Original Article

Is positive self-perception a determinant of cardiovascular performance? A didactic and sustainable view in female university students

SALVADOR BAENA-MORALES[1], HONORATO MORENTE-ORIA[2] ✉, OLALLA GARCÍA-TAIBO[3,4], FRANCISCO TOMÁS GONZÁLEZ-FERNÁNDEZ[3,4]

[1]*Department of General and Specific Didactic, Faculty of Education, University of Alicante, Spain*
[2]*Didactic of Languages, Arts and Sport's Department, University of Málaga, Spain*
[3]*Department of Physical Activity and Sport Sciences, Pontifical University of Comillas, CESAG, Palma, Spain*
[4]*SER Research Group, Pontifical University of Comillas, CESAG, Palma, Spain*

ABSTRACT

Traditionally women have been less active and physically active than men. Although the recent literature indicates this gender gap, the sexes' difference when practicing sport seems to be decreasing. This study framework's importance could be reflected in the 17 Sustainable Development Goals (SDG) proposed by UNESCO, which highlight the need to generate strategies to improve health (SDG 3) and equalize opportunities between men and women (SDG 4). The reasons for these differences are multifactorial, with intrinsic and extrinsic motivations indicated as requiring further research. Self-perception in physical performance has been documented to influence women to perform the exercise and physical activity. Therefore, this research aimed to identify and healthy women's self-perception and motivations to perform in a $VO2_{max}$ test. A total of 31 women (21.12 ± 2.01) completed the research. The study was divided into two principal tests. On the one hand, the measurement of a sub-maximal incremental stress test following established ASCM indications. Heart rate and ventilatory parameters were measured during the stress test using a metabolic measurement system and a gas analyser. After the test, the study sample completed the self-completed Healthy Lifestyle Questionnaire and the International Short Form Physical Activity Questionnaire (IPAQ-SF), and the Self Report of Reasons for Physical Activity (AMPEF). Correlation between $VO2_{Max}$ and average weight and body image (r = .001) was detected, showing the positive relationship between both values. The results obtained help confirm the importance of a positive self-perception in women regarding their weight and body image for better physical performance. Although these findings cannot be generalized, they establish a potential relationship between better physical performance and self-perception in most adults.
Keywords: Physical activity; Women; Self-perception; Motivations.

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✉ **Corresponding author.** *Didactic of Languages, Arts and Sport's Department, University of Málaga, Spain*. *https://orcid.org/0000-0003-2335-1156*
E-mail: hono@uma.es
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INTRODUCTION

The benefits of being physically fit on a better quality of life is widely documented among students (Ortega et al., 2013). The improvement of physical fitness level is partly conditioned by a genetic component, but the main factor that will allow greater performance and its maintenance is the creation of healthy habits (Cuenca-García et al., 2014). For example, the establishment of a physical exercise routine will enable the improvement of the cardiorespiratory performance, and thus a lower risk of suffering from cardiovascular diseases during the adult years (Ruiz et al., 2009). In addition, it has been shown that the level of physical fitness helps prevent the onset of other non-communicable diseases such as type II diabetes, hypertension or obesity (Ortega et al., 2008; Wilmot et al., 2012).

Despite these benefits, poor health habits among students are increasing in recent years (Tomkinson et al., 2018). The daily routine of college students is related with obesogenic behaviours which involves long periods of sitting. Wilmot et al. (2012) established a relationship between sedentary behaviours such as sitting for long periods of time, with twice as likely to suffer from diabetes or cardiovascular problems. Therefore, generating habits of being active and practicing physical activity (PA) in university students is particularly important. In addition, it seems that the short breaks between classes added to moments of stress or anxiety increase the possibility of consuming low nutritional value products. In fact, there are several studies reporting poor eating routines or low levels of PA of students within any educational level (Mohammed & Ghebreyesus, 2018). Regarding this situation, one of the Sustainable Development Goals programmed by the WHO, goal 3, highlights the importance of generating healthy lifestyle habits and increasing PA hours among the student population (UNESCO, 2017). For all the reasons mentioned above, several institutions have developed different promotional campaigns for the implementation of healthy routines in several groups of students. However, annual reports indicate that these actions are not sufficiently effective. Among the factors that can determine the improvement of a PA habit, motivation has been considered essential. Therefore, detecting the motivations and perceptions of different student populations is crucial in order to establish the most effective strategies to promote healthy routines (Bauman et al., 2012). For instance, active subjects show greater intrinsic motivation than sedentary subjects, as detailed by Capdevila Ortís et al. (2006).

Besides personal motivations, other variables are important to influence the establishment of a healthy habit. Bauman et al. (2012) pointed out that lower socioeconomic level, unhealthy habits such as smoking, older age and gender, are among the main factors associated with a lower rate of PA practice. Regarding gender differences, several studies have supported that woman present lower levels of PA compared to men, both in college age and in adulthood (Blanco et al., 2017; Carriedo et al., 2019; Gómez et al., 2006; Wilson & Rodgers, 2002) (Castañeda-Vázquez, Campos-Mesa and Del Castillo-Andrés, 2016). In addition, recent studies identify the prevalence of sedentary lifestyles in university students, especially in women (García Puello & Herazo Beltrán, 2015; Arévalo, Muñoz & Cuevas, 2016, Puerta Mateus et al., 2019. In the study conducted by Arévalo, Muñoz & Cuevas (2016), after corroborating the greater sedentary lifestyle in women than in men, an attempt was made to provide an explanation for these differences. In addition to the arguments about inequalities in gender roles widely discussed by other studies, these differences could also be explained by less availability for physical activity reported by women, due to the multiplicity of activities they have to perform since their youth, as well as the important differences in the motivations they show for physical activity.

Considering the motivations to perform PA of university women is a fundamental factor to generate healthy PA habits. One of the gold standards in the assessment of the motivation to PA has been the Exercise Motivations Inventory (EMI) (Markland & Hardy, 1993). However, this questionnaire was designed only for

physically active people. For this reason, Markland & Ingledew (1997) developed the EMI-II which, among other aspects, extended the type of population that could be assessed and included groups with sedentary behaviours. The EMI-II allows to determine the intrinsic and extrinsic motivations of the subjects through the analysis of five dimensions (psychological, interpersonal, fitness, body and health). This questionnaire was translated into Spanish and renamed *Autoinforme de Motivos para la Práctica de Ejercicio Físico* (Capdevila Ortís et al., 2006).

Previous literature has widely studied the differences between sexes in motivations for PA practice. Physical performance is a key factor that helps to improve the subjects' perception of their exercise capacity and, therefore, a key factor in motivation and adherence to the exercise routine (Bauman et al., 2021. However, there is a lack of studies analysing exclusively female gender. In addition, most of the previous research has not evaluated physiological aspects in order to correlate subjective data with objective variables and contribute to a better understanding of the topic. Thus, to attempt to resolve these issues, the present work aims to establish a relationship between cardiovascular performance and motivations towards PA practice in sedentary female university students. Considering the analysis of previous literature, a positive relationship between the level of cardiovascular performance and a higher motivation to practice PA is expected. Therefore, female students with higher physical performance are expected to register higher motivation, especially intrinsic.

METHODS

Sample

Thirty-one female university students (Granada, Spain) participated in the present study. All participants achieved 0.1 credits for their collaboration (See Table 1). Individuals completed a self-report questionnaire on healthy lifestyle habits and the short version of the international physical activity questionnaire (IPAQ-SF; Lee et al., 2011). The IPAQ data showed the low level of physical activity among the participants (Mets = 349.33 ± 286.40)]. None of the individuals had any partial/chronic lesions or any neurological disorder that could affect the experiment results or the stress test performance. The inclusion criteria were being sedentary and the absence of regular physical exercise for at least two years. The exclusion criteria were any disease that prevented the practice of physical activity, or history of neurological or physical disorders. Finally, all the participants read and signed a written consent form to inform the possible benefits and risks of participating in the study. The study respected and followed the ethical principles of the Declaration of Helsinki for human research.

Table 1. Anthropometric and physiological characteristics of the participants (mean ± SD).

Anthropometric characteristics	
Sample	31
Age (years)	21.12 ± 2.01
Height (cm)	164.74 ± 5.78
Weight (kg)	60.98 ± 8.33
Body Mass Index (BMI)	21.85 ± 2.38
Physiological parameters in the submaximal incremental test	
Maximum power (W)	90.15 ± 21.34
Relative power (W/kg)	1.48 ± 0.24
Ventilatory Anaerobic Threshold (ml/kg/min)	20.56 ± 3.61

Materials and instruments

To record the heart rate (HR) during the exercise stress test, a Polar M400 heart rate monitor (Polar Electro, Finland) was used. The ventilatory parameters were measured during the submaximal incremental exercise test using a True One 2400 Metabolic measurement system (Parvo Medics, Sandy, UT) and a Jaeger Master Screen gas analyser, and a Viasprint 150 P cycle ergometer (See Figure 1). HR was coded with Polar ProTrainer 5 Software.

Figure 1. Participant performing submaximal incremental exercise test.

IPAQ-SF

This questionnaire was used to assess physical activity undertaken across a comprehensive set of domains (leisure time physical activity, domestic and gardening (yard) activities, work-related physical activity and transport-related physical activity). The purpose of these values was to characterize the physical condition of the sample.

Healthy Lifestyle Questionnaire

Healthy Lifestyle Questionnaire is a 26-item tool in which the respondent is asked to indicate the frequency of adopting 26 positively stated lifestyle habits using a Likert-type scale (1 = Never or rarely, 2 = Sometimes, 3 = Often and 4 = Always). The introductory phrase is "*How often…*". We used the questionnaire to control the health of participants and was not analysed in the experiment.

AMPEF questionnaire

For the evaluation of the motivations for practicing physical exercise, the self-reported AMPEF questionnaire was carried out. This Spanish version of the Exercise Motivations Inventory (EMI-2; Markland and Ingledew, 1997) is called Self-report of Motives for the Practice of Physical Exercise (AMPEF; Capdevila, 2000). The questionnaire comprises 48 questions that must be answered through a 10-point Likert scale, 0 being not true and ten totally true. The 40 questions are organized to answer a total of 11 dimensions: weight and body image, fun and well-being, prevention and positive health, competition, affiliation, muscular strength and endurance, social recognition, stress control, agility and flexibility, challenge, and health urgency. (See table 2, for more information).

Table 2. Descriptive statistics of AMPEF questionnaire (N = 31).

ITEMS	M	SD
1.- To stay slim	7.57	2.27
2.- To keep healthy	7.73	1.76
3.- Because it makes me feel good	7.87	2.64
4.- To show others what I am worth	2.67	2.56
5.- To have a healthy body	8.97	1.45
6.- To have more strength	6.63	2.54
7.- Because I like the feeling I get from exercising	6.73	2.79
8.- To spend time with friends	5.10	3.09
9.- Because the doctor has advised me to exercise	3.07	3.02
10.- Because I like to try to win when I exercise	3.07	2.89
11.- To be more agile	8.70	0.92
12.- To have goals to strive for	6.20	3.11
13.- To lose weight	6.60	3.10
14.- To avoid health problems	8.33	1.67
15.- Because exercise gives me energy	7.43	2.03
16.- To have a good body	8.57	1.36
17.- To compare my skills with those of others	2.57	2.76
18.- Because it helps to reduce tension	6.63	2.82
19.- Because I want to enjoy good health	8.50	1.50
20.- To increase my endurance	8.63	1.09
21.- Because exercise makes me feel satisfied	7.67	1.90
22.- To enjoy the social aspects of exercise	5.47	2.83
23.- To avoid a disease that occurs a lot in my family	3.60	3.19
24.- Because I have a good time competing	3.57	2.80
25.- To maintain flexibility	7.57	1.28
26.- To have challenges to overcome	5.70	3.07
27.- To control weight	7.80	2.28
28.- To avoid heart problems	6.93	2.98
29.- To improve my appearance.	8.33	1.34
30.- To obtain recognition when I surpass myself	4.27	3.02
31.- To help me overcome stress	6.20	2.81
32.- To feel healthier	8.53	1.30
33.- To be stronger	6.57	2.55
34.- Because exercise makes me fun	6.17	2.37
35.- To have fun exercising with other people	5.30	2.92
36.- To recover from an illness/injury	4.97	3.59
37.- Because I enjoy doing physical competition	3.97	3.01
38.- To have more flexibility	7.77	1.16
39.- To develop my skills	5.97	2.81
40.- To burn calories	7.60	2.14
41.- To be more attractive	8.07	1.41
42.- To be able to do things that others cannot do	3.43	3.17
43.- To release tension	6.37	3.09
44.- To develop my muscles	5.63	2.49
45.- Because exercising I feel very good	7.30	2.46
46.- To make friends	3.90	2.97
47.- Because I enjoy exercising especially if there is competition	3.67	2.64
48.- To test myself	6.70	2.71

Note. M: Mean; SD: Standard Deviation.

Table 2. Descriptive statistics of AMPEF questionnaire (N = 31). Cont.

ITEMS	M	SD
Weight and Body Image		
27.- To control weight	7.80	2.28
13.- To lose weight	6.60	3.10
40.- To burn calories	7.60	2.14
1.- To stay slim	7.57	2.27
29.- To improve my appearance.	8.33	1.34
41.- To be more attractive	8.07	1.41
16.- To have a good body	8.57	1.36
	7.79	**1.99**
Fun and Wellness		
45.- Because exercising I feel very good	7.30	2.46
7.- Because I like the feeling I get from exercising	6.73	2.79
3.- Because it makes me feel good	7.87	2.64
21.- Because exercise makes me feel satisfied	7.67	1.90
34.- Because exercise makes me fun	6.17	2.37
	7.13	**2.44**
Prevention and Positive Health		
2.- To keep healthy	7.73	1.76
19.- Because I want to enjoy good health	8.50	1.50
5.- To have a healthy body	8.97	1.45
32.- To feel healthier	8.53	1.30
14.- To avoid health problems	8.33	1.67
	8.63	**1.54**
Competition		
24.- Because I have a good time competing	3.57	2.80
37.- Because I enjoy doing physical competition	3.97	3.01
47.- Because I enjoy exercising especially if there is competition	3.67	2.64
10.- Because I like to try to win when I exercise	3.07	2.89
	3.57	**2.84**
Affiliation		
8.- To spend time with friends	5.10	3.09
35.- To have fun exercising with other people	5.30	2.92
46.- To make friends	3.90	2.97
22.- To enjoy the social aspects of exercise	5.47	2.83
	4.94	**2.96**
Muscle Strength and Endurance		
6.- To have more strength	6.63	2.54
33.- To be stronger	6.57	2.55
44.- To develop my muscles	5.63	2.49
20.- To increase my endurance	8.63	1.09
	6.87	**2.17**
Social recognition		
4.- To show others what I am worth	2.67	2.56
42.- To be able to do things that others cannot do	3.43	3.17
17.- To compare my skills with those of others	2.57	2.76
30.- To obtain recognition when I surpass myself	4.27	3.02
	3.23	**2.88**

Stress Control		
31.- To help me overcome stress	6.20	2.81
43.- To release tension	6.37	3.09
18.- Because it helps to reduce tension	6.63	2.82
	6.40	**2.91**
Agility and flexibility		
25.- To maintain flexibility	7.57	1.28
38.- To have more flexibility	7.77	1.16
11.- To be more agile	8.70	0.92
	8.01	**1.12**
Challenge		
12.- To have goals to strive for	6.20	3.11
26.- To have challenges to overcome	5.70	3.07
48.- To test myself	6.70	2.71
39.- To develop my skills	5.97	2.81
	6.14	**2.93**
Health Emergencies		
36.- To recover from an illness/injury	4.97	3.59
23.- To avoid a disease that occurs a lot in my family	3.60	3.19
9.- Because the doctor has advised me to exercise	3.07	3.02
	3.88	**3.27**

Note. M: Mean; SD: Standard Deviation.

Procedure

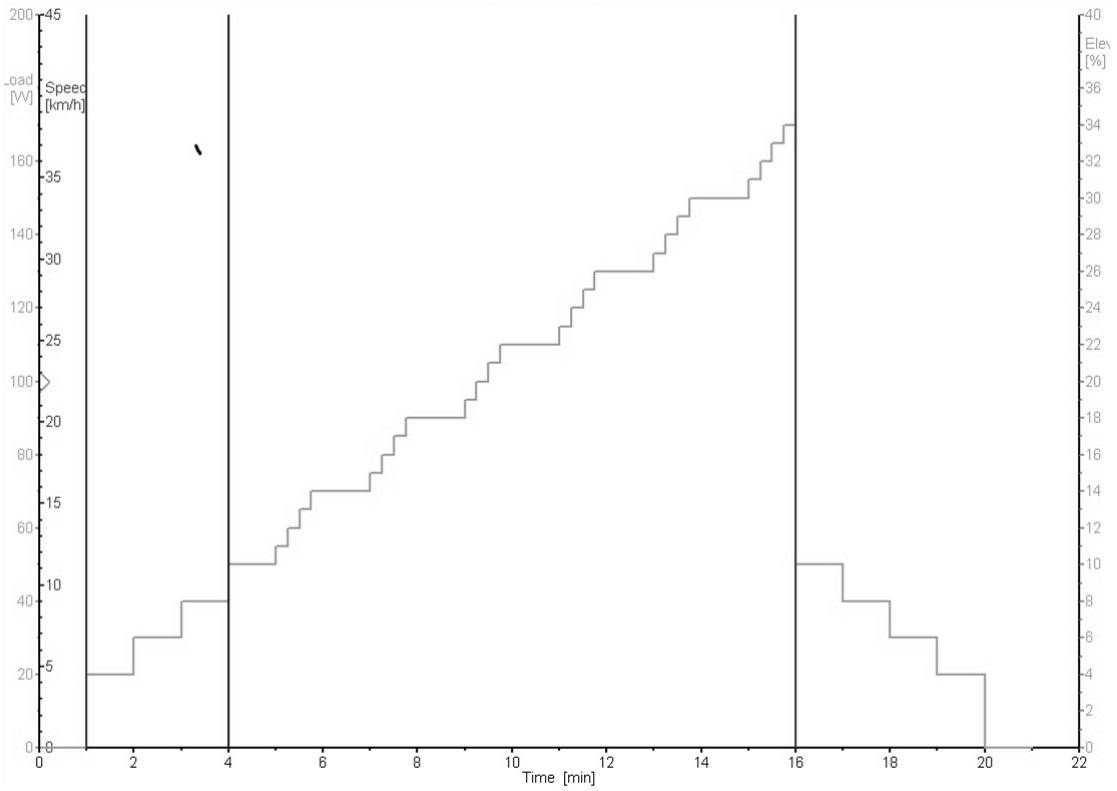

Figure 2. Adaptation of the Astrand protocol carried out for the submaximal incremental exercise test.

The participants visited the laboratory once. Immediately after the participants arrival, the heart rate monitor's recording band was placed to monitor the HR during the entire experiment. Subsequently, the participants performed a submaximal incremental exercise test on a cycle ergometer with a mask connected to a metabolic cart. To carry out this sub-maximum incremental stress test, we followed the guidelines proposed by the ACSM (ACSM, 2010) to guarantee the participants' safety. The participants were instructed to pedal at a fixed cadence of 60 revolutions per min (rpm). The Astrand protocol (Astrand, 1965) was used, which began with a warm-up period at 0 W, with 10 W increments every minute until minute 5. After these 5 minutes of warm-up, the exercise phase began pedalling at 50 W, increasing the load 25 W in women and 50 W in men every 2 '. After each increase, the workload remained stable for the next 2 '. The determination of the Ventilatory Anaerobic Threshold was based on the gas exchange method (RER) [(RER) = CO_2 produced / O_2 consumed], establishing that the UVA was reached when the RER was equal to 1.00 (Myers & Ashley, 1997; Yeh et al., 1995) and did not fall below that level again during the 2 ' constant loading phase, or when climbing a new loading step and approaching a RER of 1.1. The submaximal incremental exercise test ended when the UVA was reached, measured in ml * kg-l * min-l. (for more information on the protocol, see figure 2). The results of this test were used to establish the workload individually in the following experimental conditions. After completing the submaximal incremental exercise test, participants completed the AMPEF questionnaire in a soundproof room. All tests were repeated at the same place and time in post-test in the same humidity condition (30-40%) and temperature (20–24 ° C).

Statistical analysis

Statistical analysis were represented with means (M) and standard deviations (SD). Before conducting the analysis, a Kolmogorov-Smirnov normality test was performed, which showed that the data were normally distributed, and a Levene's test assuming their homogeneity. First, to compare the AMPEF data, a correlation analysis between the different factors of the AMPEF and $V02_{Max}$ was performed, which was interpreted according to Salkind35, considering very low correlations between .00 and .20; drops between .21 and .40; moderate between .41 and .60; high between .61 and .80 and very high between .81 and 1. Data analysis were performed using Statistica software (version 10 by Statsoft).

RESULTS

Table 3. Correlation between the factors obtained through the AMPEF questionnaire and $V02_{Max}$.

Factor	$V02_{Max}$	PIC	DB	PSP	C	A	FRM	RS	CE	AF	D	US
$V02_{max}$	1.00	-0.01	0.38	-0.12	-0.08	0.09	-0.16	-0.06	0.10	-0.16	-0.20	-0.19
PIC	-0.01	1.00	0.05	-0.01	0.19	-0.02	0.08	-0.19	-0.12	0.22	-0.19	0.03
DB	0.38	0.05	1.00	0.00	0.44	0.07	-0.28	0.23	0.29	0.24	0.30	0.21
PSP	-0.12	-0.01	0.00	1.00	0.66	0.54	0.56	0.15	0.33	0.64	0.32	0.58
C	-0.08	0.19	0.44	0.66	1.00	0.40	0.27	0.38	0.33	0.76	0.43	0.53
A	0.09	-0.02	0.07	0.54	0.40	1.00	0.60	0.20	0.72	0.58	0.23	0.60
FRM	-0.16	0.08	-0.28	0.56	0.27	0.60	1.00	0.09	0.49	0.56	0.16	0.52
RS	-0.06	-0.19	0.23	0.15	0.38	0.20	0.09	1.00	0.17	0.31	0.52	0.22
CE	0.10	-0.12	0.29	0.33	0.33	0.72	0.49	0.17	1.00	0.47	0.25	0.72
AF	-0.16	0.22	0.24	0.64	0.76	0.58	0.56	0.31	0.47	1.00	0.28	0.54
D	-0.20	-0.19	0.30	0.32	0.43	0.23	0.16	0.52	0.25	0.28	1.00	0.44
US	-0.19	0.03	0.21	0.58	0.53	0.60	0.52	0.22	0.72	0.54	0.44	1.00

Note. $V02_{max}$: Maximum Oxygen Volume; PIC: Weight and Body Image; DB: Fun and Wellness; PSP: Prevention and Positive Health; C: Competition; A: Affiliation; FRM: Muscle Strength and Endurance; RS: Social Recognition; CE: Stress Control; AF: Agility and Flexibility; D: Challenge and US: Health Emergencies.

The results associated with the dimension "*weight & body mass*" presented significant differences. In fact, the correlation was positive and when the values of weight & body mass haver a relationship with higher $V02_{Max}$. The data analysis is presented as median and standard deviations.

Subsequently, we performed a correlation analysis between the different factors of the AMPEF questionnaire and the $VO2_{Max}$. For this, the means and SD of all the scores were obtained (see Table 3). Highlighted is the only correlation between the $VO2_{Max}$ and the PIC average (0.38 *), showing the positive relationship between both values (See figure 3 For your understanding) correlation between the factors obtained through the AMPEF questionnaire and $V02_{Max.}$

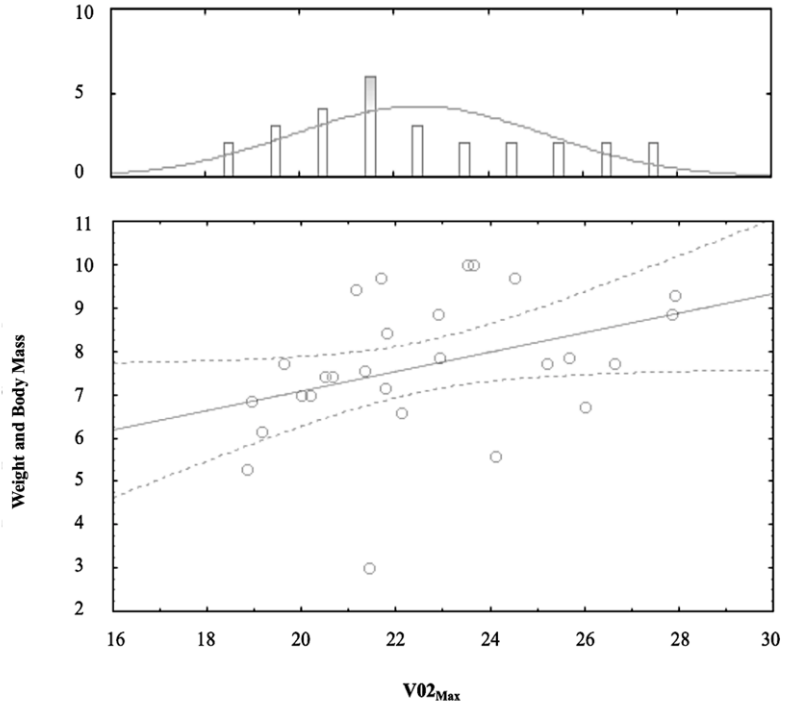

Figure 3. Relationship $V02_{Max}$, weight and body image.

DISCUSSION

The aim of this study was to establish a relationship between cardiovascular performance and the motivations for practicing PA in university students. The results obtained showed that the level of physical condition was low in the students. However, the higher cardiovascular performance was correlated with a better perception of university women's image and bodyweight. These results establish potential bidirectionality between the students' self-concept and their physical condition level at the cardiorespiratory level.

The regular practice of exercise or physical activity in students has been associated with an improvement in the level of physical condition and, therefore with several healthy variables such as cardiovascular performance (Kokkinos et al., 2011; Ruiz et al., 2011) or the feeling of well-being (Hosker et al., 2019; Papaioannou et al., 2019).Therefore, the importance of the data obtained from this study implies the establishment, in part, of a relationship between cardiovascular performance and the reasons why university students are not sufficiently active in PA. At the same time, it will be possible to identify which internal and

external motivations could lead to healthy routine in the students. The study hypothesized that higher cardiovascular performance would be associated with more PA practice motivation among university students. However, the hypothesis cannot be confirmed because only one of the motivational dimensions correlates with cardiorespiratory performance, precisely image, and body weight. Similar results have been previously documented in literature, which highlighted gender differences among the motivations for practice. Men are driven by competing, improving the FC or social recognition however, women are inclined towards body image and aesthetics (Wilson & Rodgers, 2002). Other research indicated the significantly positive relationship established between perceived body image, self-esteem, and PA practice (Murgui et al., 2016). Besides, the importance of body image has been highlighted, and they indicate the social aspects and the enjoyment of performing PA by women (Gómez et al., 2006; Wilson & Rodgers, 2002).

Our research has correlated the level of maximum oxygen consumption with the PIC variable (R = 0.001). It confirmed part of the previous hypotheses in which the value of body image is highlighted to have a better self-concept and, therefore, personality development (Esnaola et al., 2008). These findings could be partially explained since one of the consequences of physical inactivity itself is to generate different associated disorders such as increased body weight or a harmful distortion of body image (Capdevila Ortís et al., 2006). Concerning this idea, Martin et al. (2012) explain that the improvement produced by PA's practice on self-concept is caused by perceptual effects rather than as a consequence of a real change in body composition. This idea is also confirmed by Tylka (2012) since she considers PA as an essential element to improve psychological well-being and a positive body image, especially in women. In addition to the internal motivations towards PA's practice in university women, a series of external reasons have been associated with less participation and low levels of physical condition. According to our results, competing and social recognition are the dimensions that have been valued the least as motivations for practicing PA.

Therefore, PA's importance is directly related to the improvement of cardiovascular performance and several psychological aspects, such as self-concept. In turn, the improvement in self-esteem produces a greater motivation to practice PA. Therefore, government and academic institutions must develop strategies that help sedentary people to be more active. As documented, this inactivity is more significant in women than in men and even more in college-age; therefore, promoting healthy PA routines should be especially recommended in this population.

AUTHOR CONTRIBUTIONS

Conceptualization, F.T.G.F., and S.B.M.; Formal analysis, F.T.G.F.; Methodology: F.T.G.F., and S.B.M; Writing original draft, S.B.M., O.G.T., H.M.O., and F.T.G.F. Writing-Review & editing, H.M.O., and O.G.T. All authors have read and agreed to the published version of the manuscript.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

REFERENCES

Álvarez-Bueno, C., Pesce, C., Cavero-Redondo, I., Sánchez-López, M., Martínez-Hortelano, J. A., & Martínez-Vizcaíno, V. (2017). The Effect of Physical Activity Interventions on Children's Cognition and Metacognition: A Systematic Review and Meta-Analysis. Journal of the American Academy of Child and Adolescent Psychiatry, 56(9). https://doi.org/10.1016/j.jaac.2017.06.012

Arévalo, M. T. V., Muñoz, A. F. O., & Cuevas, J. R. T. (2016). Tipologías de estilos de vida en jóvenes universitarios. Universidad y Salud, 18(2), 246-256. https://doi.org/10.22267/rus.161802.35

Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J. F., Martin, B. W., Alkandari, J. R., Andersen, L. B., Blair, S. N., Brownson, R. C., Bull, F. C., Craig, C. L., Ekelund, U., Goenka, S., Guthold, R., Hallal, P. C., Haskell, W. L., Heath, G. W., Inoue, S., … Sarmiento, O. L. (2012). Correlates of physical activity: Why are some people physically active and others not? In The Lancet (Vol. 380, Issue 9838, pp. 258-271). https://doi.org/10.1016/S0140-6736(12)60735-1

Blanco, H., Verónica Benavides, E., Tristán, J. L., & Mayorga-Vega, D. (2017). Actividad física, imagen corporal y autoconcepto personal en jóvenes universitarias Mexicanas. Revista de Psicologia Del Deporte, 26, 25-33.

Capdevila Ortís, L., Pintanel Bassets, M., & Niñerola i Naymí, J. (2006). Barreras percibidas y actividad física: el autoinforme de barreras para la práctica de ejercicio físico. Revista de Psicología Del Deporte, 15(1), 53-69.

Carriedo, A., González, C., & López, I. (2019). Habits of sports consumption and physical activity practice in university students. Journal of Sport and Health Research, 11(Supl 1), 167-176.

Castañeda-Vázquez, C., del Carmen Campos-Mesa, M., & Del Castillo-Andrés, Ó. (2016). Actividad física y percepción de salud de los estudiantes universitarios. Revista de la Facultad de Medicina, 64(2), 277-284. https://doi.org/10.15446/revfacmed.v64n2.53068

Cuenca-García, M., Ortega, F. B., Ruiz, J. R., González-Gross, M., Labayen, I., Jago, R., Martínez-Gómez, D., Dallongeville, J., Bel-Serrat, S., Marcos, A., Manios, Y., Breidenassel, C., Widhalm, K., Gottrand, F., Ferrari, M., Kafatos, A., Molnár, D., Moreno, L. A., De Henauw, S., … Sjöström, M. (2014). Combined influence of healthy diet and active lifestyle on cardiovascular disease risk factors in adolescents. Scandinavian Journal of Medicine and Science in Sports, 24(3), 553-562. https://doi.org/10.1111/sms.12022

Elizondo, A. J., Guillén, G. F., y Aguinaga, O. I. (2005). Prevalencia de actividad física y su relación con variables sociodemográficas y estilos de vida en la población de 18 a 65 años de Pamplona. Revista Española de Salud Pública,79(5), 559-567. https://doi.org/10.1590/S1135-57272005000500006

Esnaola, I., Goñi, A., & Madariaga, J. M. (2008). El autoconcepto: Perspectivas de investigación. Revista de Psicodidactica, 13(1), 179-194.

Farinola, M. G., Bazán, N. E., Laíño, F. A., y Santa-María, C. J. (2012). Actividad física y conducta sedentaria en estudiantes terciarios y universitarios de la Región Metropolitana de Buenos Aires. Revista Brasilera Ciencia e Movimento,20, 79-90.

García Ferrando, M., & Llopis, M. (2011). Encuesta sobre los hábitos deportivos en España. Ideal democrático y bienestar personal. CSD. Madrid.

García Puello, F., & Herazo Beltrán, Y. (2015). Factores sociodemográficos y motivacionales asociados a la actividad física en estudiantes universitarios. Revista Medica de Chile, 143(11), 1411-1418. https://doi.org/10.4067/S0034-98872015001100006

García, H. J., y Fonseca, H. C. (2012). La actividad física en los y las jóvenes mexicanos y mexicanas: un análisis comparativo entre las universidades públicas y privadas. MHSalud: Revista en Ciencias del Movimiento Humano y Salud, 9(2). https://doi.org/10.15359/mhs.9-2.1

García, P. F., Herazo, B. Y., y Tuesca, M. R. (2015). Factores sociodemográficos y motivacionales asociados a la actividad física en estudiantes universitarios. Revista médica de Chile,143(11), 1411-1418. https://doi.org/10.4067/S0034-98872015001100006

Gómez, P., Murcia, J., & García, P. (2006). Influencia social del género y de la percepción de competencia en la valoración de las clases de educación física. Revista Española de Educación Física y Deportes, 379, 37.

Hillman, C. H., Castelli, D. M., & Buck, S. M. (2005). Aerobic fitness and neurocognitive function in healthy preadolescent children. Medicine and Science in Sports and Exercise, 37(11), 1967-1974. https://doi.org/10.1249/01.mss.0000176680.79702.ce

Hosker, D. K., Elkins, R. M., & Potter, M. P. (2019). Promoting Mental Health and Wellness in Youth Through Physical Activity, Nutrition, and Sleep. Child and Adolescent Psychiatric Clinics of North America, 28(2), 171-193. https://doi.org/10.1016/j.chc.2018.11.010

Kokkinos, P., Sheriff, H., & Kheirbek, R. (2011). Physical inactivity and mortality risk. Cardiology Research and Practice, 1(1). https://doi.org/10.4061/2011/924945

Markland, D. y Hardy, L. (1993). The Exercise Motivations Inventory: Preliminary development and validity of measure of individuals' reasons for participation in regular physical exercise. Personality and Individual Differences, 15, 289-296. https://doi.org/10.1016/0191-8869(93)90219-S

Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. British Journal of Health Psychology, 2(4), 361-376. https://doi.org/10.1111/j.2044-8287.1997.tb00549.x

Martin, K. A., Bassett, R. L. y Conlin, C. (2012). Body image and exercise. En E. O. Acevedo (Ed.), The Oxford handbook of exercise psychology (pp.55-75). Oxford: Oxford University Press. https://doi.org/10.1016/j.bodyim.2012.04.002

Mavilidi, M. F., Mason, C., Leahy, A. A., Kennedy, S. G., Eather, N., Hillman, C. H., Morgan, P. J., Lonsdale, C., Wade, L., Riley, N., Heemskerk, C., & Lubans, D. R. (2020). Effect of a Time-Efficient Physical Activity Intervention on Senior School Students' On-Task Behaviour and Subjective Vitality: the 'Burn 2 Learn' Cluster Randomised Controlled Trial. Educational Psychology Review. https://doi.org/10.1007/s10648-020-09537-x

Mohammed, A. J., & Ghebreyesus, T. A. (2018). Healthy living, well-being and the sustainable development goals. Bulletin of the World Health Organization, 96(9), 18-19. https://doi.org/10.2471/BLT.18.222042

Morales, G., del Valle, C., Soto, Á., y Ivanovic, D. (2013). Factores de riesgo cardiovascular en estudiantes universitarios. Revista chilena de nutrición,40(4), 391-396. https://doi.org/10.4067/S0717-75182013000400010

Murgui, S., García, C., & García, Á. (2016). Efecto de la práctica deportiva en la relación entre las habilidades motoras, el autoconcepto físico y el autoconcepto multidimensional. Revista de Psicologia Del Deporte, 25(1), 19-25.

Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjöström, M. (2008). Physical fitness in childhood and adolescence: A powerful marker of health. International Journal of Obesity, 32(1), 1-11. https://doi.org/10.1038/sj.ijo.0803774

Ortega, Francisco B., Ruiz, J. R., & Castillo, M. J. (2013). Actividad física, condición física y sobrepeso en niños y adolescentes: Evidencia procedente de estudios epidemiológicos. Endocrinologia y Nutricion, 60(8), 458-469. https://doi.org/10.1016/j.endonu.2012.10.006

Papaioannou, A., Milosis, D., & Gotzaridis, C. (2019). Interdisciplinary Teaching of Physics in Physical Education: Effects on Students' Autonomous Motivation and Satisfaction. Journal of Teaching in Physical Education, 39(2), 156-164. https://doi.org/10.1123/jtpe.2018-0315

Puerta Mateus, K. C., De La Rosa Luna, R., & Ramos Vivanco, A. M. (2019). Niveles de actividad física y su relación entre la distribución por sexo y programa académico en una universidad. MHSALUD Revista En Ciencias Del Movimiento Humano y Salud, 16(2), 1-20. https://doi.org/10.15359/mhs.16-2.4

Puerta, K. C., De La Rosa, R., & Ramos-Vivanco, A. M. (2019). Niveles de actividad física y su relación entre la distribución por sexo y programa académico en una universidad. MHSalud, 16(2), 46-57. https://doi.org/10.15359/mhs.16-2.4

Ruiz, J. R., Castro-Piñero, J., Artero, E. G., Ortega, F. B., Sjöström, M., Suni, J., & Castillo, M. J. (2009). Predictive validity of health-related fitness in youth: A systematic review. British Journal of Sports Medicine, 43(12), 909-923. https://doi.org/10.1136/bjsm.2008.056499

Tomkinson, G. R., Carver, K. D., Atkinson, F., Daniell, N. D., Lewis, L. K., Fitzgerald, J. S., Lang, J. J., & Ortega, F. B. (2018). European normative values for physical fitness in children and adolescents aged 9-17 years: Results from 2 779 165 Eurofit performances representing 30 countries. British Journal of Sports Medicine, 52(22), 1445-1456. https://doi.org/10.1136/bjsports-2017-098253

Tylka, T. L. (2012). Feminist perspectives on body image. En T. F. Cash y L. Smolak (Eds.), Body image. A handbook of science, practice and prevention (pp. 56-66). New York: Guilford Press. https://doi.org/10.1016/j.bodyim.2011.09.006

UNESCO. (2017). Education for Sustainable Development Goals: Learning Objective. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000247444

Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., Khunti, K., Yates, T., & Biddle, S. J. H. (2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: Systematic review and meta-analysis. Diabetologia, 55(11), 2895-2905. https://doi.org/10.1007/s00125-012-2677-z

Wilson, P. M., & Rodgers, W. M. (2002). The relationship between exercise motives and physical self-esteem in female exercise participants: An application of self-determination theory. Journal of Applied Biobehavioral Research, 7(1), 30-43. https://doi.org/10.1111/j.1751-9861.2002.tb00074.x

