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Gender differences in theory-based predictors of physical activity in university students with disabilities

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Abstract University students with disabilities engage in physical activity to a lesser extent than their able-bodied peers, with women reporting less physical activity than men. The present study aimed to examine gender differences in theory-based predictors of physical activity in this population. Spanish university students with different disabilities (n = 1076) completed measures of the Theory of Planned Behaviour constructs and the reduced Spanish version of the Barriers to Physical Activity Questionnaire for People with Mobility Impairments. Self-efficacy and controllability were significantly lower in women and gender differences on the barriers predicting controllability were obtained. In conclusion, the present results could be useful in order to implement physical activity behaviour change interventions which differently target men and women with disabilities.

Diferencias de género en predictores teóricos de la actividad física en alumnado universitario con discapacidad

PALABRAS CLAVE
Psicología del ejercicio,
teoría de la conducta planeada,
personas con discapacidad,
promoción de la salud,
modelo socioecológico

Resumen El alumnado universitario con discapacidad participa en actividad física en menor medida que el alumnado sin discapacidad, reportando las mujeres menor actividad física que los hombres. Este artículo tuvo por objetivo examinar las diferencias de género en predictores teóricos de la actividad física en esta población. Una muestra de alumnado universitario con diferentes discapacidades (n = 1076) completó medidas de los constructos de la teoría de la conducta planeada y la versión reducida en español del instrumento Barriers to Physical Activity Questionnaire for People with Mobility Impairments. La autoeficacia y la controlabilidad fueron significativamente menores en las mujeres y se encontraron diferencias de género en las barreras que predijeron la controlabilidad. En conclusión, los presentes resultados pueden ser útiles para desarrollar intervenciones de cambio de comportamiento en la actividad física que aborden de forma diferente a los hombres y las mujeres con discapacidad.

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Physical inactivity is becoming an increasingly serious public health problem in contemporary society. Nevertheless, despite its worldwide dimension, physical inactivity does not equally affect the population. As highlighted by the World Health Organization (2018) in the *Global Action Plan on Physical Activity 2018-2030*, there are especially inactive population groups. Women and people with disabilities are among these groups. A recent study including data from 168 countries showed higher prevalence of insufficient physical activity (PA) among women (Guthold, Stevens, Riley, & Bull, 2018), which can lead to the development of poorer health outcomes. Regarding people with disabilities, some studies have shown differences in PA according to the type of disability. For instance, people with hearing impairments have reported higher PA levels than their counterparts with other kinds of disabilities (Lobenius-Palmér, Sjöqvist, Hurtig-Wennlöf, & Lundqvist, 2018), while people with chronic illnesses or multiple disabilities have been shown to be less active (Simeonsson, Carlson, Huntigton, McMillen, & Brent, 2001; Úbeda-Colomer, Monforte, & Devís-Devís, 2019). Still, regardless of the type of disability, this population engages in PA to a lesser extent than the general population, thus being more likely to experience chronic and hypokinetic diseases (Carroll et al., 2014; Mascarinas & Blauwet, 2018).

The challenges related to being a woman and having a disability intersect in such a way that largely prevents women with disabilities from PA engagement. In fact, women with disabilities have been found to be less active than men in several studies (Lobenius-Palmér et al., 2018; Valis & González, 2017; Wrzesinska, Lipert, Urzedowicz & Pawlicki, 2018). Since high levels of inactivity make women with disabilities an especially vulnerable group with regard to health, it is crucial to address these disparities in PA participation in order to ensure that they equally access the health benefits that PA can provide.

There are settings that have special potential to develop PA promotion interventions that target the most vulnerable groups. Universities have such potential for two main reasons. First, universities contribute a great deal to the social progress of the communities in which they are inserted (Brennan, King, & Lebeau, 2004). In this respect, the role that universities can and should play in community health, both through research and through the promotion of healthy lifestyles, is widely acknowledged (Tsouros, Dowding, Thompson, & Dooris, 1998). In the Spanish context, for instance, the *Spanish Network of Healthy Universities* (Red Española de Universidades Saludables) was created in 2008 in order to strengthen the efforts towards health promotion and well-being, not only of university students and staff but also of the general society (Martínez-Riera et al., 2018). Second, most universities have a solid infrastructure through which PA programs and sporting activities are widely offered, being thus an important part of campus life. With such sporting structures already consolidated, implementing additional measures in order to facilitate and increase PA among the most vulnerable populations is not only necessary, but also feasible.

However, some studies highlight that university students with disabilities participate in PA to a lesser extent than their able-bodied peers, which is especially true for women (Valis, & González, 2017; Yoh, Mohr, & Gordon, 2008). In this respect, a recent study conducted at the Spanish universities showed that most students with disabilities were not sufficiently active according to the World Health Organization recommendations, with women reporting significantly less PA than men (Úbeda-Colomer et al., 2019).

In spite of the disparities between men and women with disabilities in PA participation, few studies have examined gender differences in theory-based predictors of PA in this population. As far as we know, a study by Stapleton and Martin Ginis (2014), which found that women with spinal cord injury feel less control over their PA behaviour and have lower confidence to overcome barriers to PA than men, is the only one addressing this issue. There is an absence of research on this topic in people with other kind of disabilities. Moreover, no studies have focused on the specific population of university students with disabilities. Knowledge regarding how men and women differ with regards to measures of psychosocial predictors of PA could be helpful in explaining the unequal PA participation between men and women. Such knowledge could also be useful for identifying psychosocial factors that should be differentially targeted according to gender in interventions that seek to increase PA levels in this population.

Therefore, the main aim of the present study was to examine gender differences in theory-based predictors of PA in university students with disabilities using Ajzen's (1985) Theory of Planned Behaviour (TPB). This theory has shown to be useful in predicting PA in people with different disabilities (e.g., Haegele, Hodge, & Kozub, 2017; Kirk & Haegele, 2019; Kosma, Ellis, Cardinal, Bauer, & McCubbin, 2007; Martin Ginis, Papathomas, Perrier, Smith, & SHAPE-SCI Research Group., 2017). The TPB states that a behaviour is mostly determined by the intentions to perform that behaviour, which in turn are determined by three other constructs: attitudes, subjective norms and perceived behavioural control (PBC) towards the behaviour (see Measures section for detailed information). In addition, PBC is also considered as a direct determinant of behaviour. Drawing on a previous study (Stapleton & Martin Ginis, 2014) it was hypothesized that women would have lower PBC for PA than men. Since the PBC construct is highly related to the absence or presence of barriers to perform the behaviour (Ajzen, 2002), the secondary purpose of the study was to determine if the barriers experienced by students with disabilities predict PBC and to examine if these barriers are different for men and women, given that women experience discrimination, not only for having a disability, but also for being women. In this regard, a wide range of barriers to PA in people with disabilities have been identified and reported in several review papers (e.g., Jaarsma, Dijsktra, Geertzen, & Dekker, 2014; Kissow, 2015; Martin, 2013; Martin Ginis, Ma, Latimer-Cheung, & Rimmer, 2016). Some studies have specifically focused on barriers to PA experienced by women, being lack of energy and motivation (Rimmer, Rubin, & Braddock, 2000) and the inaccessibility of the built environment of community exercise facilities (Rolfe, Yoshida, Renwick, & Bailey, 2012) among the most important ones. Therefore, the inclusion of barriers to PA in relation with PBC was considered relevant and timely for the present study. Given that people with disabilities experience barriers across different levels of influence –personal, social and environmental–, a social ecological approach was adopted, as recommended in several studies (e.g. Martin Ginis et al., 2016; Vasudevan, Rimmer, & Kviz, 2015).

Method

Participants and procedure

The participants' recruitment process was conducted in collaboration with the disability care services of the Spanish universities. These services have access to most of the students with disabilities enrolled at each institution, since they provide these students with the support needed in order to adjust to the academic requirements and the university lifestyle. According to an acknowledged institutional guide on disability care at Spanish universities (Fundación Universia, 2016), there was a population of 20,695 university students with disabilities during the data collection period (fall 2016 - fall 2017). An accessible population of 15,038 students with disabilities was estimated from the data provided by the 55 universities that were involved in the data collection process. Drawing on Cochran's (1977) sampling techniques, it was determined that 997 participants were needed for a statistically valid sample size (Confidence Level = 95%; Population proportion = 50%; Margin of error = 3%). Given that the data protection policies of the different universities prevented direct access to students, the disability care services sent the digital survey by institutional email to the accessible students.

A total of 1264 university students with disabilities completed the survey. After excluding respondents with missing data, 1076 participants (530 men, 546 women) remained for the analyses. Table 1 shows participants' sociodemographic characteristics. All participants gave their informed consent to be included in the study, and the procedures and materials used were approved by the Ethics Committee of the University of Valencia.

Table 1 Socio-demographic characteristics of the sample and accomplishment of the World Health Organization physical activity recommendations by each characteristic (*n*= 1076).

	N	% total	% meet WHO PA rec.	% not meet WHO PA rec.
Gender				
Men	530	49.3	43.2	56.8
Women	546	50.7	31.3	68.7
Age				
18-35	369	34.3	44.4	55.6
36-46	353	32.8	32.6	67.4
>46	353	32.8	34.3	65.7
Missing	1	0.1		
Disability type				
Physical disability	456	42.4	40.8	59.2
Mental disorder	69	6.4	44.9	55.1
Sensory disability	142	13.2	50.7	49.3
Chronic illness	149	13.8	26.8	73.2
Multiple disabilities	233	21.7	26.2	73.8
Missing	27	2.5		
Congenital/ acquired				
Congenital	408	37.9	39.5	60.5
Acquired	668	62.1	35.8	64.2

Measures

The TPB constructs were measured using a questionnaire, which was developed drawing on previous work by Latimer and Martin Ginis (2005), and validated using a sample of Spanish university students with disabilities by Úbeda-Colomer, Pérez-Samaniego, and Devís-Devís (2018). Consistent with other evidence in the PA domain (Armitage & Conner, 1999; Terry & O'Leary, 1995), the validation process of the Spanish questionnaire supported splitting up the PBC construct into two independent factors: self-efficacy and controllability. The results of the validation process in terms of adjustment were excellent (CFI = .97; RMSEA = .057; IC90% = .049 - .066) and the Alpha coefficients for the subscales ranged from .74 to .93, thus showing good internal consistency.

Attitudes. Attitudes were assessed using four adjective-pairs that measured both the instrumental *(bad-good, worthless-valuable)* and the experiential *(stressful-relaxing, boring-funny)* component of attitudes. Items were preceded by the statement, "I think that participating in physical activity for at least 30 minutes on at least three days a week would be…".

Subjective norms. Subjective norms were assessed with two items and the common stem "Most people who are important to me": (a) "think I should participate in physical activity for at least 30 minutes on at least three days a week", and (b) "approve of me participating in physical activity for at least 30 minutes on at least three days a week".

Self-efficacy. Self-efficacy was measured with two items: (1) "How confident are you that you will be able to participate in physical activity for at least 30 minutes on at least three days a week?"; and (2) "To what extent do you see yourself as being capable of participating in physical activity for at least 30 minutes on at least three days a week?".

Controllability. Controllability was measured with three items: (1) "How much personal control do you feel you have over whether you participate in physical activity for at least 30 minutes on at least three days a week?"; (2) "Whether or not I participate in physical activity for at least 30 minutes on at least three days a week is entirely up to me"; and (3) "How much do you feel that whether you participate in physical activity for at least 30 minutes on at least three days a week is beyond your control?"

Intentions. Intentions were assessed with two items: (1) "I will try to do at least 30 minutes of physical activity on at least three days a week", and (2) "I intend to do at least 30 minutes of physical activity on at least three days a week".

All items were rated on 7-point Likert-type scales, with lower scores indicating more negative thoughts and feelings. The overall score for each construct was calculated as the mean of all the items of that construct.

Moreover, the reduced Spanish version of the *Barriers to Physical Activity for People with Mobility Impairments (BPAQ-MI)* was used to measure barriers to PA experienced by the participants. Drawing on the questionnaire developed by Vasudevan et al. (2015), Úbeda-Colomer, Peiró-Velert, and Devís-Devís (2018) conducted a process of reduction, translation and validation of the instrument for the Spanish context using a sample of university students with disabilities. The results of the validation process in terms of adjustment were excellent (CFI = .97; RMSEA = .064; IC90% = .061, .067) and the Alpha coefficients for the different subscales ranged from .74 to .91, thus evidencing good internal consistency. With a total of 29 items, this instrument allows to equitably measure barriers across the four social ecological levels (intrapersonal, interpersonal, organizational and community).

Intrapersonal level. The intrapersonal level of barriers was measured with 7 items: "You get tired or fatigued", "You were in pain", "You were afraid of getting injured while being physically active", "You lack the motivation to be physically active", "You don't have confidence in your ability to be physically active", "You were embarrassed about your appearance while being physically active" and "You don't see a reason to be physically fit".

Interpersonal level. The interpersonal level of barriers was measured with 7 items: "Your friends didn't assist you to be physically active", "Your friends are not physically active", "Your friends were not encouraging or supportive of your efforts to be physically active", "Your family did not assist you to be physically active", "Your family members are not physically active", "Your family members were not encouraging or supportive of your efforts to be physically active" and "Your family did not think physical activity would be helpful to improve your health".

Organizational level. The organizational level of barriers was measured with eight items: "Lack of adapted equipment/material at fitness centre", "Lack of accessible showers/bathrooms/locker rooms at fitness centre", "Lack of adaptation of fitness centre facilities (corridors, doors, elevators, etc.)", "The economic cost was too high.", "Lack of inclusive marketing at fitness centre", "Lack of adapted programs or activities at fitness centre", "Lack of adaptation of outdoor spaces (parks, ways, etc.)" and "Lack of assistance or training of the fitness centre staff".

Community level. The community level was measured with 7 items: "Inaccessible sidewalks (gaps, lack of ramps, too narrow…).", "Potholes in the streets, driveways or parking lots", "The crosswalks lack traffic lights or they are not adapted (e.g. no sound when it is green…)", "Lack of adapted transport to go to fitness centre", "Lack of support staff to help you to go to fitness centre", "The city traffic is dangerous for you." and "The traffic lights or crosswalk signals change too quickly".

All the items were presented in a matrix with a common statement at the top: "Please, think about the main barriers that hindered or prevented you from PA engagement during the last months. Then, rate each of the next barriers from 0 to 4, with 0 meaning 'It has not been a barrier for me' and 4 meaning 'It has been a very important barrier for me'.

Data analyses

Homogeneity of variances and normality of all the variables were assessed using the Levene's test and the Shapiro-Wilk test. Due to violation of the normality assumption, possible gender differences in the TPB constructs were tested using Mann-Whitney U tests, with r coefficients as a measure of the effect size (Rosenthal, 1991). Finally, in order to examine which social ecological levels of barriers were predictors of self-efficacy and controllability, forward stepwise multiple regressions were conducted. This method was chosen instead of hierarchical regressions given the lack of evidence to determine the order of entry of the different social ecological levels in the model. Since preliminary analyses conducted showed no significant differences in the TPB constructs by type of disability, congenital-acquired disability and age, there was no need to control for these variables. The α level was set at $p < 0.05$ for all the analyses and multiple testing was accounted for using Bonferroni correction. All analyses were conducted using The Statistical Package for the Social Sciences for Windows (version 22.0; SPSS Inc., Chicago, IL).

Results

Mann-Whitney U tests revealed that self-efficacy ($z = -3.65$; $p < .001$; $r = -.11$) and controllability ($z = -3.16$; $p = .002$; $r = -.10$) were significantly different between men and women, with women scoring lower on both constructs (see Table 2). No significant differences by gender were found for attitudes, subjective norms or intentions.

Given that women scored lower both in self-efficacy and controllability, and considering that these constructs are closely related to the barriers that could prevent the

Table 2 Comparison of the Theory of Planned Behaviour constructs by gender.

	Men (n = 530)		Women (n = 546)		MWU
	M(SD)	Mdn(IQR)	M(SD)	Mdn (IQR)	p-value
Attitudes	5.76(1.45)	6.25(2.00)	5.70(1.48)	6.25(2.00)	0.651
Subjective norms	5.56(1.68)	6.00(2,50)	5.48(1.78)	6.00(3.00)	0.776
Self-efficacy	5.01(1.83)	5.50(3.00)	4.64(1.93)	5.00(3.00)	**<0.001***
Controllability	5.12(1.55)	5.33(2.33)	4.76(1.65)	5.00(2.33)	**0.002***
Intentions	5.21(1.95)	6.00(3.00)	5.02(1.97)	5.50(3.00)	0.077

* Significant at 0.05/5=0.01 level.

MWU= Mann-Whitney U test.

performance of the behaviour, four forward stepwise multiple regressions were performed in order to determine: (a) if the social ecological levels of barriers were predictors of the self-efficacy and the controllability constructs in men and women; and (b) if the social ecological levels of barriers predicting these constructs were different depending on gender.

The plots of the residuals and Durbin-Watson statistics were examined in order to test regression assumptions. Durbin-Watson statistics were close to 2 as recommended in the literature and the plots showed no evidence of heteroscedasticity. The residuals distributions slightly deviated from normality. No data transformation was conducted, given the robustness of regression to small deviations from normality (Kleinbaum, Kupper, Muller, & Nizam, 1998). No problems of collinearity were observed since the variance inflation factor (VIF) was lower than 2 for each independent variable in the four models (Allison, 1999).

Table 3 shows the results for the regression analyses. The models predicting self-efficacy were significant both for men ($F_{1,528} = 97.67$, $p < .05$) and women ($F_{1,544} = 153.92$, $p < .05$), with intrapersonal barriers being the only predictor of self-efficacy in both cases. The models predicting controllability were also significant both for men ($F_{2,527} = 24.93$, $p < .05$) and women ($F_{2,543} = 53.89$, $p < 0.05$). For men, the significant predictors of controllability were intrapersonal barriers and organizational barriers, whereas for women intrapersonal barriers and community barriers predicted controllability (see Table 3).

Discussion

The present study is the first to analyse gender differences in theory-based predictors of PA in a sample of university students with different disabilities. It is also the first study examining if the social ecological levels of barriers to PA differently predict self-efficacy and controllability according to gender. The results obtained could thus be of great relevance for the sports services and the disability care services of universities in order to implement specific PA behaviour change interventions which differentially target men and women.

The behavioural control variables (self-efficacy and controllability) obtained the lowest scores, both in men and women. These results make sense in light of several review studies showing the wide range of barriers that people with disabilities face when trying to be physically active (e.g., Jaarsma et al., 2014; Kissow, 2015; Martin, 2013; Martin Ginis et al., 2016). In addition, women reported even lower PBC than men, which coincides with the results obtained by Stapleton and Martin Ginis (2014) in a sample of people with spinal cord injury. In this respect, according to the theory, past behaviour is a key determinant of self-efficacy. Therefore, the lower levels of PA reported by women with disabilities in several studies (e.g., Úbeda-Colomer et al., 2019; Valis & González, 2017) might explain the lower scores on the PBC construct, thus generating a vicious circle. In addition, since the PBC construct is highly related to the absence or presence of barriers to perform the behaviour, these results are also consistent with some studies showing that women experience more barriers to PA than men (e.g., Rimmer et al., 2000; Úbeda-Colomer, Devís-Devís, & Sit, 2019).

It is important to highlight that, according to Ajzen (2002), PBC moderates the relationship between intentions and behaviour, so that individuals with higher behavioural control are more likely to translate intentions into actual behaviour. Given the low scores reported by the participants of this study on behavioural control measures, especially in the case of women, future interventions addressed to university students with disabilities would benefit from including action planning and coping strategies. These strategies could be useful in enhancing PBC and overcoming barriers to PA, and have been proven effective to increase PA behaviour (Arbour-Nicitopoulos, Martin-Ginis, & Latimer, 2009; Carraro, & Gaudreau, 2013). In addition, addressing the most important factors preventing PA engagement of university students with disabilities would increase their perceived control over the behaviour as well. For instance, offering affordable and adapted activities at university campuses would be of great importance, since the lack of adapted PA programs and their economic cost have been proven to be relevant barriers for this population (Úbeda-Colomer et al., 2019).

Table 3 Forward stepwise multiple regression analyses of barriers predicting self-efficacy and controllability for men and women.

Men (*n* = 530)		
	Self-efficacy	
Predictors	Std β	P-value
Model 1 ($R^2 = 0.155$)		
Intrapersonal barriers	-0.395	<0.001
	Controllability	
Predictors	*Std* β	P-value
Model 1 ($R^2 = .059$)		
Intrapersonal barriers	-0.243	<0.001
Model 2 ($R^2 = .086$)		
Intrapersonal barriers	-0.188	<0.001
Organizational barriers	-0.174	<0.001
Women (*n*=546)		
	Self-efficacy	
Predictors	*Std* β	P-value
Model 1 ($R^2 = .221$)		
Intrapersonal barriers	-0.470	<0.001
	Controllability	
Predictors	*Std* β	P-value
Model 1 ($R^2 = .140$)		
Intrapersonal barriers	-0.374	<0.001
Model 2 ($R^2 = .166$)		
Intrapersonal barriers	-0.332	<0.001
Community barriers	-0.166	<0.001

Given the gender differences observed in self-efficacy and controllability, the secondary aim of this study was to determine if the social ecological levels of barriers differently predicted these constructs for men and women. Intrapersonal barriers were the only significant predictor of self-efficacy for both men and women. In this regard, since lack of motivation has been identified as a relevant intrapersonal barrier to PA in university students with disabilities (Úbeda-Colomer et al., 2019), interventions aiming to encourage physically active lifestyles in this population would benefit from including strategies such as self-monitoring or goal setting (Knittle et al., 2018).

Regarding controllability, some gender differences were observed. While intrapersonal barriers predicted controllability both for men and women, organizational barriers were an additional predictor for men, while for women, community barriers were an additional predictor. It is important to note that these results do not mean that organizational barriers would not affect women, but rather that women participating in this study would not have enough experience participating in PA to realize about organizational barriers. That is, women seem to not experience organizational barriers because they are not overcoming the barriers faced at the intrapersonal level. Even though women are willing to engage in PA, a lack of confidence in their ability to do so would prevent them from trying. Men have higher self-efficacy, so they are more likely to translate PA intentions into PA behaviour according to Ajzen (2002). Therefore, once they try to be physically active, they would realize the presence of barriers at the organizational level, such as a lack of adapted PA programs or a lack of training of the staff at the fitness centre (Úbeda-Colomer et al., 2019). Instead, since women report lower PBC, they would translate intentions into behaviour to a lesser extent than men, so they would be less aware of the barriers that could appear at the organizational level.

In this respect, the social ecological theory argues that the different levels are interconnected and can exert reciprocal influence on each other. This is especially relevant to consider when implementing policies for the promotion of physically active lifestyles among people with disabilities, given the wide range of barriers that this population face at all the levels (Martin Ginis et al., 2016). For instance, interventions at the community level, such as improving accessibility of the city, could have a positive impact on women's self-efficacy, thus making them more likely to engage in PA.

Overall, the results of the present paper show the importance of adopting multi-level approaches towards health and PA promotion in people with disabilities. Since behavioural control and barriers at different social ecological levels have been revealed as important when it comes to PA in university students with disabilities, interventionists seeking to increase PA in this population should pay due attention to these factors, rather than solely focusing on the individual level. To do so, interdisciplinary research and practice that considers disability and health as multifaceted constructs is needed (Agiovlasitis, Yun, Jin, McCubbin, & Motl, 2018).

Study limitations

This study does not go without limitations. First, the use of non-parametric methods prevented the inclusion of covariates in the analyses and they have been criticized due to a possible lack of power for effects detection compared with more traditional approaches (Siegel, & Castellan, 1988), which is especially concerning with small sample sizes (Whitley, & Ball, 2002). Second, a low response rate was obtained, which is a frequent problem in studies using online surveys (Van Gelder, Bretveld, & Roeleveld, 2010). However, the present study uses a large and statistically significant sample of the population of Spanish university students with disabilities, thus minimizing these two concerns. In addition, the use of self-reported measures is not exempt from potential bias. However, the instruments used were validated for the Spanish context in a population of university students with disabilities showing good validity and reliability. In this regard, it should also be noted that gender invariance was not examined in the validation of the instruments used. Still, the results of the present paper align with previous findings and have been consistently discussed according to the theoretical framework adopted, which reinforces the existence of the gender differences found, regardless of the questionnaires.

Conclusions

The present study identifies differences in relevant theory-based predictors of PA in university students with disabilities according to gender. It also identifies the social ecological levels of barriers predicting self-efficacy and controllability for men and women. It thus provides useful knowledge to be used by the sports services and the disability care services of the universities in order to implement specific PA behaviour change interventions which differently target men and women. Specifically, increasing self-efficacy and controllability seems to be especially relevant for women in order to encourage them to lead more physically active lifestyles. In addition, since these variables obtain the lower scores, both in men and women, including action planning and coping strategies within the PA behaviour in future studies and interventions could be relevant. Finally, the results of the present study show the need for adopting a multi-level approach towards health and PA promotion that pay due attention to all the factors involved, whether individual, social or environmental.

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