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ORIGINAL ARTICLE

Physical activity barriers according to social stratification in Europe

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Abstract

Objectives To analyse relationships of social stratification on physical activity (PA) prevalence and barriers in the European population.

Methods Data were retrieved from Eurobarometer 88.4, a cross-sectional survey conducted in 2017 with 28,031 over 15-year-old inhabitants of the European Union. PA prevalence was calculated along with the probability to be physically inactive by social stratification. Logistic regressions were run in the inactive population to show the social class effect on each barrier adjusted by sociodemographic factors employing a propensity score matched method.

Results Low social class presented higher inactivity prevalence (43.11%), whilst the high social class reported the lowest prevalence (23.30%). Also, the low (OR 0.52; 95% CI 0.47–0.58) and middle (OR 0.71; 95% CI 0.64–0.79) social classes were less likely to be active compared to high social class. In the inactive population, the low social class had mostly higher odds to report each barrier.

Conclusions Social class is a relevant factor for low PA, with more barriers in the lower social classes. Public health institutions should implement strategies on more influential PA barriers and disadvantaged social groups.

Keywords Physical activity · Barriers · Social determinants · Social class · Lifestyle

Introduction

Physical activity (PA) practice has been demonstrated have benefits for population health (Rhodes et al. 2010; Hallal et al. 2012; Kohl et al. 2012; Wilmot et al. 2012). Thus, the World Health Organization (WHO) established global PA recommendations in order to assess, monitor, and promote an active lifestyle in the overall population (World Health Organization 2010). Nonetheless, worldwide PA prevalence—the population proportion that meets the WHO's PA recommendations—is widely heterogeneous and has diminished across the years: in 2010, 23% of adults aged 18–65 were considered inactive (Rhodes et al. 2010; Guthold et al. 2018); in 2016, the inactivity prevalence continues to rise, and the 27.5% of adults worldwide were classified as inactive. Because of this, physical inactivity has been declared a global pandemic and a serious public health issue worldwide (Kohl et al. 2012; Guthold et al. 2018).

Lifestyle behaviours, such as PA, could be influenced by attributes such as age, gender, social class, educational level, employment, income, resident place, and social support, among others (Denman 1998). Social, political, and cultural factors determine lifestyle behaviours, living conditions, and individual wellbeing, ultimately affecting health (Bauman et al. 2012; Rutter et al. 2019). In the last two decades, social disparities have risen across the EU, changing health-related behaviours among the population in complex and causal relationships (Huijts et al. 2017). These social determinants and socioeconomic domains of health have provided relevant and further information to understand most health-related behaviours, wellbeing, and health, as well as its underlying factors among the European population (Huijts et al. 2017). However, some of the

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social determinants of health-related behaviours have not been thoroughly investigated (O'Donoghue et al. 2018).

There is an important and emerging set of studies suggesting that these social inequalities and factors might affect PA (O'Donoghue et al. 2018) As such, those disadvantaged and deprived population groups might report lower PA level by experiencing greater difficulties, limitations, impediments, and less accessibility; they encounter more barriers to an active lifestyle (Costello et al. 2011; Gray et al. 2016). However, according to recent detailed reviews, current evidence on the social determinants of PA behaviour across the life course remains unclear and insufficient due to a limited number of primary studies, weak research designs, small or non-representative sample sizes, and methodological shortcomings (O'Donoghue et al. 2018). Therefore, here we study the social inequalities in PA prevalence using a large and representative sample of European population older than 15, and how the European population differs in their self-perceived PA barriers across social stratification.

Methods

The present study was conducted according to the STROBE Statement for cross-sectional studies (STROBE Statement 2008).

Data

Data were retrieved from Eurobarometer 88.4 (European Commission 2018), a cross-sectional survey of over 15 years European population among the respective nationalities of the 28 European Union Member States. A total of 28,031 responders participated in the study, approximately 1000 sample size per country, collected between 2 December and 11 December 2017.

A multi-stage random sampling method was used for this survey. In each country, several sampling points were systematically drawn with a proportional probability to population size and density by individual unit and type of area stratification. In all countries gender, age, region, and size of the locality were introduced in the iteration procedure. In each household, the respondent was selected at random, and all interviews were conducted face-to-face in the appropriate national language by trained interviewers.

Measures

PA assessment and classification

To assess the total amount of PA, the Short version of the International Physical Activity Questionnaire (IPAQ) was used (Craig et al. 2003). The IPAQ is a valid and reliable questionnaire to assess PA levels in large populations. Thus, IPAQ is divided into three components according to different intensity types of exercise as vigorous, moderate, and walking in the last 7 days. Time spent per day of each intensity was reported into six ranges: zero, less than 30 min, from 30 to 60 min, from 60 to 90 min, from 90 to 120 min, and more than 120 min. Then, it was estimated through median values of its intervals, and for last range (more than 120 min), a value of 135 min was used.

The European Population PA was classified into individuals who meet or do not meet the WHO PA recommendations (World Health Organization 2010), being considered "physically active" or "physically inactive", respectively. To meet such PA guidelines, individuals must achieve at least one of the following assumptions: (1) 150 min of moderate-intensity PA per week; (2) 75 min of vigorous-intensity PA per week; or (3) any equivalent combination.

Social stratification

Social class was sorted into seven categories according to occupational classification explained elsewhere (Chan and Goldthorpe 2007), being category I Professionals and managers with higher grade and category VII non-skilled manual workers. Given the few samples in several categories, the number of categories was reduced to three: these high, middle, and low social class (Domingo-Salvany et al. 2013).

Physical activity barriers

Physical inactivity could be due to several factors, such as economic, sociological, environmental, health-related, and psychological factors. Thus, nine PA barriers were included to provide a wide perspective of physical inactivity triggers: "No time", "Too expensive", "Competitivity", "No infrastructure", "Disability/Illness", "No friends", "Feel discriminated", "Lack of motivation", and "Risk of injuries". To survey PA barriers, a multi-choice question was used: "What are the main reasons currently preventing you from practising sport more regularly?". These PA barriers have been described in previous studies (Reichert et al. 2007; Cerin et al. 2010; Costello et al. 2011; Kelly et al. 2016).

Statistical analyses

First, descriptive and covariate-adjusted binomial logistic regression were performed in the overall sample between *physically inactive* and *active* sample by social stratification and others sociodemographic confounders.

Subsequently, propensity score matching was only run in the *physically inactive* population (n = 9829) for each PA barrier, excluding 17,415 participants who met the WHO's PA recommendations. The propensity score matching method is mostly used to control confounders to aim to reduce bias in observational studies (Rubin and Rosenbaum 1983). This statistic method matches cases (perceive a PA barrier) and controls with a similar propensity score. Propensity score represents the likelihood to be a case in a range from 0 to 1 based on the employed confounders (Imai and Ratkovic 2014). Gender, age, resident place (rural, small urban, and large urban), and the difficulties to pay bills were used as covariates because these variables could have effects on the perception of barriers to PA (Imai and Ratkovic 2014). The difficult to pay bills in the last year (most of the time, from time to time, or never) was included to control for the relative population's purchasing power and household incomes. Percentage of the report each PA barrier across social class and gender was calculated in the matching-physically inactive sample. Finally, logistic regression analyses were run to show the effect of social class on each of the PA barrier's adjusted by propensity score. High social class was the reference.

Those who reported any missing value in IPAQ were excluded from all analyses (n = 787). Descriptive analysis was shown as the sample size (n) and percentage (%), whereas odds ratio (OR) with its 95% confidence intervals (95% CI) were calculated for the logistic regression analyses. Statistically, significant differences were considered when $P < 0.05$. SPSS 22.0 (SPSS Inc., Chicago, USA) was used to execute all statistical analyses.

Results

Descriptive analysis

Table 1 displays the descriptive data of predictor variable across social class and confounders used in a propensity score matching method in the physically active and inactive European populations. Physical inactivity prevalence was higher in women (38.52%) than men (33.11%). Regarding age, physical inactivity prevalence was higher according to age. In a similar way, those who never had difficulties paying bills reported fewer prevalence (32.04%) to be physically inactive, whereas, by resident place, rural population presented higher inactive prevalence (38.99%).

By social stratification, Fig. 1 shows that the low social class population presented the highest physical inactivity prevalence (43.11%) and, conversely, the lowest prevalence was found in high social class population (23.30%), among which 63.92% were physically active.

Table 1 Sample size and physical activity prevalence[a] in the European Union-28 by covariates employed in propensity score matching method, 2017 Eurobarometer

	Inactive		Active	
	n	%	*n*	%
Overall	9829	36.08	17,415	63.92
Gender				
Male	4080	33.11	8241	66.89
Female	5749	38.52	9174	61.48
Age (years)				
15–24	532	23.44	1738	76.56
25–34	1014	28.81	2506	71.19
35–44	1444	34.08	2793	65.92
45–54	1640	36.04	2911	63.96
55–64	1776	36.10	3143	63.90
≥ 65	3423	44.18	4324	55.82
Resident place				
Rural	3112	38.99	4870	61.01
Small urban	3142	34.70	5912	65.30
Large urban	3575	35.02	6633	64.98
Difficulties paying bills[b]				
Most of the time	1211	49.71	1225	50.29
From time to time	2799	41.19	3997	58.81
Never	5647	32.04	11,976	67.96

[a]Inactive population was considered as who do not enough physical activity to meet the WHO guidelines

[b]In last year

PA barriers percentages among different social class and by gender in the physically inactive population are showed in Fig. 2. The most frequent barriers to PA among women in the high social class were feel discriminated (85.71%) and have no time (57.54%); and for those in the low social class, to having no friends (60.87%), competitivity (59.89%), and it is too expensive (57.14%). For men, the reasons given were feel discriminated (55.56%) in high social class, and lack of motivation (57.92%), too expensive (57.14%), disability or illness (56.21%), and competitivity (55.17%) in low social class. Furthermore, low social class group showed a higher prevalence of all PA barriers excepting for "feel discriminated" and "have no time" barriers, that were mainly reported by high social class women and middle social class men, respectively.

Logistic regression analysis

In the overall population, binomial logistic regression displayed that low and middle social class were less likely to be physically active compared to high social class (as reference) adjusting by gender, age, resident place, and the

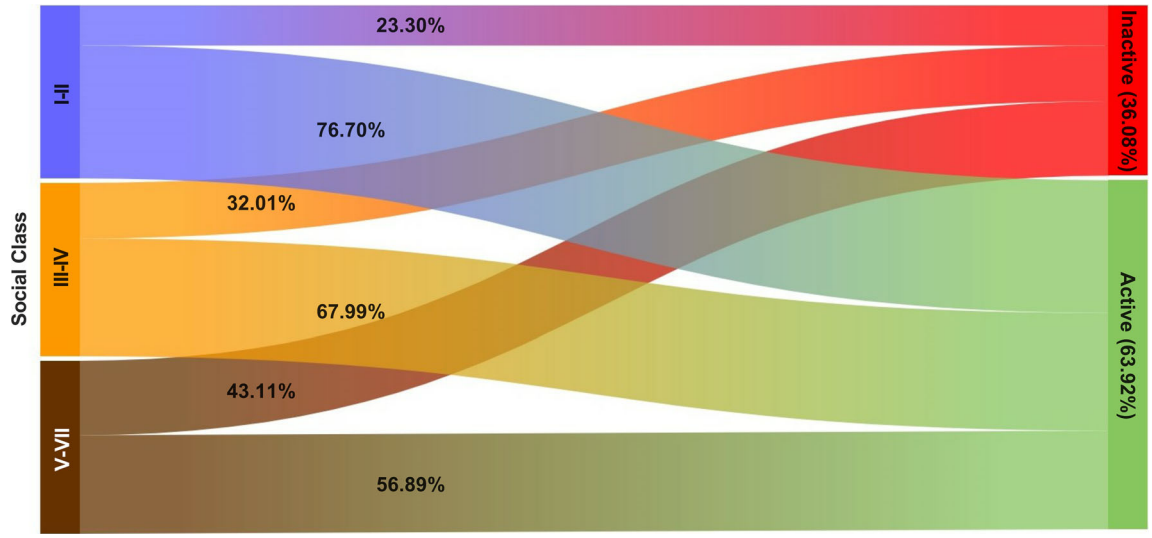

Fig. 1 Physical activity prevalence across social stratification in European Union-28; I–II social class represent high social class (n = 2382), III–IV represent middle social class (n = 12,751) and V–VII low social class (n = 11,158), 2017 Eurobarometer

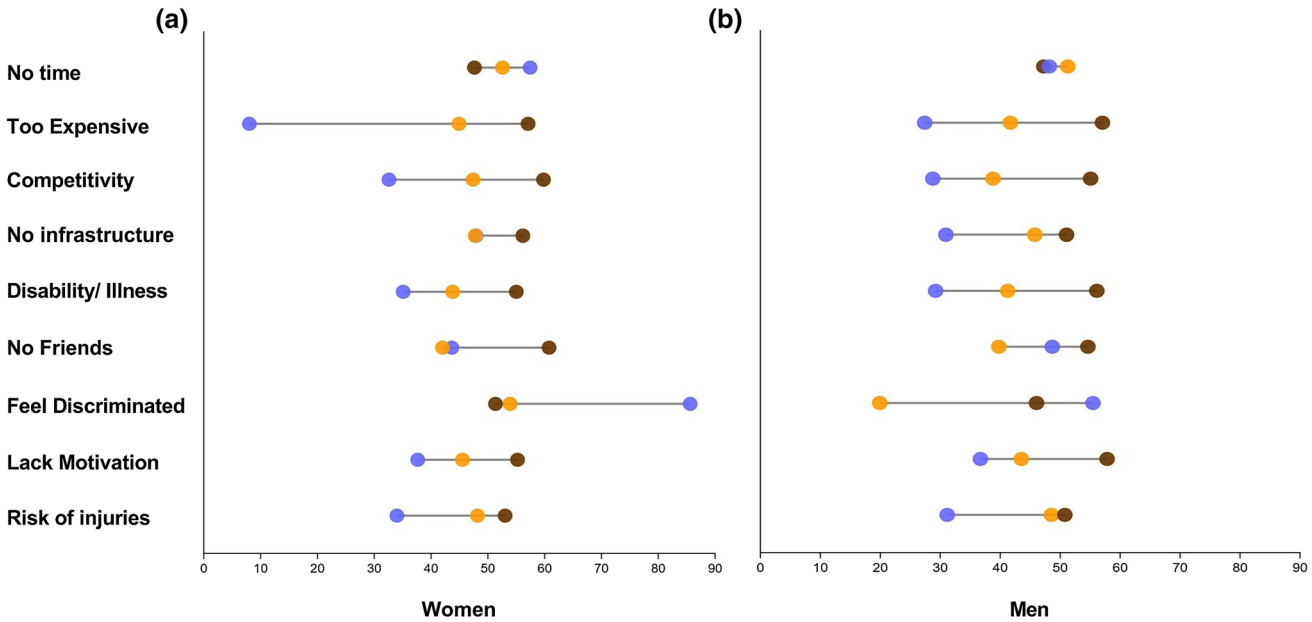

Fig. 2 Percentage of physical activity barriers among high (blue), middle (orange) and low (brown) social class by gender in inactive European population (n = 9829), European Union-28, 2017 Eurobarometer (colour figure online)

difficulties to pay bills [(OR 0.52; 95% CI 0.47–0.58; $P < 0.001$) and (OR 0.71; 95% CI 0.64–0.79; $P < 0.001$), respectively].

Regarding the physically inactive population (n = 9829) and PA barriers (Table 2; Fig. 3) compared to the high social class, both low and middle social classes were more likely not to practice PA due to its too high price, because of a risk of injury, to have disabilities or any kind of illness, to present a lack of motivation, and owing to competitivity reasons. Besides, the low social class reported higher marginal non-statistically significant likelihood not to practice PA by no infrastructures and was less likely to have no time, whilst middle social class presented lower probability not to practice PA as a result of feeling discriminated against.

Attending to gender, compared to high social class women, low social class women were more likely to have any disability or illness preventing them from exercising, owing to injury risks, to report a lack of motivation and due to competitivity, and were less likely to have no time to practice PA. Besides, both low and middle social class women had higher probabilities to not perform PA owing

Table 2 Associations between social class and physical activity barriers in inactive population[a] in the European Union-28 (n = 9829), 2017 Eurobarometer

	All		Women		Men	
	OR (95% CI)[b]	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*
No time						
Low class	0.59 (0.36–0.96)	0.034	0.68 (0.50–0.93)	0.017	0.94 (0.70–1.28)	0.706
Middle class	0.84 (0.51–1.39)	0.504	0.82 (0.60–1.13)	0.224	1.12 (0.83–1.51)	0.472
Too expensive						
Low class	5.94 (3.26–10.84)	< 0.001	15.17 (4.59–50.18)	< 0.001	3.39 (1.61–7.14)	0.001
Middle class	3.49 (1.91–6.37)	< 0.001	9.29 (2.80–30.80)	< 0.001	1.87 (0.89–3.93)	0.101
Competitivity						
Low class	2.72 (1.73–4.27)	< 0.001	2.73 (1.46–5.10)	0.002	2.72 (1.41–5.27)	0.003
Middle class	1.72 (1.10–2.70)	0.018	1.80 (0.97–3.34)	0.063	1.62 (0.84–3.13)	0.151
No infrastructure						
Low class	1.79 (0.99–3.26)	0.055	1.42 (0.61–3.31)	0.415	2.09 (0.88–4.97)	0.096
Middle class	1.39 (0.77–2.52)	0.273	1.04 (0.45–2.40)	0.932	1.71 (0.72–4.06)	0.225
Disability/illness						
Low class	2.69 (2.03–3.57)	< 0.001	2.28 (1.51–3.44)	< 0.001	3.13 (2.11–4.64)	< 0.001
Middle class	1.60 (1.20–2.13)	0.001	1.45 (0.96–2.20)	0.080	1.70 (1.13–2.54)	0.010
No friends						
Low class	1.47 (0.88–2.45)	0.137	1.92 (0.90–4.10)	0.090	1.10 (0.54–2.22)	0.791
Middle class	0.80 (0.48–1.32)	0.377	0.94 (0.44–1.20)	0.864	0.68 (0.34–1.38)	0.284
Feel discriminated						
Low class	0.34 (0.10–1.13)	0.078	0.16 (0.02–1.53)	0.112	0.38 (0.07–2.03)	0.257
Middle class	0.29 (0.09–0.94)	0.040	0.20 (0.02–1.76)	0.145	0.15 (0.02–0.93)	0.041
Lack motivation						
Low class	2.15 (1.71–2.71)	< 0.001	2.02 (1.44–2.83)	< 0.001	2.32 (1.69–3.20)	< 0.001
Middle class	1.36 (1.08–1.71)	0.009	1.38 (0.98–1.93)	0.063	1.32 (0.96–1.81)	0.088
Risk of injuries						
Low class	2.24 (1.42–3.55)	0.001	2.13 (1.11–4.09)	0.023	2.29 (1.19–4.41)	0.013
Middle class	1.93 (1.22–3.07)	0.005	1.78 (0.92–3.43)	0.084	2.08 (1.08–4.01)	0.029

[a]Inactive population was considered as who do not enough physical activity to meet the WHO guidelines

[b]Reference was high social class. All odds ratio and 95% confidence intervals are propensity score adjusted

to its too high price. There were also some marginally non-significant barriers among middle social class women, such as disability or illness, risk of injury lack of motivation, and competitivity. On the other hand, compared to high social class men, low social class men were more likely to perceive that exercise practice is too expensive, imply an injury risk, not to do PA because of disability or illness, have a lack of motivation, and due to competitivity. Ultimately, middle social class men reported a higher risk of inactivity due to disability or illness reasons, injury risk, and lack of motivation (a marginally non-significant effect for the last one), whereas they had fewer probability to mention feeling discriminated as a PA barrier.

Discussion

Here we show an important association of social class on PA prevalence and its barriers in over 15-European population. We observed a relatively higher PA prevalence among the middle and high social class population. Among the inactive population, perceived PA barriers were more frequent in those from low social class. Likewise, the likelihood to perceive barriers for PA were higher in low social class than middle social class at most barriers using high social class as the reference. The low social class more frequently experienced the following PA barriers: too expensive to practice, due to competitivity, have disabilities or illness, and injury risk.

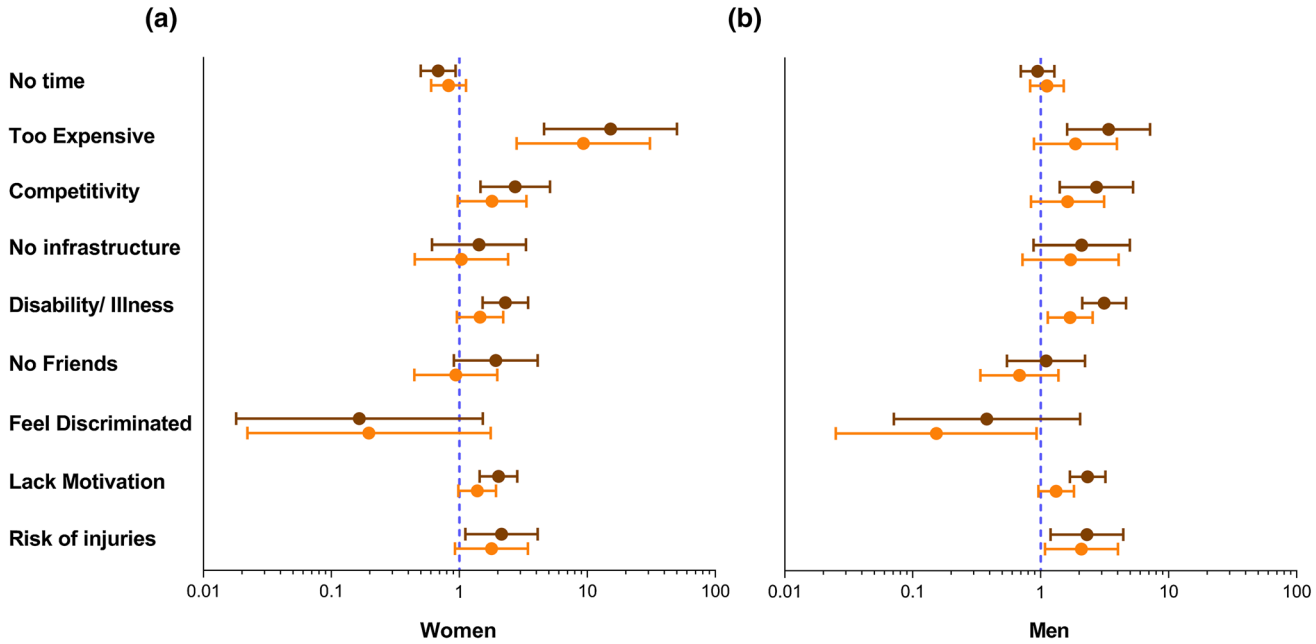

Fig. 3 Physical activity barriers in middle (orange) and low (brown) social class by gender in inactive European population (n = 9829); Results are presented as Odds ratios and 95% Confidence Intervals (base 10 logarithmic scale). Reference group was high social class, Europe Union-28, 2017 Eurobarometer (colour figure online)

These findings are consistent with several similar studies addressing PA prevalence across socioeconomic status (SES) based on incomes. Parks et al. (2003) showed that those who earned lower earnings were more likely to be physically inactive in the USA. Other study led by Popham and Mitchell (2007) also described that adults with lower SES were associated with few or no PA practice, however, when PA was adjusted by employment and health status, the relationship decreased. Another study assessed leisure-time PA (LTPA) prevalence according to social class, using several factors (e.g. education level, incomes, marital status, and employment status), yielding higher probabilities to be physically inactive among low social class population and women in the USA (Marshall et al. 2007).

On the other hand, some studies have examined associations among LTPA and PA barriers. One of these researchers found that non-practice of LTPA was correlated with a lack of motivation followed by poor health and lack of facilities in Australian adults (Cerin et al. 2010). Moreover, a cross-sectional study in Brazil showed a lack of money as a remarkable important barrier, especially in women who also described a stronger relationship to present all barriers, excluding the risk of injuries, whereas wealth status was conversely related with this lack of money and injury risk (Reichert et al. 2007). Regarding how PA barriers could vary across SES, it seems that a lower status tended to present more barriers, which also differ according to the socioeconomic gradient. Some of these studies are qualitative and are mainly focused on older adults: A focus group in Brazilian elder women showed that those with higher SES present lack of social support, routine obstacles, the weather, social isolation, and because of poor health as barriers, whereas those with lower SES cited the costs, routine obstacles, household tasks, lack of time, and safety (Añez et al. 2011); another focus group study in Northern Irish older adults yield that the lack of time, facilities, and transport are the more frequent barriers with a high SES, but health conditions, neighbourhood safety, and also the lack of facilities to practice PA were more prone among with a low SES (Gray et al. 2016). In cross-sectional studies, the evidence is quite similar with higher barriers also in lower SES groups. Among the more reported PA barriers in the high SES group are lack of time and motivation; otherwise, and in the low SES group, disabilities, illnesses, and the lack of money and transport are often cited (Chinn et al. 1999). Sequeira et al. (2011) described that the most influent barriers to not meeting PA recommendations were the desire to do other things in high SES; and the costs, lack of time, and infrastructures in low SES; as well as the lack of time were the most reported barrier regardless SES. Our results agree with others reporting the importance of the lack of time and motivation, lack of money, and disabilities and illnesses among the lower social class. However, given that the EU-28 is comprised by high-income countries, our findings might not be extrapolated to low- and middle-income countries where social class differences are slight and not so remarkable, with clear disadvantages in the

overall population. Thus, PA motives and barriers might differ, or even other determinants could be more important for physical inactivity. Furthermore, our study also has inherent limitations.

Study limits

This work has several limitations owing to the intrinsic-methodological properties of the study: being a cross-sectional study, a cause-effect relationship cannot be established, only establishing association among the social class, PA prevalence, and barriers. Also, PA assessment using IPAQ have disadvantages because this instrument is based on self-reported values, implying recall or memory biases, and social convenience bias that might under- or over-estimate PA level. Another IPAQ's bias could be reactivity response by social convenience with the interviewer overestimating PA. Moreover, most daily activity is performed at light intensities, which is difficult to recall. Despite this, IPAQ has been specifically validated for large sample size studies (Craig et al. 2003). Barriers reported in other studies that are missing here, such as transport and accessibility to determined places, could also be relevant to address daily light PA, which represents a relevant part of weekly PA. We were not able to use educational level as a potential confounder, as a high education level could prevent harmful lifestyle and health-related behaviours as physical inactivity (Parks et al. 2003; Marshall et al. 2007; Popham and Mitchell 2007), although a higher educational level is more frequent in those people from middle and high social class. Also, incomes were only controlled by the difficulty to pay bills, despite that the difficulty to pay bills could be considered a good approach to establish a relative assessment of individual income.

Implications

Inactivity prevalence has increased in the European population during recent years, and it is expected to increase worldwide in the near future. To reverse this trend, health institutions should increase active lifestyle promotion and information policies according to population needs and characteristics. Those reporting less PA and experiencing more barriers are women, older adults, and low social class groups. Our study shows that effective strategies should pay special attention to a more vulnerable population, taking into account social inequalities according to the reasons why people cannot do regular PA. These measures must be available for those of all social classes and economic statuses. For instance, PA could be promoted in low social class and deprived population groups by reducing the costs and/or applying incentives for the use of sports infrastructures, as well as to join sport club or fitness centre, as other studies have already suggested (Chinn et al. 1999). Moreover, these types of activities should be conducted under the supervision of exercise professionals, which may boost safety, self-confidence, and motivation to generate adherence, thereby increasing PA levels. Lack of time could be related to relevant aspects, such as labour conditions, active transport, accessibility and proximity to basic services, and place of work. Measures based on improving and increasing proximity and implementing cycling and improving public transport might increase daily PA. Also, these actions might benefit all social classes as regards to the lack of time to meet PA recommendations. On the assumption that physical inactivity continues rising, global health related to PA will decline with an NCDs advance and, beyond health domains, also with a considerable economic impact on medical systems and companies (Ding et al. 2016).

Future research

Further research is needed to better understand why certain groups are more prone to inactivity, as well as to implement successful and effective measures that enhance PA levels, or at least, to slow the rate of inactivity increase. Subsequently, these strategies must be monitored and evaluated across time to establish their effectiveness, using longitudinal-cohort studies, with special attention to how people experience PA barriers, and how these barriers change in the long-term.

Conclusion

More than one-third of the European population is inactive. We have found that there is a social class stratification in PA levels and PA barriers, with higher inactivity prevalence in those from a low social class that also experience more barriers. Here, we highlight how people from low social class more frequently report barriers as too high price, have disability or illness, injury risk, and competitivity. Important PA promotion strategies in the overall population are needed, especially focused on these barriers, among low social class and more vulnerable groups in the European population.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

Ethical approval Not applicable.

Informed consent Not applicable.

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