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Bicycling to university: evaluation of a bicycle-sharing program in Spain

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SUMMARY

This study examined the change in behavioral stages (e.g. contemplation, action and maintenance) of cycling to university before and after the implementation of a new public bicycle share program (PBSP) and promotion of its use. The study also determined the change in the prevalence, correlates of PBSP use and potential role in the promotion of healthy weight. An 8-month follow-up cross-sectional study (September 2010–April 2011) was carried out among undergraduate students during the first season of implementation of the PBSP in Valencia, Spain. The sample was 173 students (68.2% female) with a mean age of 21.3 years (SD 3.06) who attended a PBSP promotional session. The data were collected by questionnaire. Results indicated a significant increase of 14.6% in the action/maintenance stage of change and showed that 19% of the participants were PBSP users 8 months later. The behavioral stage did not change when students always had access to car/motorbike, lived further than 5 km from the university and had no bicycle stations within 250 m from home. Those most likely to start using PBSP were students who were in the contemplation stage, perceived fewer environmental and safety barriers to active commuting and had one or more stations within 250 m of home. PBSP users expended ∼257 metabolic equivalent·minutes/week bicycling to university, and there was a small reduction in BMI. Findings suggest that PBSPs can be considered as useful promoters of cycling behavior and may contribute to weight control in university students.

Key words: active transport; behaviour change; bicycle; obesity

INTRODUCTION

The university is an important context for health promotion, as it is associated with adult lifestyle consolidation (Dunne and Somerset, 2004; Molina-García *et al*., 2009), but it is an understudied setting for health promotion studies (Dunne and Somerset, 2004). The transition from high school to university is one of the big life transitions (King *et al*., 1992) and is usually characterized by a decrease in physical activity (Bray and Born, 2004). Physical activity changes during this period have been linked to weight gain (Pullman *et al*., 2009). In countries like Spain, the overweight/obesity rate of university-age people has increased significantly in recent decades, affecting more than one-quarter of young adults (Aranceta-Bartrina *et al*., 2005). Thus, universities have the responsibility to create living environments to promote the health of their students (Tsouros *et al*., 1998; Meier *et al*., 2007) and, specifically, to increase physical activity levels through health-promoting programs.

Diverse types of studies show that cycling as a mode of transport is associated with less work absenteeism and with healthy weight (Wen and Rissel, 2008; Hendriksen *et al.*, 2010; Rojas-Rueda *et al.*, 2011). A systematic review by Oja *et al.* (Oja *et al.*, 2011) concluded that cycling produces several health benefits, such as improvements in cardiovascular fitness and risk factors for chronic diseases.

Public policies have a crucial role in encouraging bicycle use (Pucher *et al.*, 2010). According to the World Health Organization (Edwards and Tsouros, 2008) some of the methods of promoting bicycling for transport would be expanding networks for cycling, creating safe and attractive routes that connect people to local facilities, promoting public access to bicycles for short trips and increasing bicycle parking areas. Improving infrastructure for cycling combined with advice and support could be needed to increase cycling (Vuori, 2011). In this sense, universities are considered as large trip generators and have a leadership in active transport promotion (Balsas, 2003; Shannon *et al.*, 2006). The university has a relevant role in increasing cycling through improving infrastructure and programs for active commuting (Shannon *et al.*, 2006; Molina-García *et al.*, 2010).

Inadequate facilities for leaving bikes safely is one of the major barriers to bicycle transportation (Titze *et al.*, 2007; Molina-García *et al.*, 2010). One solution would be public bicycle share programs (PBSPs) consisting of a network for cycling based on stations where bicycles are rented and stored safely. Several cities, including Paris, Montreal and Barcelona have introduced the system of bike sharing. The city of Valencia, in Spain, implemented a PBSP system in 2010. However, there are few studies that document the effects of policy and infrastructure changes such as PBSP (Fuller *et al.*, 2011; Ogilvie *et al.*, 2011).

Pucher *et al.*'s report (Pucher *et al.*, 2010) suggests that combinations of interventions, including constructing bicycle facilities and bicycle sharing programs, doubled bicycle share of trips in cities such as Barcelona and Paris. Although new PBSPs are being implemented in many cities, the use and correlates of success of these systems are poorly understood. Fuller *et al.* (Fuller *et al.*, 2011) examined the PBSP in Montreal, Canada and concluded that this system attracted younger and more educated people who already used bicycling as a main mode of transport.

Psychological theories and models of behavior change are needed to guide research and practice on health behavior (Glanz *et al.*, 2008; Van den Broucke, 2012). One model used widely in physical activity behavioral research is the transtheoretical model that includes the stages of change (Prochaska and Marcus, 1994). This model allows the assessment of movement through five stages from not intending to do the behavior through regular sustained action: pre-contemplation, contemplation, preparation, action and maintenance. Little is known about how PBSP implementation could influence readiness to become physically active in the transport domain.

The goal of the present study was to evaluate the effects of PBSP and its promotion on cycling to university based on stages of behavior change model. It was hypothesized that the implementation of a new PBSP system increases bicycle use and improves weight status. The study had three aims: first, to examine the change in stages of cycling to university before and after the implementation of the PBSP and assess sociodemographic correlates of these changes; secondly, to determine the change in the prevalence and correlates of PBSP use among university students; and finally, to analyze the role of cycling to university in the promotion of healthy weight.

METHODS

Setting and procedure

This 8-month pre-post study started during the first season of implementation of the PBSP in the city of Valencia, Spain. It was conducted with undergraduate students in two campuses of the University of Valencia: Faculty of Psychology from the Blasco Ibáñez Campus and Faculty of Teaching from the Tarongers Campus.

The data were collected in two waves; time 1 was the beginning of September 2010 and time 2 was the end of April 2011. The same paper questionnaire was self-completed voluntarily in the two waves, requiring ~20 min, and at least one investigator was present to give instructions and answer questions. A sub-sample of 79 students completed the questionnaire on another occasion separated by 1 week from the first data collection to test reliability.

PBSP and information session

PBSP was implemented during the summer of 2010 by JC Decaux company and was called Valenbisi. This system uses a magnetic stripe card to unlock bikes (www.valenbisi.es). Valenbisi became operational with 1500 bicycles distributed in 150 stations throughout the city (Valencia Council, 2008). There were 7 docking stations (210 bicycles) at Blasco Ibáñez and 5 docking stations (146 bicycles) at Tarongers. Each faculty building had a docking station: Faculty of Psychology, 30 bicycles; Faculty of Teaching, 36 bicycles. These two docking stations were next to the main entrance of the two faculty buildings. There were 130 km of bicycle lanes when Valenbisi started (Valencia Council, 2010).

Students were recruited to attend one information session about PBSP during the first data collection. This session included groups of 20 students or less and lasted 60 min. Participants were introduced to the PBSP, informed how it works using the Valenbisi website and encouraged to use the system. They completed the questionnaire before the start of the information session.

Participants and recruitment

The initial sample was composed of 201 undergraduate students. Of these, 28 were excluded from the study because they did not complete the 8-month follow-up questionnaire. Thus, 173 students (68.2% female) were included in the final sample, with a mean age of 21.3 years (SD 3.1). Participants were recruited from the Faculty of Psychology (71 students) and Faculty of Teaching (102 students). Only 8.7% of the students traveled by bike to university before the start of the study. A variety of recruitment methods were used, including announcements in class and urging faculty to inform their students about the study. Participation was voluntary and informed consent was obtained prior to study enrollment.

Questionnaire measures

Stages of behavior change in cycling to university

Participants indicated their stage of change for cycling to university. The scale of Shannon *et al.* (Shannon *et al.*, 2006) was translated (with back-translation) into Spanish, and it was adapted for measuring bicycle commuting to university. The test–retest reliability analysis indicated an almost perfect agreement (Kappa coefficient = 0.96). This scale consisted of six mutually exclusive options. Examples are items for the pre-contemplation stage: ‘I do not regularly cycle to university and do not intend to do so in the next 6 months’ and maintenance stage: ‘I regularly cycle to university and have been doing so regularly for 6 months’. Scoring was as follows: 1 = pre-contemplation; 2 = contemplation; 3 = preparation; 4 = action; 5 = maintenance.

Modes of transport to university and energy expenditure

Modes of transport were assessed by a question from Molina-García *et al.* (Molina-García *et al.*, 2010): ‘How often do you use each of the following ways to go to and from the university?’ Response options were bike, bus, car, train/metro/tram, motorbike and walking. Participants indicated the number of trips per week (to or from university) and usual minutes per trip in each mode of travel. The main mode of transport to university among students who used mixed mode trips (e.g. walk to train) was assigned based on the longest (in minutes) portion of their trip. Test–retest reliability (ICCs) for each mode of transport ranged from 0.92 to 0.99.

Bicycling to university was assigned a metabolic equivalent (MET) value using the compendium of physical activities (Ainsworth *et al.*, 2000). A weekly estimation of energy expenditure was obtained by multiplying an MET score of 4.0 (i.e. for cycling to work) by the minutes per week spent cycling.

Barriers to active commuting to university

The 14-item scale from Molina-García *et al.* (Molina-García *et al.*, 2010) was used. This scale has two factors: one includes environment and safety-related barriers (seven items) and another is related to planning for active commuting and psychological barriers (seven items). An example item is: ‘There is nowhere to leave a bike safely’. Items were rated from 1 (‘strongly disagree’) to 4 (‘strongly agree’). In the present study, the estimates of internal reliability (Cronbach’s alpha) were 0.73 for environment/safety barriers and 0.72 for planning/psychosocial barriers. Each barrier’s subscale was dichotomized by median split for analysis purposes: ‘low barriers’ (mean values $\leq$2.5) and ‘high barriers’ ($>$2.5).

Type of residence

This demographic variable was measured by: 'Where do you live during the academic year?' Response options were divided into two categories: family residence (parents' home or own house) and university residence (shared flat with other students or hall of residence).

Access to car and motorbike

This variable was assessed using two items: 'Do you have a car for personal use?'; 'Do you have a motorbike for personal use?' Items were rated on a three-point scale: 1 ('never'), 2 ('sometimes') and 3 ('always'). ICCs were >0.94. The highest score from the two items was used in the data analysis.

Distance to university

Students were asked to provide their home address, and the Spanish version of Mapquest was used to calculate the distance from home to university (www.mapquest.es). Two distance categories were established: ≤5 and >5 km based on previous studies (Badland *et al.*, 2007; Winters *et al.*, 2011).

Use and access to PBSP

At post-test, participants were asked whether they had purchased a long-term card of Valenbisi (yes/no). Following Fuller *et al.* (Fuller *et al.*, 2011), access to PBSP was measured as a count of the number of PBSP stations within a 250-m road network buffer from participants' home address. Two categories of access to stations within 250 m were created: no stations and 1 or more than 1 stations.

Body mass index

Body mass index (BMI, kg/m^2) was calculated using self-reported weight and height. One week test–retest reliability was excellent (ICC = 0.99).

Transport-related physical activity

This physical activity domain was assessed by the Spanish version of the GPAQ (Global Physical Activity Questionnaire; Bull *et al.*, 2009). An estimation of energy expenditure (MET·minutes/week) from physical activity was obtained.

Statistical analyses

T-tests and analyses of variance (ANOVA) were used to evaluate the changes among behavioral stages in cycling to university. To compare paired data between two time points, a McNemar test was used for testing differences in proportions. Univariate and multivariate logistic regression analyses were performed to identify the factors associated with PBSP use. A Wald backward stepwise regression procedure was used for the multivariate analyses. Linear regression analysis was used to evaluate the relation between bicycle energy expenditure and BMI changes. SPSS version 17.0 was used and differences were considered significant for *p*-values <0.05.

RESULTS

As shown in Figure 1, walking was the main mode of transport of university students (32.4% for time 1, 32.9% for time 2), followed by train and car as the second main modes of transport. It is notable that the use of bicycle changed from 6.9 to 11% during the study period ($p < 0.05$).

Stages of behavior change towards cycling to university were examined in relation to demographic and other variables (Table 1). At time 1, almost two-thirds of the participants were in the pre-contemplation stage, whereas only 8% were in the action–maintenance stages. However, 8 months later (time 2), the percentage of participants in the pre-contemplation group decreased considerably to 52.6% and those in the action–maintenance groups increased to 22.6% ($p < 0.001$). The mean stage scores increased from time 1 to time 2 for most of the subgroups

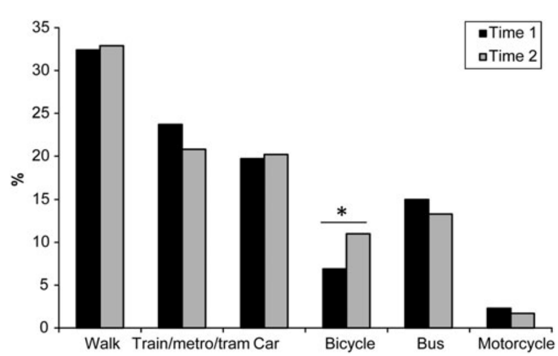

Fig. 1: Main modes of transport to university in time 1 and time 2. *$p < 0.05$.

Table 1: Percentage of university students at different bicycling stages of change at time 1 and time 2 in relation to sociodemographic and other variables

	Time 1								Time 2								*p*-for change in means
	n	Mean stage score[a] (SD)	*p*-value	PC	C	P	A/M	R	*n*	Mean stage score[a] (SD)	*p*-value	PC	C	P	A/M	R	
All participants	173	1.48 (1.01)	—	71.7	16.8	0.6	8.0	2.9	173	2.11 (1.44)	—	52.6	16.8	8.1	22.6	—	**<0.001**
Gender																	
Male	55	1.89 (1.42)	**0.004**	61.8	16.4	—	20	1.8	55	2.56 (1.66)	**0.011**	43.6	12.7	10.9	32.7	—	**<0.001**
Female	118	1.28 (0.66)		76.3	16.9	0.8	2.5	3.4	118	1.91 (1.27)		56.8	18.6	6.8	17.8	—	**<0.001**
Age (years)																	
18–23	145	1.49 (1.02)	0.633	70.3	17.2	0.7	8.3	3.4	143	2.14 (1.46)	0.643	52.4	16.6	7.6	23.4	—	**<0.001**
≥24	28	1.39 (0.96)		78.6	14.3	—	7.1	—	30	2.00 (1.33)		53.6	17.9	10.7	17.9	—	**0.001**
Type of residence																	
Family	108	1.36 (0.89)	0.055	79.6	13.0	—	6.5	0.9	108	1.64 (1.21)	**<0.001**	73.1	8.3	5.6	13.0	—	**<0.001**
University	65	1.69 (1.16)		58.5	23.1	1.5	10.8	6.2	65	2.91 (1.43)		18.5	30.8	12.3	38.5	—	**<0.001**
Access to car/motorbike																	
Never	56	1.73 (1.22)	**0.005**	57.1	23.2	—	12.5	7.1	58	2.59 (1.52)	**<0.001**	36.2	19.0	10.3	34.5	—	**<0.001**
Sometimes	65	1.56 (1.11)		70.8	15.4	1.5	10.8	1.5	59	2.54 (1.55)		39.0	16.9	11.9	32.2	—	**<0.001**
Always	52	1.12 (0.32)		88.5	11.5	—	—	—	56	1.18 (0.43)		83.9	14.3	1.8	—	—	0.209
Distance to university (km)																	
≤5	89	1.85 (1.24)	**<0.001**	51.7	27.0	1.1	14.6	5.6	89	2.97 (1.47)	**<0.001**	20.2	25.8	12.4	41.5	—	**<0.001**
>5	84	1.11 (0.49)		92.9	6.0	—	1.2	—	84	1.21 (0.62)		86.9	7.1	3.6	2.4	—	0.129
PBSP stations within 250 m																	
No stations	86	1.09 (0.48)	**<0.001**	94.2	4.7	—	1.2	—	86	1.15 (0.62)	**<0.001**	93.0	2.3	2.3	2.4	—	0.401
≥1 stations	87	1.88 (1.24)		49.4	28.7	1.1	14.9	5.7	87	3.07 (1.37)		12.6	31.0	13.8	42.5	—	**<0.001**
Environment and safety barriers																	
High barriers	89	1.49 (1.05)	0.816	70.8	15.7	—	9.0	4.5	82	1.88 (1.42)	**0.038**	63.4	15.9	2.4	18.3	—	**<0.001**
Low barriers	84	1.46 (0.97)		72.6	17.9	1.2	7.2	1.2	91	2.33 (1.42)		42.9	17.6	13.2	26.4	—	**<0.001**
Planning and psychosocial barriers																	
High barriers	54	1.21 (0.72)	**0.006**	87.0	7.4	—	3.8	1.9	52	1.23 (0.76)	**<0.001**	88.5	5.8	1.9	3.8	—	0.252
Low barriers	119	1.60 (1.10)		64.7	21.0	0.8	10.0	3.4	121	2.50 (1.49)		37.2	21.5	10.7	30.6	—	**<0.001**
Main mode of transport to university																	
Car/motorbike	38	1.13 (0.34)	**<0.001**	86.8	13.2	—	—	—	38	1.11 (0.39)	**<0.001**	92.1	5.3	2.6	—	—	0.324
Bus/train	67	1.15 (0.36)		82.1	14.9	—	—	3.0	59	1.41 (0.83)		76.3	11.9	6.8	5.1	—	**<0.001**
Walk	56	1.43 (0.80)		64.3	25.0	1.8	3.6	5.4	57	2.67 (1.29)		19.3	35.1	15.8	29.8	—	**<0.001**
Bicycle	12	4.50 (0.52)		—	—	—	100.0	—	19	4.68 (0.48)		—	—	—	100.0	—	0.220

PC, pre-contemplators; C, contemplators; A/M, action/maintenance; R, relapse.
[a]Mean stage score calculated over Stages 1–5.

studied. However, the mean stage score did not change for those who always had access to car/motorbike, lived further than 5 km from the university and had no stations within 250 m from home.

As expected, no students reported using the PBSP system at time 1. However, the prevalence of PBSP use was 19.1% at time 2. The results from the logistic regression are shown in Table 2. Having one or more stations within 250 m from home [odds ratio (OR) = 14.82, 95% confidence interval (CI) = 4.31, 50.82, $p < 0.001$] was related to greater likelihood of PBSP use. Participants who perceived fewer environmental and safety barriers (OR = 3.29, 95% CI = 1.20, 9.04, $p < 0.05$) and were in a contemplation stage of behaviour change (OR = 5.26, 95% CI = 1.83, 15.15, $p < 0.05$) were more likely to use PBSP at time 2. Gender and age were not associated with PBSP use. Although significant in the univariate analyses, type of residence, distance to university, planning and psychosocial barriers and main mode of transport to university were not associated with PBSP use in the multivariate analyses. After testing the final model, 84.3% of the sample would be appropriately classified as PBSP users.

Bicycle energy expenditure to university increased from a mean of 0.0 to a mean of 256.9 MET·min/week among PBSP users ($p < 0.001$). Although 8.7% of the students traveled by bike to university before the start of the study, none of them were a PBSP users during the study period, and no PBSP users reported bicycling to university at baseline. People who used PBSP augmented their transport-related physical activity (from GPAQ) from 644.1 to 741.0 MET·min/week, although this change was not statistically significant. Finally, BMI of PBSP users decreased from 21.2 to 20.9 during the

Table 2: Uni- and multivariate associations of demographic and other variables (time 1) with PBSP use at time 2

	Univariate			Multivariate		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value
Gender						
Female (ref.)	1.00			1.00		
Male	1.28	0.58, 2.83	0.548			
Age (years)						
≥24 (ref.)	1.00			1.00		
18–23	0.85	0.31, 2.29	0.742			
Type of residence						
Family (ref.)	1.00			1.00		
University	6.37	2.73, 14.89	<0.001			
Distance to university (km)						
>5 (ref)	1.00			1.00		
≤5	9.83	3.28, 29.48	<0.001			
PBSP stations within 250 m						
No stations (ref.)	1.00			1.00		
≥1 stations	14.82	4.31, 50.92	<0.001	13.21	3.58, 48.82	<0.001
Stages of behavior change						
Pre-contemplation (ref.)	1.00			1.00		
Contemplation	9.69	3.85, 24.38	<0.001	5.26	1.83, 15.15	0.020
Action and maintenance	0.56	0.07, 4.59	0.588	0.21	0.24, 1.86	0.161
Environment/safety barriers						
High barriers (ref.)	1.00			1.00		
Low barriers	2.94	1.30, 6.64	0.009	3.29	1.20, 9.04	0.021
Planning/psychosocial barriers						
High barriers (ref.)	1.00			1.00		
Low barriers	2.37	0.92, 6.15	0.075			
Main mode of transport to university						
Car/motorbike (ref.)	1.00			1.00		
Bus/train	7.07	0.88, 57.14	0.067			
Walk	20.00	2.55, 157.05	0.004			
Bicycle	3.27	0.19, 56.74	0.415			

OR, odds ratio; CI, confidence interval.

study period ($p = 0.011$), although this reduction was not associated with changes in MET·minutes cycling ($p > 0.05$).

DISCUSSION

This study evaluated the implementation of the PBSP in Valencia, Spain, 8 months after its introduction. It was found that ~19% of the sample of university students were PBSP users, and that the use of bicycle as the main mode of transport to university increased from 7 to 11%. As such, the study complements two recent longitudinal studies showing that adolescents' cycling to school is related to healthy weight (Pabayo *et al.*, 2010; Bere *et al.*, 2011). In the present study, bicycle energy expenditure to university increased among PBSP users to 257 MET·min/week. This shows that bicycle commuting provided about half the recommended weekly physical activity, which corresponds to 600 METs or 150 min per week. Because BMI changes are influenced by multiple factors, especially dietary intake, the effects of PBSP changes on BMI may be difficult to detect. The BMI difference among PBSP users between time 1 and time 2 was ~0.3 BMI unit amounts, <1 kg. Based on the present results, PBSP would have a positive role in the promotion of healthy weight, potentially preventing ~2 kg/academic year of weight gain. According to Lewis *et al.* (Lewis *et al.*, 2000) weight gain is especially problematic among people who are in their 20s. Controlled studies are needed to evaluate the role of cycling to university through bicycle-sharing programs as a strategy for weight gain prevention.

At baseline, most of the participants were not considering going to university by bicycle (pre-contemplation stage). During the study period there was an increase of 14.6% in the action/maintenance stage of change. As expected, those most likely to start using PBSP were students in the contemplation stage, in contrast to pre-contemplators. The stage of change score increased for most of the subgroups studied, except for those who always had access to car or motorbike, lived outside of an easy bicycling distance and did not have convenient access to a bicycle docking station. These findings are consistent with previous cross-sectional studies about barriers to active commuting by bicycle (Badland *et al.*, 2007; Molina-García *et al.*, 2010; Fuller *et al.*, 2011; Winters *et al.*, 2011). As indicated in previous studies (e.g. Molina-García *et al.*, 2010; Brockman and Fox, 2011), one strategy for increasing cycling and decreasing motorized private transport could be to restrict parking opportunities on or near the campus. Another recommendation to increase bicycle use would be to improve living facilities on or near campus (Shannon *et al.*, 2006), such as increasing the number of residence halls or a required number of semesters living on campus (Molina-García *et al.*, in press). Previous studies (e.g. Shannon *et al.*, 2006; Fortier *et al.*, 2012) showed that correlates of the progress of students through the stages of change included an increase in self-determined motivation or self-efficacy perception. The present study did not analyze the influence of psychosocial factors on stage of behavior change. It would be useful in future studies to analyze these psychosocial variables as both moderators and mediators of responses to PBSP programs.

Students who perceived fewer environmental and safety barriers to active commuting to university were more likely to use the bicycle-sharing program. Our results are consistent with cross-sectional studies in which barriers perception was negatively related to active commuting (Shannon *et al.*, 2006; Cole *et al.*, 2008; Molina-García *et al.*, 2010). In previous studies (e.g. Titze *et al.*, 2007), facilities for parking bicycles safely, categorized in the present study as an environmental/safety barrier, was one of the most important barriers for cycling behavior. Thus, PBSP appears to be an effective solution to bicycle security barriers. Considering this, a potentially effective strategy for increasing cycling to university among non-users of PBSP could be to install secure bike lockers on campus for cyclists. Furthermore, a recommendation to increase safe active commuting would be to improve the connection of the campus with the rest of the city through a network of bike lanes separated from the streets by parked cars or grass/dirt strip.

As observed in other studies (e.g. Garrard *et al.*, 2008), females were less likely than males to cycle for transport, were at lower stages of change and were less likely to increase bicycling after improvements in bicycle infrastructure. However, in the present study, men and women did not differ in their likelihood of PBSP use. These results suggest PBSP may be a good strategy for increasing transportation cycling for females.

Considering the present results and the 'potential to save money' for students as one of the most motivating factors for walking and cycling to university (Shannon *et al*., 2006), universities could offer free rental of bicycle and the largest possible number of docking stations in their campuses. These measures could encourage students to join the PBSPs.

Methodological strengths and limitations

This is one of just a few studies to evaluate a PBSP, and the study addressed multiple questions, including correlates of PBSP use and changes in BMI. Strengths included the use of measures documented to be reliable. Nevertheless, one limitation of the study was its reliance on self-report measures. We acknowledge that we have to be cautious in making generalizations about causality based on our findings, because there was no control condition. The sample may be biased because students volunteered to participate in an information session about Valenbisi. Future intervention studies should include a control group and random samples of university students and community members.

CONCLUSIONS

The current findings confirm that university can play a significant role in increasing active commuting through policy measures based on improving infrastructure and programs for cycling. Promoting cycling to university through the implementation of PBSPs might be a useful public health strategy for increasing physical activity levels and reducing weight gain among both male and female students. Because of the proven effectiveness of the PBSP in the city of Valencia, it would be of great interest to implement these programs in other Spanish university cities. Furthermore, actions to promote healthy diet could be added to these programs to achieve a deep change in behavior. The present findings help in creating a framework for analyzing the correlates and outcomes of the implementation of bicycle-sharing programs.

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