th leading risk factor for global mortality [22], causing more than 3.2 million deaths each year, and 69.3 million DALYs globally [14,23]. Physical inactivity increases the risk of many adverse health conditions, including major non-communicable diseases such as coronary heart disease, type 2 diabetes, breast and colon cancers; it also shortens life expectancy [24]. On the other hand, studies have shown an inverse relationship between an active lifestyle and the risk of illness or death, such as a reduced risk of cardiovascular disease [25], obesity [26], type 2 diabetes [27], and a lower risk of certain cancers [28]. Furthermore, physical activity contributes to the prevention of osteoporosis [29], improves muscular strength [30], enhances cognitive function [31], and protects against premature death [32]. As a result, physical activity as a modifiable risk factor is now considered a crucial topic in public health [10-12].

The observation that physical activity reduces risk of cardiovascular disease was first made by Morris [33]. It was observed that bus conductors in London, who spent their working hours walking the length of the buses as well as climbing up and down the stairs of the double-decker buses to collect fares, experienced half the coronary heart disease mortality rates of their driver counterparts, who spent their day sitting behind the wheel. Since then it was hypothesized that physical activity may protect against the development of cardiovascular diseases. Studies have

demonstrated that active people have lower rates of cardiovascular disease than inactive ones [25], and that physical activity can be more effective than surgical techniques for treating cardiovascular disease in some cases [34], thereby reducing the cost of healthcare services.

Worldwide levels of overweight and obesity are considered high. The proportion of adults overweight and obese increased, between 1980 and 2013, from 28.8% to 36.9% in men, and from 29.8% to 38% in women [35]. Besides its negative economic impact, it has a negative impact on public health [15]. Obese individuals have higher medical costs (by 30%) than their normal weight peers [36]. Lower levels of physical activity as well as high levels of food intake are thought to be the driving force behind the high prevalence of obesity[37]. Cross-sectional studies have identified an association between low levels of physical activity and an increased risk of obesity [26,38]. In spite of the results of cross-sectional studies, they are unable to distinguish between cause and effect. Therefore, prospective and retrospective studies address this issue to some extent, assessing the association between physical activity and weight change over time. However, some prospective studies have been yielding inconsistent results regarding the effects of physical activity on weight change [39], but others demonstrate that physical activity may reduce total and abdominal fat [40].

Concerning the relationship between physical inactivity and the risk of type-2 diabetes, strong evidence from prospective studies began to arise in the early 1990s. An inverse association was found between weekly energy expenditure during physical activities such as walking, stair climbing and sports activity, and the risk of developing type 2 diabetes [41]. Afterward, many observational studies have confirmed the link between physical activity and a lower risk of type-2 diabetes [42,43]. Even low intense physical activity during leisure time also conferred benefits, which is consistent with the finding that changes in leisure time physical activity has a protective effect against type 2 diabetes [27]. Therefore, increasing physical activity may substantially reduce the incidence of type 2 diabetes.

Along with tobacco use and diet, physical activity may be one of the main risk factors for cancer that can be modified through lifestyle change [28,44]. As a result, interest in physical activity, as a means for the primary prevention of cancer, is increasing. Several systematic reviews have been undertaken to examine the relation between physical activity and cancer prevention at specific cancer sites. Results have offered convincing evidence that physical activity is negatively associated with colon and breast cancer, and of a probable or possible negative relationship between physical activity and prostate, endometrium, and lung cancers [28,44]. This means that

a public health recommendation for physical activity [12], if adopted, can result in a decreased incidence of cancer worldwide.

Numerous studies have examined the effects of physical activity on bone health in children, adolescents, and young, middle-aged and older adults. There is compelling evidence that regular physical activity, especially weight-bearing and impact exercise, prevents bone loss associated with aging [45]. In addition, the risk and incidence of fractures is also reduced among active people [46]. This supports findings from an earlier investigation in which fracture rates were lower among active people, who performed weight-bearing activities, than among those who were sedentary [47]. This suggests that regular physical activity is important in preventing loss of bone mineral density, and osteoporosis, particularly in postmenopausal women.

A growing body of literature indicates that physical activity is associated with improvements in brain function [48]. Aerobic activity improves performance on tasks that involve executive cognitive function, such as planning, scheduling, inhibition, and working memory [49]. Regular physical activity can improve mental health even among people with a serious mental illness [50]. Since promoting mental health is an aim of concern, promoting physical activity should be part of the global strategy to improve people's mental health (mainly among older individuals, because aging is associated with an increased risk of chronic conditions and diseases such as cognitive impairment).

Finally, epidemiological studies reveal that changes in physical activity habits are associated with mortality risk. There is a lower mortality rate in those who became more active and increased the intensity of their physical activity [1]. Such studies provide strong evidence to support the hypothesis that inactive people can lower their risk of dying prematurely by becoming more active, as observed recently in a cohort study with a large sample of European adults [32].

Physical activity and public health: recommendations and prevalence

Recommendations for physical activity

Worldwide, the development of new technologies has enabled people to reduce the amount of physical activity at home and in the workplace. This is noticeable in more industrial countries. The use of these technologies has increased individual worker productivity and reduced physical hardships and disabilities caused by jobs entailing

continuous heavy labour. However, while the technological revolution has been of great benefit, it has come at a cost in terms of the contribution of physical inactivity to the global epidemic of non-communicable diseases [15].

Non-communicable diseases today are the leading cause of death worldwide. By the year 2003 non-communicable diseases accounted for 60% of deaths, and more than 50% of the global burden of disease. It is estimated that by 2030, these diseases will contribute to 69% of deaths and 57% of the global burden of disease [51]. Non-communicable diseases share a small number of preventable risk factors including physical inactivity, obesity, unhealthy diet, and tobacco use. The potential benefits from changing these features of a population's behaviour are considerable. The World Health Organization estimates that about 80% of premature stroke and heart diseases, 80% of diabetes type 2, and 40% of cancers are preventable [52]. Therefore, it is assumed that reducing physical inactivity and increasing physical activity levels will have a significant impact in public health, reducing the incidence of several non–communicable diseases that have a high prevalence around the world [14,15,53].

For public health strategies this information has some implications, and two approaches to primary prevention may be identified [2]. The first requires screening for risk factors, followed by therapeutic interventions with the group at greatest risk (those least active). The second approach aims to produce favourable shifts in the population distributions of risk factors. Since public health prioritizes the reduction of overall disease incidence, as opposed to clinical medicine, the most effective way may be to attempt to shift the distribution of risk. For physical inactivity, this requires a population-based strategy to increase the physical activity level of the population.

Now that new technologies have enabled people to reduce the amount of physical activity in their daily lives, people should deliberately introduce active behaviours into their lives. Today, manifestos by governments, agencies, and the World Health Organization represent efforts to encourage people to become more physically active. These entities have also developed physical activity recommendations and targets to be achieved by the people [10-12,54].

The development of physical activity guidelines began when scientific interest in the biological effect of physical activity and exercise attracted attention. At first, researchers tried to identify the type, intensity, frequency and duration of physical activity episodes needed to improve physical fitness. The first formal document was from American College of Sports Medicine. The recommendation was for aerobic activity: 3-5 days per week, at an intensity of 50-85% of maximal oxygen consumption,

for 15-60 minutes per session [55]. This position was updated in 1990 based on the conclusion that if most healthy adults attained this recommendation, then they would improve personal fitness and benefit their health [56]. The idea of health promotion being associated with physical activity was addressed during the 1990s, leading to recommendations from the American College of Sports Medicine [57] and the United States Surgeon General's Report [58]. It was recommended that every adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week. This recommendation had a strong influence on public health strategies and statements about physical activity. They differ from earlier versions by recognizing the benefits of moderate-intensity activity, asserting that multiple short episodes of physical activity during a day are one way to fulfil the recommendations, while emphasizing the need for frequent (preferably daily) physical activity.

In 2007, the adults' physical activity recommendations were updated jointly by the American College of Sports Medicine and the American Heart Association [54]. This update confirmed the guidelines included in the 1996 Surgeon General's Report, placing emphasis on the possibility to combine moderate and vigorous physical activity, and elaborating on its benefits. For adults aged 18-65, the recommendation was moderate intensity physical activity for a minimum of 30 minutes on at least five days each week, or vigorous physical activity intensity for a minimum of 20 minutes on at least three days each week. These recommendations recognize that moderate intensity, generally equivalent to a brisk walk, can be accumulated toward the 30-minute minimum by performing bouts each lasting 10 or more minutes. They also reinforce the lifestyle approach, as an alternative to structured exercise, to promote physical fitness. These recommendations received widespread acceptance, and were officially adopted by several organizations (e.g. World Health Organization [12] and European Union [10]).

Prevalence of physical activity

Since research has demonstrated the health benefits of physical activity [24,25,32,40], the importance of surveillance data has been reinforced. The data is valued for its ability to guide local, regional, or national actions to promote physical activity as a measure of public health. As a result, agencies and governments from some countries monitor their population's physical activity participation to review the progress of interventions that aim to change behaviours.

In Australia, findings from the Physical Activity Taskforce Adult Physical Activity Survey showed that 60% of adults reported sufficient physical activity to fulfil recommendations and accrue health benefits, 28% reported insufficient physical activity, and 12% reported no physical activity [6]. Slightly more men than women were sufficiently active (62% vs. 59%), and participation in sufficient levels of physical activity decreased with advancing age. Participation in sufficient levels of physical activity was highest amongst younger adults, those with a university education, and those having a higher household income.

In the United States of America, every two years there is a set of studies designed to assess the health and nutritional status of adults and children – the National Health and Nutrition Examination Survey. This is a major program of the National Center for Health Statistics, part of the Centers for Disease Control and Prevention, and has the responsibility of producing vital and health statistics for the Nation. Results of self-reported physical activity have shown that 62% of adults meet the physical activity guidelines [8]. However, fewer than 10% of adults met the physical activity guidelines according to accelerometry. Physical activity estimates vary substantially depending on whether they are self-reported or measured via accelerometer.

Data from Canada reveal that the percentage of the population that was at least moderately active increased significantly from 54% in 1995 to 65% in 2007 [7]. Results showed that older adults were less likely to meet the physical activity guidelines than their younger counterparts. Furthermore, those in the lowest income category were more likely to meet the guidelines than those in the second-lowest income category. This might be explained by a higher prevalence of walking among those in the lower income category [59]. Since walking has been promoted as a way to increase daily physical activity, it is possible that those in the lowest income category walk as a mode of transportation, and have more often been reporting this as leisure time physical activity.

Although there is information about physical activity prevalence in several countries, the comparison of patterns of physical activity participation between countries is sometimes unachievable, largely due to the absence of standardized instruments suitable for international use. Nonetheless, the Lancet Physical Activity Series Working Group undertook a study to obtain comparable estimates for physical activity and inactivity in adults from 122 countries, using the World Health Organization global health observatory data repository [5]. The combined population of these 122 countries represents 88.9% of the world’s people. Worldwide, 31.1% of adults were

considered physically inactive. Women were more inactive than men, and inactivity increased with age. Physical inactivity was more common in countries of high income than in those of low income. Once physical inactivity was defined as not meeting physical activity recommendations levels [12], the result was that less than 70% of people met the physical activity recommended levels.

These findings are disturbing because, based on individual country data or on worldwide data, three or four of every ten adults does not reach the present physical activity recommendations [12]. These individuals are at risk for coronary heart disease, type 2 diabetes, some types of cancers, several other diseases, and premature death [24].

Correlates of physical activity

Contemporary models of behaviour purport that health and physical activity is influenced by a myriad of factors that can be defined as internal and external factors [60,61]. The combination of these factors can be promising in the development of strategies to enhance people physical activity levels and overall health, as defended by the Ottawa Charter for Health Promotion [62]. Internal or external factors cannot alone be the supportive argument to get in deep into the correlates of physical activity. Thus, ecological models of physical activity behaviours have been proposed [61]. The term, “ecology” originates in the biological sciences and refers to the interrelationships between organisms and their environments. Ecological models of human behaviour have evolved in the fields of sociology, psychology, education and health. The focus has been on nature of people’s interactions with their environments. The ecological models are based on four main principles. First, multiple factors influence behaviours. Therefore, efforts to change behaviour, such as physical activity, should be based on the understanding of these factors. Second, environments are multidimensional and complex. Social or physical environments can be described as containing a variety of features or attributes, such as their size, temperature, facilities, and safety. The variable nature of environments has a direct impact on the design of initiatives to promote physical activity participation. Third, interactions between people and the environment can be described at varying levels of organisation. People’s interactions with the environment can occur at individual, small group, organisational, community, or population levels. The ecological model does not just focus on the individual but includes several levels of human interaction with environments. Fourth, the interrelationships between people and their environment are dynamic. There is a

mutual relationship between people and their environments. The social, physical, and policy environments influence the behaviour of the individual, while behaviour of the individual, group, or organisation also affects the wellbeing of their environments [61,63].

Based on the aforementioned principals, strategies to reduce physical inactivity and increase the population's level of physical activity should target modifiable and empirically supported factors related to physical activity. These modifiable factors are potential mechanisms of change to be targeted by public health policy and health promotion practice. Identifying and understanding the factors that influence physical activity is important for the development and improvement of public health interventions designed to foster people's long term participation in physical activity [64]. Therefore, studies of correlates of physical activity are an efficient and empirical means to screen potential variables. Those variables consistently identified as correlates of physical activity can be used to generate hypotheses about people's behaviours, which is important in intervention programs.

The different levels of factors that influence physical activity participation can be broadly categorized into: psychological, social, demographic, environmental, and policy [65]. Psychological correlates consist of variables such as attitudes and beliefs, knowledge, enjoyment, efficacy, personality traits, perceptions, anticipated benefits, and perceived barriers [17]. Furthermore, many people engage in physical activity because of the health benefits, and by doing so they assume or increase the control over their lives. They do it because of a salutogenic perspective, and this internal movement can be deeply imbedded in the development of the sense of coherence as the centre of life control [66]. It is a central dispositional orientation in live, searching for what can contribute to health [67], and it is perceived as comprehensive, manageable and meaningful. These resources are called generalised resistance resources [68], because they are present generally at the disposal of humans. Social correlates include support from family, friends, significant others and health professionals, as well as friendship and modelling [69,70]. Demographic correlates consist of factors used to classify the population in subgroups such as sex, age, education level, occupation, living place, partnership status, household members, citizenship, and socioeconomic status [71-73]. Environmental correlates only began to be studied in the last few years, and many studies are already available [16]. The identified environmental correlates are: perception of safety, streetlights, availability and accessibility of physical activity facilities, neighbourhood aesthetic, street connectivity (grid-like pattern of streets), and proximity to parks [19,74]. Finally, even though policy interventions can affect whole

populations for long periods, as specified with one of the strategies of the Ottawa Charter [62], findings for policy correlates were inconsistent [16].

Although there are many factors that are related with physical activity, when targeting various population subsets for positive behavioural changes, such as physical activity, it is important to first explore how different socio-demographic factors are related to physical activity patterns. Thus, with public health intervention in mind, the study of socio-demographic correlates is highlighted because they allow the identification of at-risk subgroups of the population, which is important for designing effective interventions.

METHODS

Study design and participants

This is a cross-sectional multi-country study based on data from the European Social Survey round 6, 2012, comprising 28 European countries and Israel (Albania, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Kosovo, Lithuania, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom). The European Social Survey is an academically driven cross-national survey that has been conducted every two years across Europe since 2001 (http://www.europeansocialsurvey.org). The survey measures the attitudes, beliefs and behaviour of European people. The European Social Survey had several aims: 1) to chart stability and change in social structure, conditions and attitudes in Europe and to interpret how Europe's social, political, and moral fabric was changing, 2) to achieve and spread higher standards of rigour in cross-national research in the social sciences, including, for example, questionnaire design and pre-testing, sampling, data collection, reduction of bias and the reliability of questions, 3) to introduce soundly-based indicators of national progress based on citizens' perceptions and judgements of key aspects of their societies 4) to undertake and facilitate the training of European social researchers in comparative quantitative measurement and analysis, and 5) to improve the visibility and outreach of data on social change among academics, policy makers, and the wider public.

Probability sampling from all residents aged 15 years and older was applied in all countries, comprising 54673 participants. For the present study only adults were selected because the physical activity recommendation for children and adolescents is different from adults, thus participants younger than 18 years of age were excluded (n=2000). Since Israel is not a European country, its citizens were excluded (n=2508). In addition, because certain age groups could skew the results, and the stated purpose was to study adults, those who were over 65 years of age were removed from the sample (10779). Finally, those who did not report at least 4 socio-demographic characteristics were also excluded (n=108). These restrictions resulted in a final sample size of 39278 participants (18271 men, 21006 women) with mean age 41.85±13.62 (men, 41.58±13.49; women, 42.09±13.25).

Measures

All measures were from the European Social Survey, round 6, 2012 (ESS Round 6 Source Questionnaire). The questionnaire can be seen elsewhere [75].

Physical activity

Information on physical activity was assessed with a single item asking, “On how many of the last 7 days did you walk quickly, do sports, or other physical activity for 30 minutes or longer?” Although physical activity was assessed with a single item, there is evidence that in studies where physical activity is not the primary focus, and more detailed measures are not feasible, a single question is an acceptable alternative [76]. Using European Union [10] and World Health Organization [12] criteria, participants were classified as having attained the recommended level of physical activity (≥30 minutes of at least moderate physical activity on 5 or more occasions per week), or not having attained the physical activity recommended levels (<30 minutes of at least moderate physical activity on 5 or more occasions per week).

Socio-demographic characteristics

Participants reported their sex and age. Using reported ages, participants were categorized into five age groups (18-24, 25-34, 35-44, 45-64). The European Social Survey data provides two variables of education attainment: the recoded variable that focuses on levels of education achieved and years of full time education. For the analysis, the level of education achieved was chosen because the population might cluster according to education level [17,77]. Participants were then classified as: less than high school, high school education, and superior education. Participants were asked to report what they were doing for the last 7 days. Response options were: paid work (employed), studying (education), unemployed actively looking for a job, unemployed but not actively looking for a job, retired, military service, and others. Both unemployed categories (unemployed actively looking for a job, unemployed but not actively looking for a job) were classified into a single category named unemployed. Those who were doing military service were considered employed. To determine the living place, participants were asked to report whether they lived in a big city, a suburb or the outskirts of a big city, a town or small city, a country village, or a home in the countryside. Those who responded that they lived in a big city, or the suburbs/outskirts of big city, were grouped into a new category named urban areas. Those who indicated that they lived in a country village, or in a home in countryside, were grouped into rural areas. Respondents were asked to describe whether they live with or without a husband/wife/partner, and the legal situation (e.g. married, civil union, illegally

recognized). Response options were dichotomized into live with or without a partner. Participants answered if they lived with or without children at home, and then the number of people living regularly as a member of the household. In each country participants were asked whether they were national citizens or immigrants. Household income was determined based on decile. Using this data, 1st to 3rd decile, 4th to 7th decile, and 8th to 10th were organized to create three groups.

Procedures

The European Social Survey uses a multi-stage probability cluster sampling design to provide national representative samples. According to national options, participants were sampled by means of postal code address files, population registers, social security register data, or telephone books. In the sampling procedure, statistical precision was kept the same for all countries, notwithstanding the difference in method used for a specific country. In each country, information was collected using a questionnaire [75] completed through an hour-long face-to-face interview that included questions on the use of medicine, immigration, citizenship, socio-demographic and socioeconomic issues, health perception, and physical activity. The questionnaire was translated, by language experts, into the language of each of the participating countries.

Statistical analysis

Descriptive statistics were calculated for all variables (means, standard deviation, and percentages). Mann-Whitney test and Chi-square test were used to compare men and women according to socio-demographic characteristics and physical activity. ANOVA, followed by Tukey's HSD test, and Student t-test were performed to assess socio-demographic variables for the number of times participants engaged in physical activity in the last 7 days. Bivariate relationships between physical activity (not attaining the physical activity recommended level vs. attaining the physical activity recommended level) and socio-demographic variables were tested by Chi-square test and Fisher's exact test. To analyse the effects that socio-demographic variables had on attaining physical activity recommended levels, a binary logistic regression analysis was conducted. All analyses were stratified by sex, and statistical analysis was performed using IBM SPSS Statistics 22. The significance level was set at $p<0.05$.

RESULTS

The general samples' characteristics are presented in Table 1.

Table 1. Participants' socio-demographic characteristics.

	Total (n=39278)	Men (n=18272)	Women (n=21006)	*p*
	n (%)	n (%)	n (%)	
Age [a]				0.011
18-24	5445 (13.86)	2667 (14.60)	2778 (13.22)	
25-34	7293 (18.57)	3415 (18.69)	3879 (18.46)	
35-44	8631 (21.97)	3934 (21.53)	4697 (22.36)	
45-54	9321 (23.73)	4306 (23.57)	5015 (23.87)	
55-64	8588 (21.86)	3950 (21.62)	4638 (22.08)	
Education level [b]				<0.001
Less than high school	2193 (5.61)	940 (5.17)	1253 (5.99)	
High school	27467 (70.28)	13279 (73.10)	14188 (67.83)	
Superior education	9425 (24.11)	3948 (21.73)	5477 (26.18)	
Occupation [b]				<0.001
Employed	24253 (69.55)	12371 (81.32)	11882 (67.81)	
Unemployed	4233 (12.11)	2074 (11.96)	2159 (12.32)	
Students	3552 (10.19)	1702 (9.81)	1852 (10.57)	
Retired	2829 (8.11)	1199 (6.91)	1631 (9.31)	
Living place [b]				0.007
Urban area	12967 (33.09)	5969 (32.74)	6999 (33.40)	
Town or small city	11885 (30.33)	5447 (29.87)	6439 (30.73)	
Rural areas	14331 (36.57)	6817 (37.39)	7515 (35.87)	
Partnership status [b]				0.340
Live without partner	13754 (35.15)	6357 (34.91)	7397 (35.37)	
Live with partner	25372 (64.85)	11855 (65.09)	13518 (64.63)	
Children living at home [b]				<0.001
No	19643 (49.99)	10094 (55.25)	9549 (45.46)	
Yes	19633 (51.01)	8177 (44.75)	11456 (54.54)	
Members of household [b]				<0.001
1 person	4135 (10.53)	2135 (11.68)	2000 (9.52)	
2 people	10205 (25.98)	4607 (25.22)	5598 (26.65)	
3-4 people	18661 (47.51)	8791 (48.11)	9870 (46.99)	
≥5 people	6277 (15.98)	2739 (14.99)	3538 (16.84)	
Citizenship status [b]				0.090
National	37482 (95.49)	17399 (95.30)	20082 (95.66)	
Immigrant	1770 (4.51)	858 (4.70)	912 (4.34)	
Household income [b]				<0.001
1st to 3rd decile	8613 (27.19)	3757 (25.24)	4855 (28.92)	
4th to 7th decile	13215 (41.72)	6139 (41.23)	7077 (42.16)	
8th to 10th decile	9847 (31.09)	4993 (33.53)	4854 (28.92)	
PA in the last 7 days (≥ 30 min/day) [a]				<0.001
None	2586 (6.58)	1152 (6.31)	1434 (6.83)	
1 day	1674 (4.26)	865 (4.74)	809 (3.85)	
2 times	2867 (7.30)	1402 (7.67)	1464 (6.97)	
3 times	3686 (9.38)	1777 (9.72)	1906 (9.07)	
4 times	3134 (7.98)	1497 (8.19)	1636 (7.79)	
5 times	4512 (11.48)	2298 (12.58)	2211 (10.53)	
6 times	3089 (7.86)	1530 (8.37)	1559 (7.42)	
7 times	17743 (45.16)	7750 (42.42)	9988 (47.55)	
PA recommendations [b]				<0.001
Not attaining PA recommended level	13942 (35.50)	6694 (36.64)	7248 (34.51)	
Attaining PA recommended level	25336 (64.50)	11578 (63.36)	13758 (65.49)	

PA, physical activity

Attaining physical activity recommended level means ≥30 minutes of at least moderate physical activity, 5 or more times per week. Not attaining physical activity recommended levels means <30 minutes of at least moderate physical activity, 5 or more times per week.

[a] Tested by Mann-Whitney test.

[b] Tested by Chi-square.

Most participants were older than 35 years (67.56%), had high school education (70.28%), were employed (69.55%), lived with a partner (64.85%), and were national citizens (95.49%). On average, men had participated 4.92 times per week in physical activity in the last 7 days, while women had participated 5.06 per week (t(39276)=-6.036, p<0.001). Significantly less men (63.36%) than women (65.49%) attained the physical activity recommended levels ($\chi^2(1)=19.379$, p<0.001).

The estimated prevalence of physical activity in the last 7 days according to socio-demographic characteristics is shown in Table 2.

Table 2. Estimated prevalence of European people's physical activity in the last 7 days by socio-demographic characteristics.

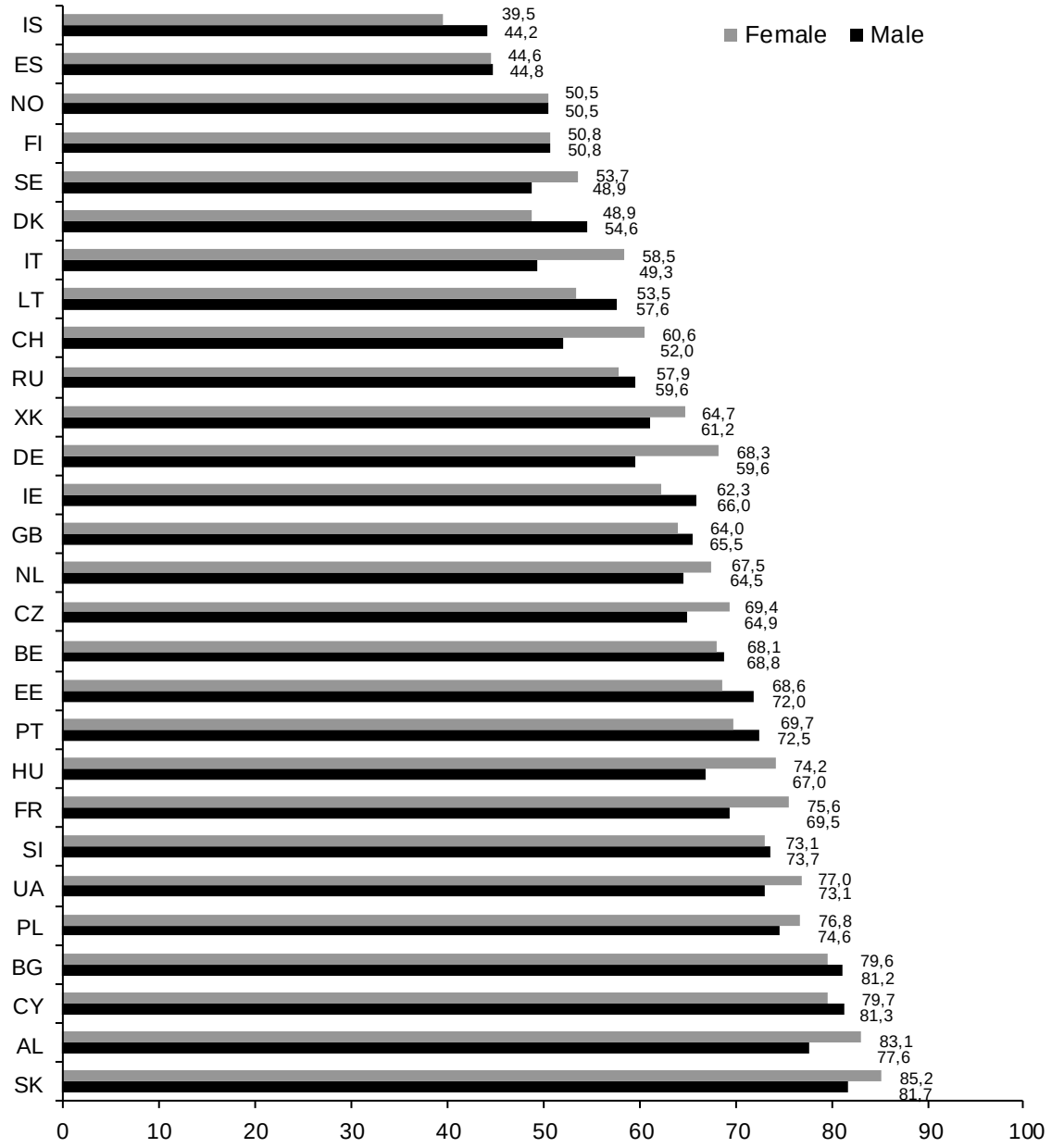
	Men (n=18272)		Women (n=21006)	
	Number of times of PA in the last 7 days (≥ 30 min/day) (95% CI)	*p*	Number of times of PA in the last 7 days (≥ 30 min/day) (95% CI)	*p*
Age [a]		0.005		<0.001
18-24	4.81 (4.72-4.89)		4.58 (4.50-4.67)	
25-34	4.86 (4.79-4.94)		4.99 (4.92-5.06)	
35-44	4.92 (4.84-4.99)		5.12 (5.05-5.19)	
45-54	4.98 (4.91-5.05)		5.15 (5.08-5.21)	
55-64	4.98 (4.91-5.06)		5.26 (5.19-5.32)	
Education level [a]		<0.001		<0.001
Less than high school	4.51 (4.34-4.68)		4.77 (4.62-4.91)	
High school	5.06 (5.02-5.09)		5.17 (5.13-5.21)	
Superior education	4.55 (4.48-4.63)		4.85 (4.79-4.91)	
Occupation [a]		<0.001		<0.001
Employed	5.02 (4.98-5.06)		5.10 (5.06-5.14)	
Unemployed	4.80 (4.69-4.90)		5.05 (4.95-5.15)	
Students	4.62 (4.51-4.72)		4.44 (4.34-4.54)	
Retired	4.98 (4.84-5.12)		5.39 (5.27-5.50)	
Living place [a]		<0.001		<0.001
Urban area	4.84 (4.79-4.90)		5.00 (4.94-5.05)	
Town or small city	4.76 (4.70-4.82)		4.93 (4.87-4.98)	
Rural areas	5.11 (5.06-5.17)		5.24 (5.18-5.29)	
Partnership status [b]		<0.001		<0.001
Live without partner	4.82 (4.76-4.87)		4.83 (4.78-4.89)	
Live with partner	4.98 (4.94-5.02)		5.18 (5.14-5.22)	
Children living at home [b]		0.001		<0.001
No	4.87 (4.82-4.91)		4.90 (4.85-4.94)	
Yes	4.99 (4.94-5.04)		5.20 (5.16-5.24)	
Members of household [a]		<0.001		<0.001
1 person	4.75 (4.65-4.85)		4.85 (4.74-4.95)	
2 people	4.87 (4.80-4.94)		5.08 (5.02-5.14)	
3-4 people	4.96 (4.92-5.01)		5.03 (4.98-5.08)	
≥5 people	5.00 (4.92-5.09)		5.24 (5.17-5.32)	
Citizenship status [b]		0.700		0.825
National	4.92 (4.89-4.96)		5.06 (5.03-5.09)	
Immigrant	4.89 (4.74-5.04)		5.05 (4.89-5.20)	
Household income [a]		<0.001		0.005
1st to 3rd decile	4.87 (4.79-4.94)		5.09 (5.02-5.16)	
4th to 7th decile	4.98 (4.92-5.04)		5.08 (5.03-5.14)	
8th to 10th decile	4.79 (4.72-4.85)		4.96 (4.89-5.02)	

PA, physical activity
[a] Tested by ANOVA, followed by Tukey's HSD test.
[b] Tested by t-test for independent samples.

The average times that men (F(4, 18266)=79.139, p=0.005) and women (F(4, 21001)=889.932, p<0.001) participated in physical activity for at least 30 minutes

increased significantly with age. Man and women who completed high school engaged more frequently in physical activity than those with lower and higher school qualification (men: $F(2, 18163)=934.613$, $p<0.001$; women: $F(2, 20915)=506.854$, $p<0.001$). Employed men ($F(3,17344)= 19.696$, $p<0.001$) and retired women ($F(3,17522)=58.473$, $p<0.001$) practiced physical activity more often than others with a different occupation classification. Men and women from rural areas were more physically active than their peers from town or small cities and urban areas (men: $F(2, 18228)=433.770$, $p<0.001$; women: $F(2, 20948)=376.616$, $p<0.001$). Similarly, men and women who lived with a partner (men: $t(18210)=4.510$, $p<0.001$; women: $t(20913)=10.410$, $p<0.001$), had children (men: $t(18269)=3.452$, $p=0.001$; women: $t(21004)=9.387$, $p<0.001$), and lived with more people at home (men: $F(3, 18267)=108.164$, $p<0.001$; women: $F(3, 21002)=221.176$, $p<0.001$), engaged significantly more times in physical activity than individuals who lived without any partner, had no children and had less members in the household. Men with an income between decile 4^{th} and 7^{th} ($F(2, 14886)=104.335$, $p<0.001$), and women with 1^{st} to 3^{rd} and 4^{th} and 7^{th} decile ($F(2, 16783)=55.731$, $p=0.005$), were more active than those from other income levels.

Figure 1 shows the prevalence of attained physical activity guidelines by countries. The less active countries were Iceland (41.8%, men 44.2%, women 39.5%), Spain (44.7%, men 44.8%, women 44.6%), and Norway (50.5%, men 50.5%, women 50.5%). On the other hand, Cyprus (80.4%, men 81.3%, women 79.7%), Albania (80.7%, men 77.6%, women 83.1%), and Slovakia (83.7%, men 81.7%, women 85.2%) had the most active adult populations. Differences between men and women in prevalence of attained physical activity guidelines were observed in Albania ($\chi^2(1)=4.322$, $p=0.038$), Czech Republic ($\chi^2(1)=3.819$, $p=0.029$), Denmark ($\chi^2(1)=3.959$, $p=0.047$), France ($\chi^2(1)7.027$, $p=0.008$), Germany ($\chi^2(1)=17.960$, $p<0.001$), Hungary ($\chi^2(1)=10.010$, $p=0.002$), Ireland ($\chi^2(1)=3.102$, $p=0.043$), Italy ($\chi^2(1)=6.404$, $p=0.041$), Sweden ($\chi^2(1)=3.325$, $p=0.038$), Switzerland ($\chi^2(1)=8.461$, $p=0.004$), and Ukraine ($\chi^2(1)=3.308$, $p=0.039$).



IS Iceland, ES Spain, NO Norway, FI Finland, SE Sweden, DK Denmark, IT Italy, LT Lithuania, CH Switzerland, RU Russian Federation, XK Kosovo, DE Germany, IE Ireland, GB United Kingdom, NL Netherlands, CZ Czech Republic, BE Belgium, EE Estonia, PT Portugal, HU Hungary, FR France, SI Slovenia, UA Ukraine, PL Poland, BG Bulgaria, CY Cyprus, AL Albania, SK Slovakia

Figure 1. Prevalence of attained physical activity, according to the World Health Organization, by European countries in 2012.

The associations between physical activity recommendation levels and socio-demographic characteristics are shown in Table 3. For men ($\chi^2(4)=22.539$, $p<0.001$) and women ($\chi^2(4)=200.979$, $p<0.001$), as age increased, the proportion of people who attained physical activity recommended levels also increased significantly. Also, for both sexes, those who had completed high school (male: $\chi^2(2)=185.237$, $p<0.001$; female: $\chi^2(2)=86.210$, $p<0.001$) more frequently attained the physical activity recommended levels. Employed men ($\chi^2(3)=85.720$, $p<0.001$), and employed and

retired women, ($\chi^2(3)=210.618$, $p<0.001$) were more likely to attain physical activity recommended levels. Those who lived in rural areas (male: $\chi^2(2)=185.237$, $p<0.001$; female: $\chi^2(2)=86.210$, $p<0.001$), who lived with a partner (male: $\chi^2(1)=18.902$, $p<0.001$; female: $\chi^2(1)=105.008$, $p<0.001$), had children at home (male: $\chi^2(1)=8.757$, $p=0.003$; female: $\chi^2(1)=101.725$, $p<0.001$), as well as those who belonged to a household with more members, (male: $\chi^2(1)=14.057$, $p=0.003$; female: $\chi^2(3)=48.556$, $p<0.001$) were more likely to attain physical activity recommended levels. For men, the proportion of those who attained the physical activity recommendation were significantly higher between the 4th and 7th decile ($\chi^2(2)=23.615$, $p<0.001$); for women it was between the 1st to 3rd and the 4th to 7th decile ($\chi^2(2)=17.274$, $p<0.001$).

Table 3. Estimated prevalence of attained physical activity recommended levels, according to World Health Organization, by socio-demographic characteristics.

	Men			Women		
	Not attaining PA recommended level (n=6694)	Attaining PA recommended level (n=11578)	*p*	Not attaining PA recommended level (n=7248)	Attaining PA recommended level (n=13758)	*p*
Age [a]			<0.001			<0.001
18-24	39.60	60.40		45.43	54.57	
25-34	38.13	61.87		36.01	63.99	
35-44	36.60	63.40		33.26	66.74	
45-54	35.46	64.54		32.42	67.58	
55-64	34.66	65.34		30.23	69.77	
Education level [a]			<0.001			<0.001
Less than high school	40.53	59.47		37.27	62.73	
High school	33.78	66.22		32.44	67.56	
Superior education	45.47	54.53		39.27	60.73	
Occupation [a]			<0.001			<0.001
Employed	34.51	65.49		33.91	66.09	
Unemployed	39.30	60.70		34.41	65.59	
Students	45.27	54.73		48.92	51.08	
Retired	34.78	65.22		26.89	73.02	
Living place [a]			<0.001			<0.001
Urban area	38.36	61.64		35.62	64.38	
Town or small city	39.58	60.42		37.15	62.85	
Rural areas	32.82	67.18		31.24	68.76	
Partnership status [a]			<0.001			<0.001
Live without partner	38.76	61.24		39.12	60.88	
Live with partner	35.50	64.50		32.07	67.93	
Children living at home [a]			0.003			<0.001
No	37.59	62.41		38.13	61.87	
Yes	35.47	64.53		31.49	68.51	
Members of household [a]			0.003			<0.001
1 person	39.30	60.70		38.80	61.20	
2 people	37.57	62.43		34.46	65.54	
3-4 people	36.13	63.87		35.22	64.78	
≥5 people	34.61	65.39		30.13	69.87	
Citizenship status [b]			0.280			0.497
National	36.60	63.40		34.50	65.50	
Immigrant	37.65	62.35		34.43	65.57	
Household income [a]			<0.001			<0.001
1st to 3rd decile	36.99	63.01		33.61	66.39	
4th to 7th decile	35.46	64.54		33.99	66.01	
8th to 10th decile	39.92	60.01		37.19	62.81	

PA, physical activity

Attaining physical activity recommended level means ≥30 minutes of at least moderate physical activity, 5 or more times per week. Not attaining physical activity recommended levels means <30 minutes of at least moderate physical activity, 5 or more times per week.

[a] Tested by qui-square. [b] Tested by Fisher's exact test.

Table 4 presents the results of the multivariate binary logistic regression. For this analysis, results were presented for the entire sample and only for Portugal. This analysis aimed to show that each country has its specificities. For European men, being in the age group of 55-64 years was positively related to attaining physical activity recommendations (OR=1.22, 95% CI: 1.02-1.45, p<0.05), compared to age group of 18-24 years. Attaining physical activity recommendations was also positively associated with: having completed high school (OR=1.28, 95% CI: 1.08-1.51, p<0.01), living in rural areas (OR=1.20, 95% CI: 1.10-1.30, p<0.001), and having 3 or more people living at home (OR=1.28, 95% CI: 1.10-1.50, p<0.01; and OR=1.40, 95% CI: 1.17-1.67, p<0.001). On the other hand, attaining the recommended levels of physical activity was negatively associated with: having superior education (OR=0.76, 95% CI: 0.63-0.91, p<0.01), being unemployed (OR=0.70, 95% CI: 0.62-0.79, p<0.001), being a student (OR=0.56, 95% CI: 0.47-0.66, p<0.001), and being a retired person (OR=0.86, 95% CI: 0.73-1.00, p<0.05), when compared with being employed; and with having a higher household income (OR=0.80, 95% CI: 0.72-0.89, p<0.001). For women, older ages were more likely to attain the recommendations of physical activity, and age group of 55-64 years represented the strongest association (OR=1.66, 95% CI: 1.39-1.99, p<0.001). Furthermore, attaining the physical activity recommendation was more likely among those with high school qualification (OR=1.26, 95% CI: 1.04-1.52, p<0.05), those who lived in rural areas (OR=1.10, 95% CI: 1.02-1.20, p<0.05), and who had 5 or more people living at home (OR=1.43, 95% CI: 1.18-1.73, p<0.001). Conversely, women who were unemployed (OR=0.87, 95% CI: 0.78.0.98, p<0.05), who were students (OR=0.64, 95% CI: 0.55.0.75, p<0.01), and who had the highest household income (OR=0.81, 95% CI: 0.72-0.90, p<0.01) had lower likelihood of attaining physical activity recommended levels.

Data from Portugal presented some differences. Among men, attaining physical activity recommendations was negatively associated with being unemployed (OR=0.23, 95% CI: 0.10-0.53, p<0.01) living in small cities (OR=0.41, 95% CI: 0.18-0.91, p<0.05) and in rural areas (OR=0.20, 95% CI: 0.09-0.45, p<0.001). Among women attaining physical activity recommendations was positively associated with having high school qualification (OR=1.79, 95% CI: 1.01-3.20, p<0.05), and negatively associated with living in rural areas (OR=0.35, 95% CI: 0.19-0.66, p<0.01) and having 3-4 people living at home (OR=0.26, 95% CI: 0.07-0.94, p<0.05).

Table 4. Binary logistic regression predicting the attainment of the physical activity recommended level by European people.

	Attaining the PA recommended level OR (95% CI)			
	Europe		Portugal	
	Men	Women	Men	Women
Age				
18-24	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
25-34	0,98 (0,83-1,14)	1,14 (0,97-1,34)	0,83 (0,16-4,31)	1,70 (0,40-7,18)
35-44	1,03 (0,87-1,21)	1,26 (1,06-1,50)**	0,82 (0,14-4,73)	0,61 (0,15-2,52)
45-54	1,09 (0,92-1,29)	1,41 (1,19-1,67)***	0,70 (0,12-4,20)	0,57 (0,14-2,28)
55-64	1,22 (1,02-1,45)*	1,66 (1,39-1,99)***	0,89 (0,14-5,83)	0,63 (0,14-2,83)
Education level				
Less than high school	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
High school	1.28 (1.08-1.51)**	1.26 (1.04-1.52)*	0,88 (0,44-1,75)	1,79 (1,00-3,20)*
Superior education	0.76 (0.63-0.91)**	0.90 (0.74-1.10)	0,31 (0,08-1,25)	1,01 (0,39-2,59)
Occupation				
Employed	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
Unemployed	0,70 (0,62-0,79)***	0,87 (0,78-0,98)*	0,23 (0,10-0,53)**	1,43 (0,78-2,62)
Students	0,56 (0,47-0,66)***	0,64 (0,55-0,75)**	0,56 (0,09-3,55)	0,38 (0,07-1,89)
Retired	0,86 (0,73-1,00)*	1,08 (0,92-1,25)	0,72 (0,22-2,38)	0,79 (0,31-2,06)
Living place				
Urban area	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
Town or small city	0.93 (0.85-1.02)	0.93 (0.85-1.01)	0,40 (0,18-0,91)*	0,97 (0,55-1,73)
Rural areas	1.20 (1.10-1.30)***	1.11 (1.02-1.22)*	0,20 (0,09-0,45)***	0,35 (0,19-0,66)**
Partnership status				
Live without partner	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
Live with partner	1.12 (0.99-1.27)	1.08 (0.98-1.18)	0,80 (0,29-2,20)	1,04 (0,55-1,97)
Children living at home				
No	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
Yes	0.76 (0.66-0.87)	1.12 (1.00-1.25)	0,68 (0,25-1,84)	1,45 (0,73-2,86)
Members of household				
1 person	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
2 people	0,97 (0,83-1,13)	1,00 (0,87-1,15)	1,61 (0,42-6,18)	0,33 (0,10-1,03)
3-4 people	1,28 (1,10-1,50)**	1,05 (0,89-1,24)	3,43 (0,84-9,96)	0,26 (0,07-0,94)*
≥5 people	1,40 (1,17-1,67)***	1,43 (1,18-1,73)***	1,35 (0,24-7,53)	1.01 (0,89-1.18)
Citizenship status				
National	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
Immigrant	1.00 (0.85-1.02)	1.05 (0.88-1.25)	1,63 (0,16-16,32)	0,37 (0,06-2,23)
Household income				
1st to 3rd decile	1.00 ref.	1.00 ref.	1.00 ref.	1.00 ref.
4th to 7th decile	0.93 (0.84-1.02)	0.94 (0.86-1.04)	0,56 (0,26-1,22)	1,59 (0,89-2,84)
8th to 10th decile	0.80 (0.72-0.89)***	0.81 (0.72-0.90)***	2,37 (0,33-8,16)	1,86 (0,62-5,53)

PA, physical activity; OR, odds ratio; CI, confidence interval
Attaining the physical activity recommended level means ≥30 minutes of at least moderate physical activity, 5 or more times per week.
*p<0.05, **p<0.01, ***p<0.001

DISCUSSION

The present study examined the associations of socio-demographic factors with engagement in the recommended physical activity level among European adults. The results showed that 64.5% were physically active enough to attain the physical activity recommended levels (≥30 minutes of at least moderate physical activity on 5 or more occasions per week). Age, educational level, occupation, living place, number of household members, and household income are factors related with physical activity participation, and are related to attaining the physical activity recommended levels among European adults. Findings from this study provide data that might be used to monitor trends of physical activity among European adults. Moreover, because the study was based on a representative sample of European adults, it can also be used as a basis for setting European goals based on physical activity criteria [10,12]. However, since each country has its specificities, the singularity of each one has to be considered, as observed in the example provided from the Portuguese data.

At first glance, it seems noteworthy that about 64.5%% of European adults attained the physical activity recommended levels. Nonetheless, 35.5% were not active enough to benefit their health [24,32]. Perhaps some less active individuals might think that they do not need more physical activity because they misjudge their physical activity levels [78]. This way their meaningfulness dimension could be compromised influencing a low investment [67]. They may also have relatively limited knowledge of the physical activity recommendation as it relates to health benefits [79]. Therefore, improving health literacy about physical activity could trigger higher levels of compliance regarding World Health Organization recommendations, and may help reduce health disparities and achieve health equity [80]. Additionally, considering that most physical activity among European adults takes place during leisure time [4], strategies to increase active transportation might also be successful to increase the levels of physical activity [81]. This could help improve their investment and manageability of physical activity and move them towards the health end of the continuum dysfunctionality/functionality [82].

European women were significantly more active than men, and were also more likely to meet the physical activity guidelines. This finding is different from other studies, which showed that men were more likely to engage in physical activity that met the guidelines [5,8,16,83]. Although these results are not in line with most studies, it cannot be said that the outcome is entirely different from the literature. A recent study among urban Portuguese adults showed that women slightly surpassed men in time spent in

physical activity during leisure time [17]. Another study among Dutch adults also demonstrated that women older than 45 years were more physically active than men of same age [72]. The increased activity among women could be due to extra available time caused by a variable workload at home, and caring for children. Another reason could be that men achieve their physical activity levels by playing sports, but with increasing age these activities become harder to continue.

The prevalence of European adults considered physically active is comparable to what was observed in several countries and regions, such as in Australia [6], Canada [7], and the United States of America [8]. On the other hand, the prevalence is lower than the values observed in lower-income countries [9]. This can be observed in European countries, once the lowest prevalence of physical activity was observed in Iceland, Spain, Norway and Finland (higher-income countries), and the highest prevalence was observed in Bulgaria, Cyprus, Albania and Slovakia (lower-income countries). This fact suggests that advancements in industry and technology have contributed to a decrease in total physical activity, and, consequently, has a negative impact in public health . This comes as no surprise because most people from high-income countries work in the tertiary sector of the economy, which demands lower levels of physical activity in the workplace. In addition, the easy access to passive commuting (private and public transportation) also contributes to a decrease in physical activity levels and energy expenditure. Consequently, physical activity is predominantly practiced during leisure time [18,84], which means that efforts to promote an improvement in physical activity among adults should focus on active commuting and enhancing the availability and accessibility of recreational physical activities. Research has shown that changing the environment, to improve health, involves supporting more leisure time physical activity, along with active and less sedentary transportation [85,86].

In contrast to other studies [16,77,83,87], the present study showed that physical activity participation increased as age increased, among men and women, as did the proportion of people attaining the physical activity recommended level. These findings are particularly interesting because the aging of the population has social and economic implications (including an increase in age-related diseases), and physical activity contributes to health promotion and disease prevention [1]. Perhaps the increase of physical activity with age is related to the fact that older people more often visit family doctors, who are likely to recommend physical activity as part of the patient's everyday work [88,89]. For this population, physical activity has much to offer in terms of personal and public health, because it helps to prevent some important age-

related diseases, while enhancing functional capacities, which leads to a better quality of life as well as an increased capacity for independent living [25,29-31]. Thus, the observed physical activity levels among older people highlight the need to continue to promote physical activity among all age groups, because age does not seem to be a limitation for physical activity.

The education level was associated with physical activity frequency, and attaining the physical activity recommendations. Men and women with high school education were more likely to be physically active. This result is not consistent with previous investigations, which showed that participants who achieved a higher educational level showed a lower prevalence of a sedentary lifestyle [16,90,91]. However, there are also studies that do not observe a relationship between education level and physical activity [17,84]. The correlation between education level and physical activity is not entirely understood; this is reinforced by the fact that it is reported as a correlate of activity, but not determinant [16]. In this particular study the results should be interpreted carefully because of the wide cultural variance among countries. Nonetheless, for European people in general, one can speculate that people with a higher education level generally have high control, high daily demands, and long work hours. These realities might reduce their available time for physical activity.

Employed and retired adults were physically more active than students, and those unemployed. Moreover, there was an opposite association between being unemployed or a student, and attaining the physical activity recommended levels, in men and women. The physical activity levels of the employed could be due to active commuting or, in some cases, the demands of the workplace. Insufficient physical activity among students is reported and it is a serious health concern [92]. It is plausible that most students were young adults and were studying at university. Regular physical activity during this stage of transition into adulthood serves as an important foundation for adult life patterns. Further, this group may be important because those who attend university may play an important role in establishing social and cultural norms as they move into roles as decision-makers and opinion leaders within the population [93]. For unemployed people, results confirmed what was observed among adults from the United States of America [94]. The unemployed do not accumulate any occupational physical activity, or any activity associated with daily commuting. Both of which have been shown to be appreciable sources of activity in workers [95]. As a result, leisure time is the primary opportunity for physical activity. Unfortunately, unemployment is associated with depression [96], which is related with less physical activity during

leisure time [97]. This is a group at risk, and strategies to minimize the effect of being unemployed on physical activity participation have to be developed.

People from rural areas were more active than those from small cities or urban areas. One reason for this could be the fact that in rural areas more people, mainly men, work in the primary and secondary sectors of the economy, thereby increasing physical activity both in the workplace and in the household [73]. The fact that people from rural areas are more active than people from urban areas should be taken into consideration in public health strategies designed to promote physical activity. This is particularly important because the urban population in 2014 accounted for 54% of the total global population, a proportion that is expected to increase to 66% by 2050 [98]. It is estimated that by 2017, even in less developed countries, a majority of people will be living in urban areas. This data suggests that the prevalence of physical activity may decrease as a result of growing urbanization. Although the urban-level factors are related with physical activity and attaining the physical activity recommended levels, there is evidence that environmental variables, as well as perceived neighbourhood environmental attributes, are more important in determining the physical activity levels of adults than living in urban or rural areas [70,86].

Due to the complexity of addressing social structural determinants of health, physical activity research focuses mainly on individual-level factors. However, there is an increased emphasis on the role of social factors as modifiable determinants of physical activity [69,99]. Interpersonal relationships may affect physical activity by providing social support and establishing social norms that compel or facilitate health-promoting behaviours [100,101]. The results of this study suggest that a higher number of individuals in a household was correlated with attaining the physical activity recommended levels. Although the other social variables were not correlated with physical activity in the multivariate logistic regression model, it is worth mentioning that men and women who lived with a partner and had children living at home were more physically active than those who lived without a partner, and those who had no children living at home. This result is in line with studies that have shown that having a spouse/partner, or social support from relatives, is positively associated with increased physical activity [69]. Previously it was observed that, as a category, women living alone was negatively associated with physical activity, unlike men living alone [83]. Perhaps in some countries women without partners were particularly disadvantaged in terms of their living standards, which may have an impact on access to physical activity participation. Although it was not the purpose of the present study, the relationship between partnership status and physical activity, as observed in both sexes, may

explain why marriage and cohabitation are associated with a decreased risk of morbidity and mortality related to multiple non-communicable diseases in both sexes [102].

Higher household income was negatively associated with attaining the physical activity recommended levels in men and women. This study's findings do not support the idea that people from higher income or socioeconomic status are more physically active [103,104], or that they are more likely to follow preventive programs and health-promoting behaviour, either due to greater motivation or access to resources. In fact, so far there is no consensual evidence that socioeconomic status explains people's physical activity behaviours. Nevertheless, neighbourhood aesthetics, street connectivity, safety from crime, and proximity to parks are all associated with recreational walking and physical activity [19,74]. Environmental factors may explain the variance in physical activity among socioeconomic status categories, observed in some studies, because access to attractive, safe, green space and resources for structured physical activity may be limited in deprived areas. In cases where people from a lower household income are less physically active than those from a higher household income, interventions to reduce differences in the availability of recreational physical activity among adults would be effective if they focused on neighbourhood perceptions as well as individual cognition [19]. On the other hand, it is possible that those with a lower income walk as a mode of transportation, which increases their physical activity levels.

The different results observed in table 4 between European and Portuguese people reflect the discrepancies in Europe population. Although the aim of the study was to analyse the socio-demographic correlates of physical activity of European adults, this showed that results have to be interpreted with caution, because each country has its idiosyncrasies. This study results are useful for a general understanding of the socio-correlates among European adults, and for general policy makers that are responsible to defined the health policy in Europe. The results do not necessarily represent the reality of each country. Therefore, it is recommended to undertake an individual study for each country, to improve the accuracy of interventions based on research results.

Implications for physical activity promotion and public health

Proving population recommended levels of physical activity is a public health priority because of the health benefits associated with the physical activity [2,3], and the significant burden associated with inactivity [14,15]. Studies have shown that even relatively small increases in physical activity in inactive individuals may be of public health benefit, reducing all-cause mortality risk [32].

Results from this study strengthen the evidence of a relationship between socio-demographic characteristics and physical activity, and indicate potential direction for public health efforts to promote physical activity. The study of socio-demographic correlates allows identifying sub-population groups for targeted interventions aimed to enhanced the physical activity levels. For instance, being unemployed or a student is negatively related with attaining physical activity recommended levels. Results from studies have shown that when students engage in higher education, their levels of physical activity decrease significantly [105,106]. Therefore, campaigns specifically designed to promote physical activity for these sub-populations have to be implemented. Thus, identifying the sub-population groups at risk of becoming sedentary is important for public health promoters and policy makers, because well designed interventions, for a specific public, have the potential to significantly increase physical activity levels and improve health literacy [53,107].

Based on the findings of this study, there are opportunities to improve levels of physical activity among some socio-demographic groups. This may be achieved by increasing interest in, and opportunities for, leisure time physical activity. This is important because most people in Europe live in cities, and work in the tertiary sector of the economy, which demands lower levels of physical activity in the workplace. Consequently, physical activity has to be practiced mostly during leisure time [18,84], and in active commuting. The chosen type of leisure activity has to be integrated into the participant's lifestyle, and be able to be performed with a degree of success and positive experiences. There should be an association between physical activity and a personally desirable outcome, such as seeing friends, weight management, or feeling fit. The advantages consistent with this goal need to be emphasised so as to increase the immediate satisfactory experiences, and strengthen the association between the leisure time physical activity and the desired outcome. Nonetheless, the information of socio-demographic correlates is useful, because, interventions should be tailored for specific targeted groups, as mentioned before. For instance, for men the most common activities are team competitive sports, and for women are individual non-competitive sports [108]. Moreover, women are more likely to walk for exercise than men, while

men were more likely to undertake moderate to vigorous exercise [4,6,108]. It means that interventions for men can easily emphasize competitive sport activities, and for women recreational activities. Another example, young adults are more likely to engage in physical activity in fitness centres than older adults [4]. Therefore, moderate to vigorous physical activities can be promoted for younger adults and activities such as walking for older adults. Thus, understanding the relationship between socio-demographic factors and physical activity [71], as well as the information on prevalence of physical activity of the population is important for intervention design aimed to increase physical activity levels.

Besides leisure time physical activity, there are natural behaviours people have every day that might enhanced their physical activity levels. The use of stairs in the apartment building where people live and in worksite, mainly among those in urban areas, should be promoted and could include painted stairwells, music, and artwork to create a pleasant experience as well as signs as point of decision prompts and situational triggers [110,111]. Adding interactive components to motivational or environmental change in worksite, such as signs to promote short term achievements via end of destination congratulations, estimates of the energy expended from stair use, as well as long term outcomes such as health benefits seems to be promising in increasing stair usage [111].

For those who live alone, the lack of social support could be a potential obstacle. Enhancing social support may be an important aspect of interventions aimed at increasing physical activity. Social encouragement for physical activity can include praise for interest and participation, and invitations to engage in leisure time physical activity. Health professionals can provide social encouragement among their family, friends and colleagues, as well as in the general community, because it is observed that support from the closest person may help the individual to maintain the recommended level of physical activity [112]. Other community-based interventions to provide social encouragement include establishing buddy systems or groups and social contracting [113].

Contemporary public health recommendations focussing on moderate-intensity physical activity, and walking are less demanding and more sustainable at a population level [12,54]. Promotion of walking and moderate-intensity physical activity that emphasises outcomes of weight management and opportunities for social interactions could specifically target women and younger adults that are more likely to be able to walk without constrains.

It is important to understand whether interventions are effective. Nevertheless, first it is necessary to identify the sub-population groups that are at risk in order to prioritize the interventions. “One-sized fits all” approach is not likely to succeed, and interventions need to be adapted to different groups. For that, the study of socio-demographic is important to identify the groups and to establish priorities. However, since the socio-demographic factors are in different layers of the main determinants of health [60], interventions based on ecological model seems to be more effective, because they focus on the individual and also in several levels of human interaction with others and with the environments [61].

Independently of the target groups for interventions, studies have shown the value of empowering people to engage in the practice of physical activity and health promotion [114], because there is evidence of the effectiveness of empowerment strategies to improve health and physical activity, while reducing health disparities related with socio-demographic factors [115].

Strengths and limitations

A major strength of the study is that the European Social Survey database includes a large and representative sample size of various European countries, as well as several socio-demographic characteristics to characterize the study sample. Since the European Social Survey is conducted every two years, it allows for the monitoring of change in physical activity among European people in the future.

The current investigation had some limitations that have to be addressed. Physical activity was self-reported rather than objectively measured, which could be subject to bias. Usually self-reported physical activity estimates are greater than objective measures [8]. Furthermore, people’s self-reported physical activity may be overestimated because of social desirability [116]. However, there is evidence that social desirability accounts for only a small variance in physical activity [117], and self-reported physical activity is a reliable method for epidemiologic studies [118], even when using a single item to assess physical activity as was used in the European Social Survey [76]. The analysis was cross-sectional, thereby making it impossible to determine cause and effect. There was no information about the participants’ weight status. This would be of importance since weight status is related with physical activity [77]. Furthermore, the results for the entire sample may not reflect the results in each country, and because of that it is recommended to developed studies based on data for each country.

CONCLUSIONS AND RECOMMENDATIONS

The World Health Organization provides evidence-based recommendations for the amount of physical activity needed to benefit one's health status. Based on this physical activity recommendation, almost 64.5% of European adults are considered sufficiently active. Considering that 35.5% did not practice enough physical activity to attain the recommended levels, there is much work to do to improve the levels of physical activity among European adults.

The current study adds to the literature by identifying socio-demographic correlates of physical activity in European individuals aged 18–64 years. In summary, for men and women, the following were positively associated with attaining the physical activity recommended levels: being older, having high school qualification, living in rural areas, and having more family members in the household. Conversely, the following were inversely associated with attaining the physical activity recommended levels: being unemployed, being a student, and having a higher household income. These findings contribute additional evidence to the literature on the multivariate socio-demographic factors associated with physical activity behaviour. As part of the overall effort to address the physical activity recommended levels, some socio-demographic groups of the population will require robust interventions, which have the highest possible likelihood of succeeding, if improved health and health equity are to be achieved.

The promotion of regular engagement in physical activity is critical to sustain health, and to prevent disease, among adults. Consequently, socio-demographic factors are clearly important to consider when designing policies or programs to increase physical activity participation, and to improve the health of adults. An understanding of correlates of physical activity can help to increase physical activity levels and reduce physical inactivity. Such an understanding can, therefore, contribute to effective global prevention of non-communicable diseases.

Future studies should require that more correlates be observed in literature, that the potential of physical activity be considered, and that specific domains of physical activity (e.g. commuting, activity at work, and housework) be analysed.

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APPENDICES

Appendix A. Published papers associated with this thesis

Marques A, Sarmento H, Martins J, Saboga Nunes L. Prevalence of physical activity in European adults - Compliance with the World Health Organization's physical activity guidelines. Prev Med. 2015;81:333-8.

doi: 10.1016/j.ypmed.2015.09.018

http://www.ncbi.nlm.nih.gov/pubmed/26449407

Preventive Medicine 81 (2015) 333–338

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Prevalence of physical activity in European adults — Compliance with the World Health Organization's physical activity guidelines

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ARTICLE INFO

Available online 9 October 2015

Keywords:
Europe
Lifestyle
Physical activity guidelines
Cross-sectional study

ABSTRACT

Background. Adults are recommended to engage in at least 150 min/week of moderate-to-vigorous physical activity (PA).

Purpose. This study aimed to examine the level of compliance with PA recommendations among European adults.

Methods. Using data from European Social Survey round 6, PA self-report data was collected from 52,936 European adults from 29 countries in 2012. Meeting PA guidelines was assessed using World Health Organization criteria.

Results. 61.47% (60.77% male, 62.05% female) of European adults reported to be engaged in moderate to vigorous PA at least 30 min on 5 or more days per week. The likelihood of achieving the PA recommended levels was higher among respondents older than 18–24. For those aged 45–64 years the likelihood increased 65% (OR = 1.65, 95% CI: 1.51–1.82, $p < 0.001$) and 112% (OR = 2.12, 95% CI: 1.94–2.32, $p < 0.001$) for males and females, respectively. Those who were high school graduates were more likely to report achieving the recommended PA levels than those with less than high school education (males: OR = 1.19, 95% CI: 1.12–1.27, $p < 0.001$; females: OR = 1.13, 95% CI: 1.06–1.20, $p < 0.001$).

Conclusion. Although about 60% of European adults reported achieving the recommended levels of PA, there is much room for improvement among European adults, particularly among relatively inactive subgroups.

Appendix B. Oral communication associated with this thesis

26 de novembro 2015

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Caro Adilson Marques,

A Sociedade Científica de Pedagogia do Desporto, entidade organizadora do seu 5º Congresso a ter lugar na Universidade Lusófona em Lisboa nos dias 4 e 5 de dezembro, através da sua Comissão Organizadora procedeu a uma revisão dos resumos submetidos.

Em nome desta comissão tenho o prazer de o convidar a apresentar uma COMUNICAÇÃO ORAL do resumo submetido **"Correlatos sociodemográficos da atividade física dos adultos europeus. Um estudo transversal com dados do European Social Survey 2012"**

Detalhes sobre o dia da sua apresentação deverá ser consultado no programa do congresso em http://www.ipg.pt/scpd/5congresso-scpd/programa.aspx.

Relembramos que todos os participantes devem regularizar a sua inscrição em http://www.ipg.pt/scpd/5congresso-scpd/inscricoes.aspx

Enviamos as melhores saudações académicas, aguardando com expectativa a sua participação,

(Rui Resende, Ph. D)
Vice presidente da SCPD

Appendix C. Data analysis for table 1

Frequency Table

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	18271	46,5	46,5	46,5
	Female	21006	53,5	53,5	100,0
	Total	39278	100,0	100,0	

Idade em intrevalos

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-24	5445	13,9	13,9	13,9
	25-34	7293	18,6	18,6	32,4
	35-44	8631	22,0	22,0	54,4
	45-54	9321	23,7	23,7	78,1
	55-64	8588	21,9	21,9	100,0
	Total	39278	100,0	100,0	

Habilit_tric

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than high school	2193	5,6	5,6	5,6
	High school	27467	69,9	70,3	75,9
	Superior education	9425	24,0	24,1	100,0
	Total	39085	99,5	100,0	
Missing	System	193	,5		
Total		39278	100,0		

Empregado

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Empregado	24253	61,7	69,55	69,6
	Desempregado	4233	10,8	12,14	81,7
	Estudante	3554	9,0	10,19	91,9
	Reformado	2829	7,2	8,11	100,0
	Total	34869	88,8	100,0	
Missing	Doente	1146	2,9		
	System	3263	8,3		
	Total	4409	11,2		
Total		39278	100,0		

Living_place

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Urban areas	12967	33,0	33,1	33,1
	Town or small city	11885	30,3	30,3	63,4
	Rural areas	14331	36,5	36,6	100,0
	Total	39184	99,8	100,0	
Missing	System	94	,2		
Total		39278	100,0		

Com quem vive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sem companheiro	13754	35,0	35,2	35,2
	Companheiro (esposo, companheiro)	25372	64,6	64,8	100,0
	Total	39127	99,6	100,0	
Missing	System	151	,4		
Total		39278	100,0		

Children living at home or not

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Does not	19643	50,0	50,0	50,0
	Respondent lives with children at household grid	19633	50,0	50,0	100,0
	Total	39277	100,0	100,0	
Missing	Not available	1	,0		
Total		39278	100,0		

Numero_pessoa_casa

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 pessoa	4135	10,5	10,5	10,5
	2 pessoas	10205	26,0	26,0	36,5
	3-4 pessoas	18661	47,5	47,5	84,0
	>= 5 pessoas	6277	16,0	16,0	100,0
	Total	39278	100,0	100,0	

Citizen of country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	37482	95,4	95,5	95,5
	No	1770	4,5	4,5	100,0
	Total	39252	99,9	100,0	
Missing	Refusal	4	,0		
	Don't know	1	,0		
	No answer	22	,1		
	Total	26	,1		
Total		39278	100,0		

ESE_tric

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-3 decil	8613	21,9	27,2	27,2
	4-7 decil	13215	33,6	41,7	68,9
	8-10 decil	9847	25,1	31,1	100,0
	Total	31675	80,6	100,0	
Missing	System	7602	19,4		
Total		39278	100,0		

Physically active for 30 minutes or longer last 7 days

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No days	2586	6,6	6,6	6,6
	One day	1674	4,3	4,3	10,8
	Two days	2866	7,3	7,3	18,1
	Three days	3683	9,4	9,4	27,5
	Four days	3133	8,0	8,0	35,5
	Five days	4509	11,5	11,5	47,0
	Six days	3088	7,9	7,9	54,8
	Seven days	17738	45,2	45,2	100,0
	Total	39278	100,0	100,0	

AF_rec_dummy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Não cumpre	13942	35,5	35,5	35,5
	Cumpre	25336	64,5	64,5	100,0
	Total	39278	100,0	100,0	

Idade em intrevalos

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	18-24	2667	14,6	14,6	14,6
		25-34	3415	18,7	18,7	33,3
		35-44	3934	21,5	21,5	54,8
		45-54	4306	23,6	23,6	78,4
		55-64	3950	21,6	21,6	100,0
		Total	18271	100,0	100,0	
Female	Valid	18-24	2778	13,2	13,2	13,2
		25-34	3879	18,5	18,5	31,7
		35-44	4697	22,4	22,4	54,0
		45-54	5015	23,9	23,9	77,9
		55-64	4638	22,1	22,1	100,0
		Total	21006	100,0	100,0	

Habilit_tric

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Less than high school	940	5,1	5,2	5,2
		High school	13279	72,7	73,1	78,3
		Superior education	3948	21,6	21,7	100,0
		Total	18167	99,4	100,0	
	Missing	System	105	,6		
	Total		18271	100,0		
Female	Valid	Less than high school	1253	6,0	6,0	6,0
		High school	14188	67,5	67,8	73,8
		Superior education	5477	26,1	26,2	100,0
		Total	20918	99,6	100,0	
	Missing	System	88	,4		
	Total		21006	100,0		

Empregado

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Empregado	12371	67,7	71,32	71,3
		Desempregado	2074	11,4	11,96	83,3
		Estudante	1702	9,3	9,81	93,1
		Reformado	1199	6,6	6,91	100,0
		Total	17346	94,9	100,00	
	Missing	Doente	552	3,0		
		System	374	2,0		
		Total	926	5,1		
	Total		18271	100,0		
Female	Valid	Empregado	11882	56,6	67,81	67,8
		Desempregado	2159	10,3	12,32	80,1
		Estudante	1852	8,8	10,57	90,7
		Reformado	1631	7,8	9,31	100,0
		Total	17524	83,4	100,00	
	Missing	Doente	594	2,8		
		System	2889	13,8		
		Total	3483	16,6		
	Total		21006	100,0		

Living_place

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Urban areas	5969	32,7	32,7	32,7
		Town or small city	5447	29,8	29,9	62,6
		Rural areas	6817	37,3	37,4	100,0
		Total	18232	99,8	100,0	
	Missing	System	40	,2		
	Total		18271	100,0		
Female	Valid	Urban areas	6999	33,3	33,4	33,4
		Town or small city	6439	30,7	30,7	64,1
		Rural areas	7515	35,8	35,9	100,0
		Total	20952	99,7	100,0	
	Missing	System	54	,3		
	Total		21006	100,0		

Com quem vive

Sex			Frequency	Percent	Valid Percent
Male	Valid	Sem companheiro	6357	34,8	34,9
		Companheiro (esposo, companheiro)	11855	64,9	65,1
		Total	18212	99,7	100,0
	Missing	System	60	,3	
	Total		18271	100,0	
Female	Valid	Sem companheiro	7397	35,2	35,4
		Companheiro (esposo, companheiro)	13518	64,4	64,6
		Total	20915	99,6	100,0
	Missing	System	92	,4	
	Total		21006	100,0	

Children living at home or not

Sex			Frequency	Percent	Valid Percent
Male	Valid	Does not	10094	55,2	55,2
		Respondent lives with children at household grid	8177	44,8	44,8
		Total	18271	100,0	100,0
	Missing	Not available	0	,0	
	Total		18271	100,0	
Female	Valid	Does not	9549	45,5	45,5
		Respondent lives with children at household grid	11456	54,5	54,5
		Total	21006	100,0	100,0
	Missing	Not available	1	,0	
	Total		21006	100,0	

Numero_pessoa_casa

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	1 pessoa	2135	11,7	11,7	11,7
		2 pessoas	4607	25,2	25,2	36,9
		3-4 pessoas	8791	48,1	48,1	85,0
		>= 5 pessoas	2739	15,0	15,0	100,0
		Total	18271	100,0	100,0	
Female	Valid	1 pessoa	2000	9,5	9,5	9,5
		2 pessoas	5598	26,6	26,6	36,2
		3-4 pessoas	9870	47,0	47,0	83,2
		>= 5 pessoas	3538	16,8	16,8	100,0
		Total	21006	100,0	100,0	

Citizen of country

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Yes	17399	95,2	95,3	95,3
		No	858	4,7	4,7	100,0
		Total	18258	99,9	100,0	
	Missing	Refusal	2	,0		
		Don't know	1	,0		
		No answer	10	,1		
		Total	14	,1		
	Total		18271	100,0		
Female	Valid	Yes	20082	95,6	95,7	95,7
		No	912	4,3	4,3	100,0
		Total	20994	99,9	100,0	
	Missing	Refusal	1	,0		
		No answer	11	,1		
		Total	12	,1		
	Total		21006	100,0		

ESE_tric

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	1-3 decil	3757	20,6	25,2	25,2
		4-7 decil	6139	33,6	41,2	66,5
		8-10 decil	4993	27,3	33,5	100,0
		Total	14889	81,5	100,0	
	Missing	System	3382	18,5		
	Total		18271	100,0		
Female	Valid	1-3 decil	4855	23,1	28,9	28,9
		4-7 decil	7077	33,7	42,2	71,1
		8-10 decil	4854	23,1	28,9	100,0
		Total	16786	79,9	100,0	
	Missing	System	4220	20,1		
	Total		21006	100,0		

Physically active for 30 minutes or longer last 7 days

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	No days	1152	6,3	6,3	6,3
		One day	865	4,7	4,7	11,0
		Two days	1402	7,7	7,7	18,7
		Three days	1777	9,7	9,7	28,4
		Four days	1497	8,2	8,2	36,6
		Five days	2298	12,6	12,6	49,2
		Six days	1530	8,4	8,4	57,6
		Seven days	7750	42,4	42,4	100,0
		Total	18271	100,0	100,0	
Female	Valid	No days	1434	6,8	6,8	6,8
		One day	809	3,9	3,9	10,7
		Two days	1464	7,0	7,0	17,6
		Three days	1906	9,1	9,1	26,7
		Four days	1636	7,8	7,8	34,5
		Five days	2211	10,5	10,5	45,0
		Six days	1559	7,4	7,4	52,5
		Seven days	9988	47,5	47,5	100,0
		Total	21006	100,0	100,0	

AF_rec_dummy

Sex			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Não cumpre	6694	36,6	36,6	36,6
		Cumpre	11578	63,4	63,4	100,0
		Total	18271	100,0	100,0	
Female	Valid	Não cumpre	7248	34,5	34,5	34,5
		Cumpre	13758	65,5	65,5	100,0
		Total	21006	100,0	100,0	

Mann-Whitney Test

Ranks

	Sex	N	Mean Rank	Sum of Ranks
Idade em intrevalos	Male	18351	19567,80	359088669,50
	Female	21090	19854,30	418727291,50
	Total	39441		
Physically active for 30 minutes or longer last 7 days	Male	18351	19263,55	353505339,00
	Female	21090	20119,04	424310622,00
	Total	39441		

Test Statistics[a]

	Idade em intrevalos	Physically active for 30 minutes or longer last 7 days
Mann-Whitney U	190699893,500	185116563,000
Wilcoxon W	359088669,500	353505339,000
Z	-2,549	-7,829
Asymp. Sig. (2-tailed)	,011	,000

Crosstabs

Habilit_tric * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	129,817[a]	2	,000
Likelihood Ratio	130,272	2	,000
Linear-by-Linear Association	48,862	1	,000
N of Valid Cases	39085		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 1019,32.

Occupation * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	82,936[a]	3	,000
Likelihood Ratio	83,195	3	,000
Linear-by-Linear Association	81,410	1	,000
N of Valid Cases	34870		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 1407,78.

Living_place * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9,840[a]	2	,007
Likelihood Ratio	9,837	2	,007
Linear-by-Linear Association	6,712	1	,010
N of Valid Cases	39186		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5530,48.

Com quem vive * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,909[a]	1	,340		
Continuity Correction[b]	,889	1	,346		
Likelihood Ratio	,909	1	,340		
Fisher's Exact Test				,345	,173
Linear-by-Linear Association	,909	1	,340		
N of Valid Cases	39127				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 6401,92.
b. Computed only for a 2x2 table

Children living at home or not * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	374,262[a]	1	,000		
Continuity Correction[b]	373,871	1	,000		
Likelihood Ratio	374,872	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	374,253	1	,000		
N of Valid Cases	39276				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 9133,17.
b. Computed only for a 2x2 table

Numero_pessoa_casa * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	74,795[a]	3	,000
Likelihood Ratio	74,743	3	,000
Linear-by-Linear Association	29,541	1	,000
N of Valid Cases	39278		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 1923,59.

Citizen of country * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,865[a]	1	,090		
Continuity Correction[b]	2,784	1	,095		
Likelihood Ratio	2,861	1	,091		
Fisher's Exact Test				,092	,048
Linear-by-Linear Association	2,865	1	,091		
N of Valid Cases	39251				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 823,29.

ESE_tric * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	95,259[a]	2	,000
Likelihood Ratio	95,287	2	,000
Linear-by-Linear Association	93,682	1	,000
N of Valid Cases	31675		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 4048,12.

AF_rec_dummy * Sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19,379[a]	1	,000		
Continuity Correction[b]	19,286	1	,000		
Likelihood Ratio	19,369	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	19,378	1	,000		
N of Valid Cases	39278				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 6485,77.

Appendix D. Data analysis for table 2

Oneway

Descriptives

Physically active for 30 minutes or longer last 7 days

Sex		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Male	18-24	2667	4,81	2,180	,042	4,72	4,89	0	7
	25-34	3415	4,86	2,296	,039	4,79	4,94	0	7
	35-44	3934	4,92	2,290	,037	4,84	4,99	0	7
	45-54	4306	4,98	2,303	,035	4,91	5,05	0	7
	55-64	3950	4,98	2,364	,038	4,91	5,06	0	7
	Total	18271	4,92	2,296	,017	4,89	4,95	0	7
Female	18-24	2778	4,58	2,290	,043	4,50	4,67	0	7
	25-34	3879	4,99	2,318	,037	4,92	5,06	0	7
	35-44	4697	5,12	2,327	,034	5,05	5,19	0	7
	45-54	5015	5,15	2,301	,032	5,08	5,21	0	7
	55-64	4638	5,26	2,293	,034	5,19	5,32	0	7
	Total	21006	5,06	2,316	,016	5,03	5,09	0	7

ANOVA

Physically active for 30 minutes or longer last 7 days

Sex		Sum of Squares	df	Mean Square	F	Sig.
Male	Between Groups	79,139	4	19,785	3,756	,005
	Within Groups	96216,894	18266	5,268		
	Total	96296,033	18270			
Female	Between Groups	889,932	4	222,483	41,805	,000
	Within Groups	111764,988	21001	5,322		
	Total	112654,919	21005			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Physically active for 30 minutes or longer last 7 days

Tukey HSD

Sex	(I) Idade em intrevalos	(J) Idade em intrevalos	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Male	18-24	25-34	-,055	,059	,885	-,22	,11
		35-44	-,108	,058	,328	-,27	,05
		45-54	-,176*	,057	,016	-,33	-,02
		55-64	-,178*	,058	,017	-,33	-,02
	25-34	18-24	,055	,059	,885	-,11	,22
		35-44	-,053	,054	,860	-,20	,09
		45-54	-,121	,053	,145	-,26	,02
		55-64	-,122	,054	,151	-,27	,02
	35-44	18-24	,108	,058	,328	-,05	,27
		25-34	,053	,054	,860	-,09	,20
		45-54	-,068	,051	,667	-,21	,07
		55-64	-,069	,052	,666	-,21	,07
	45-54	18-24	,176*	,057	,016	,02	,33
		25-34	,121	,053	,145	-,02	,26
		35-44	,068	,051	,667	-,07	,21
		55-64	-,002	,051	1,000	-,14	,14
	55-64	18-24	,178*	,058	,017	,02	,33
		25-34	,122	,054	,151	-,02	,27
		35-44	,069	,052	,666	-,07	,21
		45-54	,002	,051	1,000	-,14	,14
Female	18-24	25-34	-,412*	,057	,000	-,57	-,26
		35-44	-,540*	,055	,000	-,69	-,39
		45-54	-,567*	,055	,000	-,72	-,42

	55-64	-,675*	,055	,000	-,83	-,52
25-34	18-24	,412*	,057	,000	,26	,57
	35-44	-,128	,050	,077	-,26	,01
	45-54	-,156*	,049	,014	-,29	-,02
	55-64	-,264*	,050	,000	-,40	-,13
35-44	18-24	,540*	,055	,000	,39	,69
	25-34	,128	,050	,077	-,01	,26
	45-54	-,027	,047	,978	-,16	,10
	55-64	-,135*	,048	,037	-,27	-,01
45-54	18-24	,567*	,055	,000	,42	,72
	25-34	,156*	,049	,014	,02	,29
	35-44	,027	,047	,978	-,10	,16
	55-64	-,108	,047	,144	-,24	,02
55-64	18-24	,675*	,055	,000	,52	,83
	25-34	,264*	,050	,000	,13	,40
	35-44	,135*	,048	,037	,01	,27
	45-54	,108	,047	,144	-,02	,24

*. The mean difference is significant at the 0.05 level.

Descriptives

Physically active for 30 minutes or longer last 7 days

Sex		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Male	Less than high school	940	4,51	2,681	,087	4,34	4,68	0	7
	High school	13279	5,06	2,249	,020	5,02	5,09	0	7
	Superior education	3948	4,55	2,306	,037	4,48	4,63	0	7
	Total	18167	4,92	2,297	,017	4,89	4,95	0	7
Female	Less than high school	1253	4,77	2,635	,074	4,62	4,91	0	7
	High school	14188	5,17	2,285	,019	5,13	5,21	0	7
	Superior education	5477	4,85	2,294	,031	4,79	4,91	0	7
	Total	20918	5,06	2,315	,016	5,03	5,09	0	7

ANOVA

Physically active for 30 minutes or longer last 7 days

Sex		Sum of Squares	df	Mean Square	F	Sig.
Male	Between Groups	934,613	2	467,307	89,459	,000
	Within Groups	94877,630	18163	5,224		
	Total	95812,243	18165			
Female	Between Groups	506,854	2	253,427	47,500	,000
	Within Groups	111588,812	20915	5,335		
	Total	112095,666	20917			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Physically active for 30 minutes or longer last 7 days
Tukey HSD

Sex	(I) Habilit_tric	(J) Habilit_tric	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Male	Less than high school	High school	-,545*	,077	,000	-,73	-,36
		Superior education	-,042	,083	,867	-,24	,15
	High school	Less than high school	,545*	,077	,000	,36	,73
		Superior education	,503*	,041	,000	,41	,60
	Superior education	Less than high school	,042	,083	,867	-,15	,24
		High school	-,503*	,041	,000	-,60	-,41
Female	Less than high school	High school	-,399*	,068	,000	-,56	-,24
		Superior education	-,083	,072	,481	-,25	,09
	High school	Less than high school	,399*	,068	,000	,24	,56
		Superior education	,315*	,037	,000	,23	,40
	Superior education	Less than high school	,083	,072	,481	-,09	,25
		High school	-,315*	,037	,000	-,40	-,23

*. The mean difference is significant at the 0.05 level.

Descriptives

Physically active for 30 minutes or longer last 7 days

Sex		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Male	Empregado	12371	5,02	2,235	,020	4,98	5,06	0	7
	Desempregado	2074	4,80	2,425	,053	4,69	4,90	0	7
	Estudante	1702	4,62	2,152	,052	4,51	4,72	0	7
	Reformado	1199	4,98	2,412	,070	4,84	5,12	0	7
	Total	17346	4,95	2,267	,017	4,92	4,99	0	7
Female	Empregado	11882	5,10	2,249	,021	5,06	5,14	0	7
	Desempregado	2159	5,05	2,377	,051	4,95	5,15	0	7
	Estudante	1852	4,44	2,248	,052	4,34	4,54	0	7
	Reformado	1631	5,39	2,302	,057	5,27	5,50	0	7
	Total	17524	5,05	2,281	,017	5,02	5,09	0	7

ANOVA

Physically active for 30 minutes or longer last 7 days

Sex		Sum of Squares	df	Mean Square	F	Sig.
Male	Between Groups	302,725	3	100,908	19,696	,000
	Within Groups	88844,757	17341	5,123		
	Total	89147,482	17344			
Female	Between Groups	903,857	3	301,286	58,473	,000
	Within Groups	90267,765	17519	5,153		
	Total	91171,622	17522			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Physically active for 30 minutes or longer last 7 days
Tukey HSD

Sex	(I) Empregado	(J) Empregado	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Male	Empregado	Desempregado	,225*	,054	,000	,09	,36
		Estudante	,405*	,059	,000	,26	,56
		Reformado	,043	,068	,925	-,13	,22
	Desempregado	Empregado	-,225*	,054	,000	-,36	-,09
		Estudante	,181	,074	,070	-,01	,37
		Reformado	-,182	,082	,118	-,39	,03
	Estudante	Empregado	-,405*	,059	,000	-,56	-,26
		Desempregado	-,181	,074	,070	-,37	,01
		Reformado	-,363*	,085	,000	-,58	-,14
	Reformado	Empregado	-,043	,068	,925	-,22	,13
		Desempregado	,182	,082	,118	-,03	,39
		Estudante	,363*	,085	,000	,14	,58
Female	Empregado	Desempregado	,051	,053	,777	-,09	,19
		Estudante	,661*	,057	,000	,52	,81
		Reformado	-,284*	,060	,000	-,44	-,13
	Desempregado	Empregado	-,051	,053	,777	-,19	,09
		Estudante	,611*	,072	,000	,43	,80
		Reformado	-,334*	,074	,000	-,53	-,14
	Estudante	Empregado	-,661*	,057	,000	-,81	-,52
		Desempregado	-,611*	,072	,000	-,80	-,43
		Reformado	-,945*	,077	,000	-1,14	-,75
	Reformado	Empregado	,284*	,060	,000	,13	,44
		Desempregado	,334*	,074	,000	,14	,53
		Estudante	,945*	,077	,000	,75	1,14

*. The mean difference is significant at the 0.05 level.

Descriptives

Physically active for 30 minutes or longer last 7 days

Sex		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Male	Urban areas	5969	4,84	2,282	,030	4,79	4,90	0	7
	Town or small city	5447	4,76	2,327	,032	4,70	4,82	0	7
	Rural areas	6817	5,11	2,268	,027	5,06	5,17	0	7
	Total	18232	4,92	2,296	,017	4,89	4,95	0	7
Female	Urban areas	6999	5,00	2,311	,028	4,94	5,05	0	7
	Town or small city	6439	4,93	2,332	,029	4,87	4,98	0	7
	Rural areas	7515	5,24	2,296	,026	5,18	5,29	0	7
	Total	20952	5,06	2,316	,016	5,03	5,09	0	7

ANOVA

Physically active for 30 minutes or longer last 7 days

Sex		Sum of Squares	df	Mean Square	F	Sig.
Male	Between Groups	433,770	2	216,885	41,335	,000
	Within Groups	95642,290	18228	5,247		
	Total	96076,060	18230			
Female	Between Groups	376,616	2	188,308	35,219	,000
	Within Groups	112004,954	20948	5,347		
	Total	112381,570	20950			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Physically active for 30 minutes or longer last 7 days
Tukey HSD

Sex	(I) Living_place	(J) Living_place	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Male	Urban areas	Town or small city	,085	,043	,115	-,02	,19
		Rural areas	-,270*	,041	,000	-,37	-,18
	Town or small city	Urban areas	-,085	,043	,115	-,19	,02
		Rural areas	-,356*	,042	,000	-,45	-,26
	Rural areas	Urban areas	,270*	,041	,000	,18	,37
		Town or small city	,356*	,042	,000	,26	,45
Female	Urban areas	Town or small city	,071	,040	,178	-,02	,16
		Rural areas	-,239*	,038	,000	-,33	-,15
	Town or small city	Urban areas	-,071	,040	,178	-,16	,02
		Rural areas	-,310*	,039	,000	-,40	-,22
	Rural areas	Urban areas	,239*	,038	,000	,15	,33
		Town or small city	,310*	,039	,000	,22	,40

*. The mean difference is significant at the 0.05 level.

Group Statistics

Sex		Com quem vive	N	Mean	Std. Deviation	Std. Error Mean
Male	Physically active for 30 minutes or longer last 7 days	Sem companheiro	6357	4,82	2,297	,029
		Companheiro (esposo, companheiro)	11855	4,98	2,294	,021
Female	Physically active for 30 minutes or longer last 7 days	Sem companheiro	7397	4,83	2,344	,027
		Companheiro (esposo, companheiro)	13518	5,18	2,293	,020

Independent Samples Test

			Levene's Test for Equality of Variances		t-test for Equality of Means						
										95% Confidence Interval of the Difference	
Sex			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Male	Physically active for 30 minutes or longer last 7 days	Equal variances assumed	,851	,356	-4,510	18210	,000	-,161	,036	-,231	-,091
		Equal variances not assumed			-4,509	12983,143	,000	-,161	,036	-,231	-,091
Female	Physically active for 30 minutes or longer last 7 days	Equal variances assumed	22,742	,000	-10,410	20913	,000	-,348	,033	-,413	-,282
		Equal variances not assumed			-10,344	14934,379	,000	-,348	,034	-,414	-,282

T-Test

Group Statistics

Sex		Children living at home or not	N	Mean	Std. Deviation	Std. Error Mean
Male	Physically active for 30 minutes or longer last 7 days	Does not	10094	4,87	2,294	,023
		Respondent lives with children at household grid	8177	4,99	2,297	,025
Female	Physically active for 30 minutes or longer last 7 days	Does not	9549	4,90	2,295	,023
		Respondent lives with children at household grid	11456	5,20	2,324	,022

Independent Samples Test

Sex			Levene's Test for Equality of Variances		t-test for Equality of Means						
										95% CI of the Difference	
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Male	Physically active for 30 minutes or longer last 7 days	Equal variances assumed	,017	,898	-3,452	18269	,001	-,118	,034	-,185	-,051
		Equal variances not assumed			-3,451	17481,647	,001	-,118	,034	-,185	-,051
Female	Physically active for 30 minutes or longer last 7 days	Equal variances assumed	,002	,963	-9,387	21004	,000	-,301	,032	-,363	-,238
		Equal variances not assumed			-9,398	20416,764	,000	-,301	,032	-,363	-,238

Descriptives

Physically active for 30 minutes or longer last 7 days

Sex		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Male	Does not	10094	4,87	2,294	,023	4,82	4,91	0	7
	Respondent lives with children at household grid	8177	4,99	2,297	,025	4,94	5,04	0	7
	Total	18271	4,92	2,296	,017	4,89	4,95	0	7
Female	Does not	9549	4,90	2,295	,023	4,85	4,94	0	7
	Respondent lives with children at household grid	11456	5,20	2,324	,022	5,16	5,24	0	7
	Total	21006	5,06	2,316	,016	5,03	5,09	0	7

ANOVA

Physically active for 30 minutes or longer last 7 days

Sex		Sum of Squares	df	Mean Square	F	Sig.
Male	Between Groups	62,759	1	62,759	11,914	,001
	Within Groups	96231,289	18269	5,267		
	Total	96294,048	18270			
Female	Between Groups	470,647	1	470,647	88,116	,000
	Within Groups	112181,849	21003	5,341		
	Total	112652,496	21004			

Group Statistics

Sex		Citizen of country	N	Mean	Std. Deviation	Std. Error Mean
Male	Physically active for 30 minutes or longer last 7 days	Yes	17399	4,92	2,297	,017
		No	858	4,89	2,284	,078
Female	Physically active for 30 minutes or longer last 7 days	Yes	20082	5,06	2,315	,016
		No	912	5,05	2,336	,077

Independent Samples Test

Sex			Levene's Test F	Levene's Test Sig.	t-test for Equality of Means t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI of the Difference Lower	95% CI of the Difference Upper
Male	Physically active for 30 minutes or longer last 7 days	Equal variances assumed	,015	,902	,385	18256	,700	,031	,080	-,126	,188
		Equal variances not assumed			,387	944,652	,699	,031	,080	-,126	,188
Female	Physically active for 30 minutes or longer last 7 days	Equal variances assumed	,217	,642	,221	20992	,825	,017	,078	-,136	,171
		Equal variances not assumed			,219	993,625	,827	,017	,079	-,138	,173

Oneway

Descriptives

Physically active for 30 minutes or longer last 7 days

Sex		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Male	1-3 decil	3757	4,87	2,417	,039	4,79	4,94	0	7
	4-7 decil	6139	4,98	2,267	,029	4,92	5,04	0	7
	8-10 decil	4993	4,79	2,240	,032	4,72	4,85	0	7
	Total	14889	4,89	2,298	,019	4,85	4,92	0	7
Female	1-3 decil	4855	5,09	2,365	,034	5,02	5,16	0	7
	4-7 decil	7077	5,08	2,297	,027	5,03	5,14	0	7
	8-10 decil	4854	4,96	2,274	,033	4,89	5,02	0	7
	Total	16786	5,05	2,311	,018	5,01	5,08	0	7

ANOVA

Physically active for 30 minutes or longer last 7 days

Sex		Sum of Squares	df	Mean Square	F	Sig.
Male	Between Groups	104,335	2	52,167	9,889	,000
	Within Groups	78525,895	14886	5,275		
	Total	78630,230	14888			
Female	Between Groups	55,731	2	27,865	5,219	,005
	Within Groups	89604,015	16783	5,339		
	Total	89659,745	16785			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Physically active for 30 minutes or longer last 7 days
Tukey HSD

Sex	(I) ESE_tric	(J) ESE_tric	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Male	1-3 decil	4-7 decil	-,112*	,048	,050	-,22	,00
		8-10 decil	,081	,050	,228	-,03	,20
	4-7 decil	1-3 decil	,112*	,048	,050	,00	,22
		8-10 decil	,193*	,044	,000	,09	,30
	8-10 decil	1-3 decil	-,081	,050	,228	-,20	,03
		4-7 decil	-,193*	,044	,000	-,30	-,09
Female	1-3 decil	4-7 decil	,007	,043	,984	-,09	,11
		8-10 decil	,131*	,047	,014	,02	,24
	4-7 decil	1-3 decil	-,007	,043	,984	-,11	,09
		8-10 decil	,124*	,043	,011	,02	,22
	8-10 decil	1-3 decil	-,131*	,047	,014	-,24	-,02
		4-7 decil	-,124*	,043	,011	-,22	-,02

*. The mean difference is significant at the 0.05 level.

Appendix E. Data analysis for table 3

Crosstabs
Idade em intrevalos * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	22,539[a]	4	,000
	Likelihood Ratio	22,479	4	,000
	Linear-by-Linear Association	22,174	1	,000
	N of Valid Cases	18272		
Female	Pearson Chi-Square	200,979[b]	4	,000
	Likelihood Ratio	196,175	4	,000
	Linear-by-Linear Association	160,879	1	,000
	N of Valid Cases	21007		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 977,06.
b. 0 cells (,0%) have expected count less than 5. The minimum expected count is 958,62.

Habilit_tric * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	185,237[a]	2	,000
	Likelihood Ratio	182,165	2	,000
	Linear-by-Linear Association	94,830	1	,000
	N of Valid Cases	18167		
Female	Pearson Chi-Square	86,210[b]	2	,000
	Likelihood Ratio	85,361	2	,000
	Linear-by-Linear Association	38,468	1	,000
	N of Valid Cases	20918		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 344,71.
b. 0 cells (,0%) have expected count less than 5. The minimum expected count is 432,48.

Empregado * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	85,720[a]	3	,000
	Likelihood Ratio	83,930	3	,000
	Linear-by-Linear Association	18,888	1	,000
	N of Valid Cases	17347		
Female	Pearson Chi-Square	210,618[b]	3	,000
	Likelihood Ratio	205,401	3	,000
	Linear-by-Linear Association	,015	1	,903
	N of Valid Cases	17524		

Living_place * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	70,783[a]	2	,000
	Likelihood Ratio	71,223	2	,000
	Linear-by-Linear Association	44,638	1	,000
	N of Valid Cases	18232		
Female	Pearson Chi-Square	59,135[b]	2	,000
	Likelihood Ratio	59,472	2	,000
	Linear-by-Linear Association	31,923	1	,000
	N of Valid Cases	20952		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 1996,62.

Com quem vive * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Male	Pearson Chi-Square	18,902[a]	1	,000		
	Continuity Correction[b]	18,762	1	,000		
	Likelihood Ratio	18,836	1	,000		
	Fisher's Exact Test				,000	,000
	Linear-by-Linear Association	18,901	1	,000		
	N of Valid Cases	18212				
Female	Pearson Chi-Square	105,008[c]	1	,000		
	Continuity Correction[b]	104,697	1	,000		
	Likelihood Ratio	104,187	1	,000		
	Fisher's Exact Test				,000	,000
	Linear-by-Linear Association	105,003	1	,000		
	N of Valid Cases	20915				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 2329,25.
b. Computed only for a 2x2 table
c. 0 cells (,0%) have expected count less than 5. The minimum expected count is 2557,02.

Children living at home or not * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Male	Pearson Chi-Square	8,757[a]	1	,003		
	Continuity Correction[b]	8,666	1	,003		
	Likelihood Ratio	8,766	1	,003		
	Fisher's Exact Test				,003	,002
	Linear-by-Linear Association	8,757	1	,003		
	N of Valid Cases	18271				
Female	Pearson Chi-Square	101,725[c]	1	,000		
	Continuity Correction[b]	101,431	1	,000		
	Likelihood Ratio	101,563	1	,000		
	Fisher's Exact Test				,000	,000
	Linear-by-Linear Association	101,720	1	,000		
	N of Valid Cases	21005				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 2995,83.
b. Computed only for a 2x2 table
c. 0 cells (,0%) have expected count less than 5. The minimum expected count is 3294,98.

Numero_pessoa_casa * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	14,057[a]	3	,003
	Likelihood Ratio	14,030	3	,003
	Linear-by-Linear Association	14,031	1	,000
	N of Valid Cases	18271		
Female	Pearson Chi-Square	48,556[b]	3	,000
	Likelihood Ratio	48,921	3	,000
	Linear-by-Linear Association	30,257	1	,000
	N of Valid Cases	21006		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 782,21.
b. 0 cells (,0%) have expected count less than 5. The minimum expected count is 690,09.

Citizen of country * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Male	Pearson Chi-Square	,383[a]	1	,536		
	Continuity Correction[b]	,339	1	,560		
	Likelihood Ratio	,381	1	,537		
	Fisher's Exact Test				,538	,280
	Linear-by-Linear Association	,383	1	,536		
	N of Valid Cases	18258				
Female	Pearson Chi-Square	,002[c]	1	,966		
	Continuity Correction[b]	,000	1	,994		
	Likelihood Ratio	,002	1	,966		
	Fisher's Exact Test				,999	,497
	Linear-by-Linear Association	,002	1	,966		
	N of Valid Cases	20994				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 314,48.
b. Computed only for a 2x2 table
c. 0 cells (,0%) have expected count less than 5. The minimum expected count is 314,60.

ESE_tric * AF_rec_dummy

Chi-Square Tests

Sex		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	23,615[a]	2	,000
	Likelihood Ratio	23,557	2	,000
	Linear-by-Linear Association	9,942	1	,002
	N of Valid Cases	14890		
Female	Pearson Chi-Square	17,274[b]	2	,000
	Likelihood Ratio	17,176	2	,000
	Linear-by-Linear Association	13,693	1	,000
	N of Valid Cases	16786		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 1403,26.
b. 0 cells (,0%) have expected count less than 5. The minimum expected count is 1689,33.

Appendix F. Data analysis for table 4

Logistic Regression

Case Processing Summary

Sex	Unweighted Cases[a]		N	Percent
Male	Selected Cases	Included in Analysis	13738	77,3
		Missing Cases	4039	22,7
		Total	17777	100,0
	Unselected Cases		0	,0
	Total		17777	100,0
Female	Selected Cases	Included in Analysis	13838	67,7
		Missing Cases	6607	32,3
		Total	20445	100,0
	Unselected Cases		0	,0
	Total		20445	100,0

a. If weight is in effect, see classification table for the total number of cases.

Block 0: Beginning Block

Classification Table[a,b]

				Predicted		
				AF_rec_dummy		Percentage
Sex		Observed		Não cumpre	Cumpre	Correct
Male	Step 0	AF_rec_dummy	Não cumpre	0	5162	,0
			Cumpre	0	8827	100,0
		Overall Percentage				63,1
Female	Step 0	AF_rec_dummy	Não cumpre	0	4898	,0
			Cumpre	0	9011	100,0
		Overall Percentage				64,8

Variables in the Equation

Sex			B	S.E.	Wald	df	Sig.	Exp(B)
Male	Step 0[a]	Constant	,537	,018	937,532	1	,000	1,710
Female	Step 0[a]	Constant	,610	,018	1179,323	1	,000	1,840

a. Variable(s) entered on step 1: Idade_intervalos2, Habilit_tric, Empregado, Living_place, Civil_status, aaa_chldhm, Numero_pessoa_casa, ctzcntr, ESE_tric.

Block 1: Method = Enter

Omnibus Tests of Model Coefficients

Sex			Chi-square	df	Sig.
Male	Step 1	Step	354,328	19	,000
		Block	354,328	19	,000
		Model	354,328	19	,000
Female	Step 1	Step	395,916	19	,000
		Block	395,916	19	,000
		Model	395,916	19	,000

Model Summary

Sex	Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
Male	1	18066,105[a]	,025	,034
Female	1	17650,856[b]	,028	,039

Classification Table[a]

				Predicted		
				AF_rec_dummy		Percentage
Sex		Observed		Não cumpre	Cumpre	Correct
Male	Step 1	AF_rec_dummy	Não cumpre	412	4749	8,0
			Cumpre	369	8457	95,8
		Overall Percentage				63,4
Female	Step 1	AF_rec_dummy	Não cumpre	414	4484	8,5
			Cumpre	377	8634	95,8
		Overall Percentage				65,1

Variables in the Equation

Sex			B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Male	Step 1[a]	Idade_intervalos2			13,864	4	,008			
		Idade_intervalos2(1)	-,025	,080	,095	1	,757	,98	,83	1,14
		Idade_intervalos2(2)	,025	,086	,088	1	,767	1,03	,87	1,21
		Idade_intervalos2(3)	,083	,086	,941	1	,332	1,09	,92	1,29
		Idade_intervalos2(4)	,197	,090	4,757	1	,029	1,22	1,02	1,45
		Habilit_tric			146,142	2	,000			
		Habilit_tric(1)	,244	,087	7,948	1	,005	1,28	1,08	1,51
		Habilit_tric(2)	-,280	,094	8,906	1	,003	,76	,63	,91
		Empregado			68,301	3	,000			
		Empregado(1)	-,354	,061	34,207	1	,000	,70	,62	,79
		Empregado(2)	-,580	,085	47,049	1	,000	,56	,47	,66
		Empregado(3)	-,157	,079	3,927	1	,048	,86	,73	1,00
		Living_place			34,056	2	,000			
		Living_place(1)	-,069	,045	2,353	1	,125	,93	,85	1,02
		Living_place(2)	,179	,044	16,547	1	,000	1,20	1,10	1,30
		Civil_status(1)	,113	,064	3,140	1	,076	1,12	,99	1,27
		aaa_chldhm(1)	-,278	,069	16,074	1	,000	,76	,66	,87
		Numero_pessoa_casa			25,411	3	,000			
		Numero_pessoa_casa(1)	-,034	,080	,182	1	,670	,97	,83	1,13
		Numero_pessoa_casa(2)	,247	,080	9,663	1	,002	1,28	1,10	1,50
		Numero_pessoa_casa(3)	,335	,089	14,033	1	,000	1,40	1,17	1,67
		ctzcntr(1)	-,003	,084	,001	1	,970	1,00	,85	1,18
		ESE_tric			19,498	2	,000			
		ESE_tric(1)	-,073	,050	2,162	1	,141	,93	,84	1,02
		ESE_tric(2)	-,223	,055	16,486	1	,000	,80	,72	,89
		Constant	,428	,127	11,390	1	,001	1,53		
Female	Step 1[a]	Idade_intervalos2			46,391	4	,000			
		Idade_intervalos2(1)	,129	,083	2,402	1	,121	1,14	,97	1,34
		Idade_intervalos2(2)	,234	,088	7,083	1	,008	1,26	1,06	1,50
		Idade_intervalos2(3)	,342	,087	15,481	1	,000	1,41	1,19	1,67
		Idade_intervalos2(4)	,509	,092	30,619	1	,000	1,66	1,39	1,99
		Habilit_tric			67,020	2	,000			
		Habilit_tric(1)	,230	,096	5,779	1	,016	1,26	1,04	1,52
		Habilit_tric(2)	-,105	,100	1,091	1	,296	,90	,74	1,10
		Empregado			31,671	3	,000			
		Empregado(1)	-,136	,060	5,144	1	,023	,87	,78	,98
		Empregado(2)	-,444	,083	28,676	1	,000	,64	,55	,75
		Empregado(3)	,073	,078	,872	1	,350	1,08	,92	1,25
		Living_place			16,305	2	,000			
		Living_place(1)	-,074	,044	2,761	1	,097	,93	,85	1,01
		Living_place(2)	,108	,045	5,787	1	,016	1,11	1,02	1,22
		Civil_status(1)	,076	,047	2,573	1	,109	1,08	,98	1,18
		aaa_chldhm(1)	,110	,058	3,597	1	,058	1,12	1,00	1,25
		Numero_pessoa_casa			31,765	3	,000			
		Numero_pessoa_casa(1)	,002	,072	,001	1	,974	1,00	,87	1,15
		Numero_pessoa_casa(2)	,049	,084	,339	1	,560	1,05	,89	1,24
		Numero_pessoa_casa(3)	,360	,097	13,671	1	,000	1,43	1,18	1,73
		ctzcntr(1)	,047	,090	,273	1	,601	1,05	,88	1,25
		ESE_tric			18,140	2	,000			
		ESE_tric(1)	-,057	,049	1,387	1	,239	,94	,86	1,04
		ESE_tric(2)	-,215	,056	14,957	1	,000	,81	,72	,90
		Constant	,176	,135	1,714	1	,190	1,19		

a. Variable(s) entered on step 1: Idade_intervalos2, Habilit_tric, Empregado, Living_place, Civil_status, aaa_chldhm, Numero_pessoa_casa, ctzcntr, ESE_tric.