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Original

CONEXIÓN ENTRE LA IMAGEN CORPORAL Y VARIABLES RELACIONADAS CON LA SALUD, LA PSICOLOGÍA Y LA SOCIOLOGÍA EN ADOLESCENTES

CONNECTIONS BETWEEN BODY IMAGE AND ADOLESCENTS' HEALTH, PSYCHOLOGICAL AND SOCIAL VARIABLES

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RESUMEN

El objetivo fue incrementar el conocimiento existente en relación a la imagen corporal en adolescentes y su conexión con variables relacionadas con la salud (Índice de Masa Corporal, hábitos de sueño), la psicología (bienestar, autoconcepto físico) y la sociología (nivel socioeconómico y dieta). Participaron 246 estudiantes (130 hombres, 116 mujeres) de entre 13-15 años pertenecientes a 10 institutos de una ciudad del norte de España. Los adolescentes llevaron las 24h durante una semana un acelerómetro para monitorizar su movimiento. Se obtuvo también el IMC y para el resto de variables se emplearon cuestionarios. Los resultados indicaron que la mayoría tenían un adecuado IMC, una dieta mediterránea óptima y un nivel socioeconómico medio. La eficiencia de sueño fue de un 92%. Una cuarta parte mostró signos de psicopatología. En comparación a la figura actual, la mayoría escogió una más delgada (52,1%), el 32,1% una similar, y el 15% una más robusta. La mayoría de participantes seleccionaron una figura distinta a la actual, especialmente entre las mujeres, aunque este hecho no varió según la dieta ni el estatus socioeconómico. La silueta percibida y la discrepancia entre silueta percibida e ideal se relacionaron positivamente con el IMC y negativamente con la eficiencia de sueño. La eficiencia de sueño predijo la silueta percibida y la discrepancia entre silueta percibida e ideal, mientras que el género predijo la figura ideal. Participantes con mayor discrepancia entre silueta percibida e ideal mostraron menor autoconcepto físico y menor bienestar psicológico. Como conclusión, la imagen corporal sigue teniendo alta prevalencia entre los adolescentes, impactando negativamente en su autoconcepto físico y su bienestar psicológico. El IMC es un factor estrechamente ligado a la insatisfacción con la imagen corporal. No se encontró una relación entre la insatisfacción corporal con respecto a la dieta y al nivel socioeconómico. La eficiencia de sueño parece ser un factor que predice la percepción con la propia imagen corporal y la (in)satisfacción con la misma.

Palabras clave: imagen corporal, IMC, sueño, dieta, bienestar psicológico adolescentes.

ABSTRACT

The aim was to expand the existing knowledge on adolescents' body image and its connections with health (Body Mass Index, sleep activity), psychological (well-being, physical self-concept), and social (socio-economic status, diet) variables.

246 students (130 boys, 116 girls), age range 13-15 years, enrolled in 10 schools from a city in northern Spain participated. Seven days/24 hours, they wore accelerometers to monitor their activity, including sleep. Participants' Body Mass Index was obtained and they completed several questionnaires. The results indicated that most participants had an adequate BMI, optimal Mediterranean diet and medium socioeconomic status. Sleep efficiency was above 92%. One quarter showed signs of psychological disorders. The majority (52,1%) chose an ideal body image thinner than the perceived one, 32,1% a similar one, and 15% a larger one. Most participants wanted a different figure, especially among females, but it did not vary depending on socioeconomic status or Mediterranean diet. Perceived body image and body image discrepancy were positively correlated with BMI. Negative relationships were observed between sleep efficiency and perceived body image and body image discrepancy. Sleep efficiency predicted both perceived body image and body image discrepancy, while sex predicted ideal body image. Participants with greater body image discrepancy showed lower levels of physical self-concept and psychological well-being.

In conclusion, body image dissatisfaction had high prevalence among adolescents with negative implications on their psychological well-being and physical self-concept. BMI is a factor closely linked to adolescents' body dissatisfaction. No connection was found between body image discrepancy and SES or Mediterranean diet. Finally, sleep efficiency predicted both perceived body image and body image discrepancy.

Keywords: body image, BMI, sleep, diet, psychological well-being, adolescents

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INTRODUCTION

Body image is a complex, multifactorial construct that includes perceptions, thoughts and attitudes towards one's body (Baile, Raich & Garrido, 2003). Perceptions refers to body weight's evaluation and the different body parts, including shape and size; thoughts deal with feelings that perceptions arouse in the individual, and attitudes are behavioural manifestations derived from perceptions (Holsen, Jones & Birkeland, 2012). Body image includes how individuals perceive, feel and act in relation to their body (Thompson, Heinberg, Altabe & Tantleff-Dunn, 1999). As a consequence, a person may experience feelings of satisfaction or dissatisfaction (Cash, 1994). Regarding gender, scientific literature indicated the existence of greater body dissatisfaction among women (Kantanista, Osiński, Borowiec, Tomczak & Król-Zielińska, 2015; Ingolfsdottir, Asgeirsdottir, Gunnarsdottir & Bjornsson, 2014). However, a progressive increase in body dissatisfaction among men has been recently observed (Murray & Lewis, 2014). Different studies have identified a high prevalence of body weight dissatisfaction among adolescents (Lawler & Nixon, 2011; Paxton, Eisenberg & Neumark-Sztainer, 2006). The World Health Organization (WHO, 1995) defines adolescence as the life span between 10 and 19 years. It is a stage where intense physical changes such as body growth and reproductive maturation occur (Todd, Street, Ziviani, Byrne & Hills, 2015), along with cognitive changes such as increased intellectual capacity (Taylor, Barker, Heavey & McHale, 2013) or the search for one's own identity (Gonçalves & Bedin, 2015). These changes, accelerated, make adolescence a critical period for the emergence of distortions in body image perceptions (Hermes & Keel, 2003). In many cases, these distortions cause dissatisfaction with one´s body, which, in turn, often generates health risk behaviours among adolescents to be in line with social beauty standards, which are, in many cases, unattainable from a healthy perspective. These behaviours are usually aimed at reducing or controlling body weight through inadequate diets, use of laxatives and diuretics, diet pills, vomiting, compensatory behaviours (Johnson, Kim, Lee & Kim, 2014), excessive physical activity practice (Paradis, Cooke, Martin & Hall, 2013) and tobacco consumption (Malinauskas, Raedeke, Aeby, Smith & Dallas, 2006) among others. Associations between body dissatisfaction and psychological disorders such as depression, stress, anxiety or eating disorders have been studied (Moreno & Ortiz-Viveros, 2010; Farhat, Iannotti & Caccavale, 2014).

Researchers continue to explore the consequences that body dissatisfaction can have on adolescents' psychological well-being. Body mass index (BMI) has been found one of the greatest predictors of body dissatisfaction (Gouveia, Frontini, Canavarro & Moreira 2014). Therefore, it should be a factor to consider in any type of intervention program to improve individuals' body image. On the other hand, while the relationship of these two variables (BMI and body dissatisfaction) in women is linear, an inverted quadratic function has been observed in men: those who are underweight or overweight are more dissatisfied with their body image compared to those with a normal weight (Frederick, Forbes, Grigorian & Jarcho, 2007).

Diet constitutes, with physical activity, one of the essential pillars of the energy balance and, consequently, of adiposity (Pereira, Bobbio, Antonio & Barros-Filho, 2013). Adolescents tend to eat outside their homes and to increase the consumption of fast-food and snacks because they are gaining independence, displacing foods that could be healthier for their diet (Das et al., 2017). Among the different dietary options, the Mediterranean Diet has proven to be one of the most beneficial dietary patterns for health (Sofi, Cesari, Abbate, Gensini & Casini, 2008). This diet, implemented in numerous countries, is based on the consumption of vegetables, fruit, cereals, legumes and nuts, combined with a moderate intake of fish, poultry and dairy products, a low intake of wine and red meat, and the use of olive oil as the main source of fat (Novak et al., 2017). Unfortunately, in the last decades this diet is in evident decline among young population in numerous countries (Cabrera et al., 2015). The decrease in Mediterranean dietary patterns, compared to other less healthy forms of food such as ultra-processed, makes young people lose the opportunity of the benefits it offers, such as the reduction of cardiovascular diseases, type 2 diabetes, some types of cancer and neurodegenerative diseases (Sofi, Abbate, Gensini & Casini, 2010).

Linked to diet, sleep seems to be an important factor connected to BMI. Current sleep recommendation for adolescents is between 8 and 10 hours per night, and

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it is considered a short sleep when it lasts less than 8 hours (Hirshkowitz et al., 2015). Unfortunately, it has been observed how many adolescents maintain a deficit in the duration of their sleep (Keyes, Maslowsky, Hamilton & Schulenberg, 2015). The causes of changes in sleep behaviors are multifactorial. Some associated factors are: early class start times, many extracurricular academic activities, more night activities with friends and, lately, the use of electronic devices (smartphones, game consoles…) (Cain & Gradisar, 2010). Longitudinal studies have indicated that insufficient sleep is a clear risk factor for overweight in adolescents (Jensen et al., 2019). Although the focus has been placed on the duration of sleep, and it is still considered important, research indicates that its quality should not be underestimated (Pilcher, Ginter & Sadowsky, 1997). The quality of sleep has been operationalized as *sleep efficiency*, which is the ratio between the effective time spent sleeping and the total time spent in bed (Meltzer, Montgomery-Downs, Insana & Walsh, 2012).

In addition to BMI, the predictive role of adolescents' family socioeconomic status (SES) on body image remains under debate. Unfortunately, the existing literature is limited, being much more extensive the studies that directly relate obesity and SES. High SES has been associated with greater body dissatisfaction (Pereira, Graup, Lopes, Borgatto & Daronco, 2009; Czyz, Swanepoel, Moss & Monyeki, 2016). In a recent review, Pereira et al. (2011) explained that although it seems that adolescents of medium-high SES were more dissatisfied with their body image due to high exposure to products, services and media linked to beauty, they have the purchasing power to go to health professionals looking for diets, exercise plans, psychological care... to counteract it. Nevertheless, they also indicated that there is a lack of studies, evidence on the topic is still inconclusive, and more research is needed.

Finally, physical self-concept has been defined as the multidimensional mental representation that people have about their corporeality; this includes cognitive, perceptive, emotional elements (Cash & Pruzinsky, 1990). It has a strong impact on individuals' general self-concept (Contreras, Fernández, García, Palou & Ponseti, 2010). Positive connections between physical self-concept, psychological well-being and the affirmation of one's identity have been found (Harter, 1998). During the teenage years, physical self-concept has been related to healthy lifestyle habits, such as a greater sports practice (Ruiz de Azúa, Rodríguez & Goñi, 2005). It has been observed that a lower physical self-concept is associated with greater body dissatisfaction and viceversa (Polivy & Herman, 2002). Previous studies in adolescents indicated gender differences: women have lower scores both in physical self-concept and in their subdomains (sports competition, physical condition, strength and physical attractiveness) (Hagger, Biddle & Wang, 2005; Trujano et al., 2010; García-Sánchez, Burgueño-Menjibar, López-Blanco & Ortega, 2013). In women, general physical self-concept is highly related to their physical appearance, while men rely more on factors such as strength and sports performance (Hayes, Crocker & Kowalski, 1999).

Based on the aforementioned, the main goal of the study was to expand the existing knowledge on adolescents' body image and assess its connections with health (BMI, sleep activity), psychological (well-being, physical self-concept), and social (SES, diet) variables.

METHODS

Study design

A simple (one group), transversal, ex post facto research design was used (Cohen, Manion, & Morrison, 2011). The study followed the principles of the Declaration of Helsinki (World Medical Association, 2013), and it was approved by the researchers' State Research Ethics Committee (135/18). The whole project was explained to both families and students, and parents/tutors signed an informed consent prior to enter the study. Complete confidentiality and anonymity was granted. Finally, they were informed that participation was voluntary and that they could leave the study at any time.

Participants

246 Secondary Education students (13,28 ± 0,57 years), age range 13-15 years (130 boys, 116 girls), enrolled in 10 different high schools in northern Spain (Avilés, Asturias), agreed to participate. An intentional, non-probabilistic, convenience and volunteer sampling was used (Cohen et al., 2011).

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Measures

Socioeconomic Status. The Family Affluence Scale II was developed in the Health Behaviour in School-Aged Children study (HBSC) to assess family SES. It includes four simple questions: car, van or truck ownership (No = 0; One = 1; Two or more = 3), having one's own bedroom (No = 0; Yes = 1), number of computers, including laptops and tables, but no video game consoles and smartphones (None = 0; One = 1; Two = 2; Three or more = 3) and family holidays abroad in the past year (Never = 0; Once = 1; Twice = 2; Three or more times = 3). Participants' scores are added and results are categorized in three levels: low=0-3, medium= 4-6, high= 7-9). In 2014, the scale was updated and two questions were added (Currie et al., 2014): dishwasher ownership (No = 0; Yes = 2) and number of bathrooms, considering this as a room with bath/shower or both (None = 0; One = 1; Two = 2; Three or more =3). Consequently, new cut-off levels were established: low = 0–6; medium = 7–9, high = 10–13). The Family Affluence Scale with the six-question format has been validated in different European countries (Torsheim et al., 2016).

Body Image Discrepancy. To assess the perceptive component of the BMI, the Figure Rating Sale (Stunkard, Sorenson & Schlusinger, 1983), adapted for Spanish contexts by Marrodán et al. (2008) was used. It includes nine adult male/female silhouettes with their corresponding BMI increasing in size from very thin (number one) to very heavy (number nine). The variable *Perceived body image* is obtained when the participant is asked: "choose the figure that reflects how you think you actually look", while the variable *Ideal body image* is obtained when the participant is asked: "choose the silhouette that best shows how you would like to look". Comparing both answers a third variable can be developed: *Body image discrepancy.* If the result is 0, the individual is satisfied with his/her body and image. As the result moves away from 0 (positive or negative), body dissatisfaction is bigger. This procedure has been used in previous studies (Paans, Bot, Brouwer, Visser & Penninx, 2018). The Figure Rating Scale has showed adequate psychometric properties and it is considered a reliable tool to assess BMI, both in males and females (Bulik et al., 2001).

Body Mass Index (BMI). Participants' anthropometric measures were obtained during the physical education class, following recommendations of the Spanish Federation of Sports Medicine (FEMED, 2014). To assess participants' weight, in kilograms, a digital professional *Tanita RD-545* (Tanita Corporation, Tokyo, Japan) was used (maximum weight 200 kg). It has a precision of 50 grs between 0-100 kg, and 100 grs between 100-200 kg. To assess participants' height, a portable stadiometer *SECA 213* (SECA Ltd., Hamburg, Germany) was used (range 20-205 cm). It has a precision of ± 1 mm. Participants' height (in meters) and weight (in kilograms) were determined to the nearest second decimal. BMI was calculated based on the weight (kg)/height^2 (m) formula Kg/m^2 (Garrow & Webster, 1985). The cut-off points for the different ages and categories were those established by the IOFT (Cole & Lobstein, 2012).

Sleep activity. Participants wore ActiGraph GT3x accelerometers (ActiGraph^{TM}, Fort Walton Beach, FL, USA) on the waist (right hip) along 7 complete days, except on water activities (bathing, swimming…), but they were asked to move them to the wrist of their non-dominant hand during sleep at night. The use of wrist-accelerometers has showed good correlations with the gold standard measure for sleep: polysomnography (Full et al., 2018). Data were re-integrated in 60-s epoch and scored using the Sadeh algorithm (Sadeh, Sharkey & Carskadon, 1994). Results were analysed using Actilife v.6. (ActiGraph, Pensacola, FL, USA). In the present study, the focus was on sleep efficiency, which has been defined as the total sleep time divided by total time in bed, in % (Tan, Chapman, Cedernaes & Benedict, 2018). Participants were instructed how to complete a sleep diary: they had to mark the time they went to bed and turned the light off to sleep, and the time they got out of bed (Talarico & Janssen 2018). The recorded times for each sleep day were verified by the research team using data obtained through accelerometry, and they were adjusted, when needed, using Actilife software (Borghese, Lin, Chaput & Janssen, 2017). If no movement was recorded during the night, it was assumed that the accelerometer was removed and the data was excluded from analysis (Jensen et al., 2019). Participants who did not complete the sleep diary, cut-off points were manually selected using Actilife:

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when the activity was nearly ceased in the evening, and when there was a noticeable amount of activity in the morning (Jensen et al., 2019). Sleep data were considered valid if daily total sleep period time was ≥160 min/night and >90% estimated wear time (Lin et al., 2018). Only subjects with ≥3 nights, including at least one at the weekend were included in the sample (Chaput et al., 2014).

P*sychological well-being.* The General Health Questionnaire (Goldberg, 1978), validated for Spanish contexts by Lobo & Muñoz (1996), was used to assess participants' mental health. It includes 12 items, which focus on the last weeks of the participants' lives. There are positive questions (i.e., "Have your worries made you lose a lot of sleep?"), whose response range go from "more than usual" to "less than usual", and negative questions (i.e. "Have you lost confidence in yourself?"), with a response range from "not at all" to "much more than usual". Responses were coded using a binary method (0,0,1,1), the best for demographic screening (Tait, Hulse & Robertson, 2002). Scores were added, taking the questionnaire as a sole factor, and the optimal threshold was selected based on the participants' mean score (from 1,85 to 2,7 → ≥3) (Goldberg, Oldehinkel & Ormel, 1998). Cronbach's alpha was 0,74.

Physical Self-concept. The Global Physical Self-Concept subscale of the Self-Concept Questionnaire (CAF; Goñi, Ruiz de Azúa & Rodríguez, 2006) was used. It assesses individuals' feelings on physical traits (i.e., "I do not feel physically comfortable with myself") Participants answered in a 5-point likert scale from one: "totally disagree" to five: "totally agree". Cronbach's alpha was 0,86.

Mediterranean diet. In order to assess participants' adherence to a Mediterranean diet, the Mediterranean Diet Quality Index in children and adolescents (KIDMED; Serra-Majem et al., 2004) was used. It includes 16 yes/no questions: positive responses (i.e., consumption of fish, fruits, vegetables…) adds 1 point (items 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 15), while negative responses (i.e., consumption of fast food, sweets...) take away 1 point (items 6, 12, 14, 16). The final score provides a KIDMED index and the following categories: optimal adherence to the Mediterranean Diet (≥8); average adherence to the Mediterranean Diet, improvements are needed (4-7); very low diet quality (0-3). It is the most widely used instrument to assess children and adolescents' adherence to a Mediterranean diet (Idelson, Scalfi, & Valerio, 2017).

Statistical analyses

Data analysis was conducted using IBM SPSS Statistics 22 (IBM Corp., Armonk, NY, USA). Descriptive statistics, independent Student´s t-test, Pearson correlations and two-way ANOVA were performed. Finally, linear stepwise regressions were used to explore the predictive power of the different variables under study regarding discrepancy of body image, perceived body image and ideal body image.

RESULTS

Table 1 shows descriptive results. The majority of participants showed medium SES, adequate BMI and optimal Mediterranean diet quality. Regarding sleep, most went to bed before midnight (24 hours), sleep more than 8 hours per day, and their sleep efficiency was above 92%. One quarter of participants showed signs of psychological disorders.

Table 1. Descriptive results.

	Mean	SD
Sleep		
Hour: minute (going to sleep)	23:25	:50
Hour: minute (wake up)	8:12	:29
Hour: minute (time in bed)	8:50	:42
Hour: minute (time sleeping)	8:11	:41
	Percentage	SD
Sleep efficiency	92,91	4
	Frequency (n)	Percentage
IMC		
Underweight	9	3,7
Healthy weight	151	61,4
Overweight	64	26,0
Obese	22	8,9
SES		
Low	59	24,4
Medium	117	48,3
High	66	27,3
Mediterranean diet		
Low	16	6,6
Medium	94	38,8
Optimum	132	54,6
Psychological well-being		
Adequate	178	73
Psychological disorder	66	27

Note: Data from 4 participants in SES, Mediterranean diet and Psychological well-being were missed

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There was a medium correlation between perceived and ideal body image: r = 0,37, p <0,01. Mean body image discrepancy (perceived - ideal) was 0,64 (SD = 1,17, min - max = -2 - 5), which suggested that most participants wanted a thinner figure. Approximately 15% (n = 31) chose a larger figure than the perceived one, 32,1% (n = 79) chose a similar or equal ideal figure (the same figure as the perceived one), while the majority (52,1%; n = 125) chose an ideal figure thinner than the perceived one. Around 24,36% (n = 57) had a discrepancy score superior to one (n = 6, missing data).

Figure 1 shows responses regarding perceived (actual) body image (ABI) and ideal body image (IBI). 1 corresponds to the thinnest figure and 7 to the most voluminous.

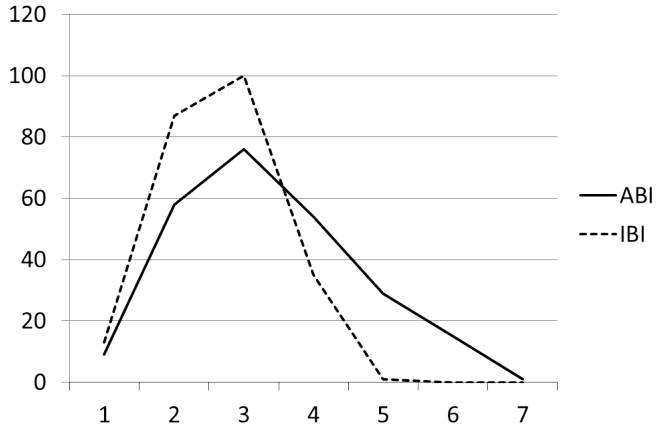

Figure 1. Discrepancy between perceived and ideal figure.

Relationships between body image and other variables

Body image discrepancy did not vary depending on SES: F (2, 231) = 0,40, p = 0,669 or Mediterranean diet: F (2, 231) = 0,28, p = 0,962. As shown in Table 2, perceived body image and body image discrepancy were moderately and positively correlated with BMI: r = 0,74, p <0,01 and BMI-P: r = 0,66, p <0,01, while ideal body image was weak and positively correlated with real BMI: r = 0,23, p <0,01 and BMI-P r = 0,22, p = 0,0001. Body image Discrepancy differed significantly according to BMI: F (3, 236) = 5.45, p <0,01. The overweight group had higher body image discrepancy scores (M = 1,76, SD = 1,22) in comparison to subjects with normal weight (M = 0,20, SD = 0,97, p <0,01). Results of the two-way ANOVA showed a significant effect of gender interaction in body image discrepancy: F (2,233) = 3,19, p <0,05). Girls showed more body image discrepancy than boys.

Negative relationships were observed between sleep efficiency and perceived body image, as well as between sleep efficiency and body image discrepancy. High scores of both perceived body image and body image discrepancy were related to reduced sleep efficiency. Finally, inverse relationships were also observed between body image discrepancy and general physical self-concept: r = -0,47, p <0,01, and psychological well-being: r = 0,31, p <0,01 (considering that high scores on the latter indicated low levels of psychological well-being).

Regression analysis

Stepwise regression analyses were conducted using body image discrepancy, perceived body image and ideal body image as dependent variables (Table 3). In step 1, those who had the lowest predictive value were included: sex, age, SES, Mediterranean diet and sleep efficiency. In step 2 the ones that should show greater influence, general physical self-concept, psychological well-being and BMI, were added. Results in step 1 indicated that sleep efficiency predicted both perceived body image and body image discrepancy, while sex predicted ideal body image. In step 2, the variable that showed the greatest predictive value in all cases was BMI. Regarding body image discrepancy, BMI, psychological well-being and physical self-concept worked as predictive variables. In other words, those who showed greater discrepancy between perceived and ideal body image showed lower levels of physical self-concept and psychological well-being (variable with inverted measurement). Finally, regarding perceived body image, the only three variables that showed predictive value in step 2 were sex (men identified themselves with a larger silhouette than women did), physical self-concept that was negatively related to the size of the silhouette, and BMI that was positively related.

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Table 2. Inter-correlations between variables

	1	2	3	4	5	6	7	8
1. Perceived body image	1							
2. Ideal body image	0,37**	1						
3. Body image discrepancy	0,76**	-0,25**	1					
4. BMI	0,74**	0,23**	0,61**	1				
5. Mediterranean diet	-0,09	0,02	-0,09	-0,07	1			
6. Psychological well-being	0,25**	-0,078	0,31**	0,13*	-0,25**	1		
7. Physical self-concept	-0,42**	0,040	-0,47**	-0,33**	0,34**	-0,48**	1	
8. Sleep efficiency	-0,20**	-0,07	-0,15*	-0,20**	-0,02	0,04	0,13	1
9. SES	-0,08	0,05	-0,14*	-0,03	0,28**	-0,09	0,17**	-0,09

*Note: BMI= Body Mass Index, SES= Socio-economic Status; * p<0,05; **p<0,01*

Table 3. Hierarchical linear regression of correlates of body image discrepancy, perceived body image and ideal body image.

	Body image discrepancy				Perceived body image				Ideal body image			
	B (95% CI)	SE	*p-value*	R^2	*B* (95% CI)	SE	*p-value*	R^2	*B* (95% CI)	SE	*p-value*	R^2
Step 1				0,27				0,25				0,24
Sex	0,12 (-0,03, 0.61)	0,16	0,076		-0,02 (-0,39, 0,31)	0,18	0,818		-0,22 (-0,69, -0,15)	0,14	0,002	
Age	0,13 (-0,26, 0,61)	0,16	0,072		0,08 (-0,15, 0,54)	0,18	0,271		0,02 (-0,23. 0,30)	0,13	0,789	
SES	-0,13 (-0,14, 0,01)	0,04	0,078		-0,07 (-0,12, 0,04)	0,04	0,342		0,02 (-0,06, 0,07)	0,03	0,810	
Mediterranean diet	-0,01 (-0,08, 0,07)	0,04	0,886		-0,03 (-0,10, 0,07)	0,04	0,736		0,05 (-0,04, 0,09)	0,03	0,455	
Sleep efficiency	-0,18 (-0,09, -0,12)	0,02	0,011		-0,22 (-0,11, -0,02)	0,02	0,003		-0,04 (-0,04, 0,03)	0,02	0,586	
Step 2				0,68				0,78				0,37
Sex	0,01 (-0,22, 0,28)	0,13	0,811		-0,14(-0,59, -0,12)	0,12	0,003		-0,24 (-0,73, -0,20)	0,13	0,001	
Age	0,04 (-0,16, 0,33)	0,13	0,504		-0,02 (-0,27, 0,18)	0,12	0,688		0,00 (-0,26. 0,26)	0,13	0,999	
SES	-0,07 (-0,09, 0,02)	0,03	0,245		-0,01 (-0,06, 0,05)	0,03	0,781		0,03 (-0,05, 0,07)	0,03	0,695	
Mediterranean diet	-0,07 (-0,03, 0,10)	0,03	0,251		0,03 (-0,04, 0,72)	0,03	0,611		0,02 (-0,06, 0,07)	0,03	0,827	
Sleep efficiency	-0,02 (-0,04, -0,27)	0,02	0,728		-0,03 (-0,04, -0,22)	0,02	0,606		0,02 (-0,03, 0,04)	0,02	0,735	
Physical self-concept	-0,20 (-0,045, -0,09)	0,09	0,003		-0,12 (-0,34, -0,01)	0,08	0,036		0,07 (-0,11, 0,26)	0,10	0,431	
PWB	0,14 (0,01, 0,15)	0,04	0,024		0,10 (-0,01, 0,13)	0,03	0,053		-0,06 (-0,10. 0,05)	0,04	0,488	
BMI	0,53 (0,12, 0,19)	0,02	0,00		0,71 (0,20, 0,26)	0,02	0,000		0,30 (0,04, 0,11)	0,02	0,000	

Note. SES= Socio-economic Status; BMI=Body-Mass Index; PWB=Psychological well-being

DISCUSSION

The main goal of the current study was to expand the existing knowledge on adolescents' body image and assess its connections with *health* (BMI, sleep activity), *psychological* (well-being, physical self-concept), and *social* (SES, diet) variables.

Regarding body image, results showed that body image discrepancy exceeded half of the sample: most wanted to be thinner, but also 15% wanted to be larger. Previous studies showed similar results (Cruz-Licea et al., 2018; Lima et al., 2018; Sánchez-Castillo, López-Sánchez, Sgroi & Díaz-Suárez, 2019). Results clearly indicated that body image dissatisfaction has high prevalence among adolescents, which is worrying, considering the consequences that a deficient body image could bring: increased risk of eating disorders, anxiety, depression and low self-esteem (Mantilla, Bergsten & Birgegård, 2014; Striegel-Moore & Franko, 2002).

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Regarding health variables, BMI results showed that the majority of adolescents were within normal limits, but a significant percentage could be considered overweight, including obesity (34.9%). These results were similar to others found in previous studies in Spain (Ministry of Health, Social Services and Equality, 2013; Ortega, 2010). However, differences have been found in different countries: Croatia and Iceland showed better results: 80% normal weight (Peternel & Sujoldžić, 2009; Eidsdóttir, Kristjansson, Sigfusdottir, Garber & Allegrante, 2013), while Mexico: 37,2% overweight (Cruz-Licea, Urbina-Cedillo, Alvear-Galindo, Ortiz-Hernández & Morán-Álvarez, 2018) or Greece: 44,5% overweight (Bacopoulou, Foskolos, Stefanaki, Tsitsami & Vousoura, 2018) showed worse results. Despite differences between countries, data on overweight and obesity adolescents should be taken seriously, because of its consequences on their health: excessive weight has been associated with unbalanced lipid metabolism, type II diabetes, hypertension, orthopedic problems, sleep apnea (Waters et al., 2014; Sugiyama et al., 2007), depressive symptoms, anxiety and eating disorders (Puder & Munsch, 2010). From an economic point of view, excessive weight in children and adolescents entails a huge associated waste on health care (Finkelstein, Graham & Malhotra, 2014). Finally, an overweight adolescent has a high probability of being an overweight adult (Freedman et al., 2009), making things worse.

In this study, overweight and obese individuals had higher body image discrepancy than their normal weight partners, which has also been observed in previous studies (Farah-Wahida, Mohd-Nasir & Hazizi. 2011; Bibiloni, Pich, Pons & Tur, 2013). Furthermore, regression analyses showed that BMI predicted perceived body image, ideal body image and body image discrepancy. Previous research has showed the important role of BMI in body dissatisfaction: Wardle & Cooke's review (2005) showed a clear positive connection between both in males and females; Paxton et al. (2006), monitoring a cohort of 2,516 American adolescents for five years, confirmed the important role of the BMI in body dissatisfaction; finally, recent studies confirmed the same trend (Behdarvandi, Azarbarzin & Baraz, 2017). Coelho, Fonseca, Pinto and Mourão-Carvalhal (2016) found that overweight and obese adolescents were 7 times more likely to suffer from body dissatisfaction compared to their peers with normal weight.

In relation to sleeping habits, most participants went to sleep shortly before 00:00 (around 11:30 p.m.) and slept more than 8 hours, meeting recommendations of the National Sleep Foundation: 8-10 hours (Hirshkowitz et al., 2015). These results are similar to those found in previous studies (Bei, Allen, Nicholas, Dudgeon, Murray & Trinder, 2014; Cabré-Riera et al., 2019). However, Hennig, Krkovic and Lincoln (2017) reported that the adolescents they assessed went to sleep earlier: around 10:00 p.m. These differences could be caused by factors such as number of daylight hours, culture or school schedule. As for sleep efficiency, ratio between effective time spent sleeping and total time spent in bed (Meltzer et al., 2012), high scores were found (92%), which was similar (Master et al., 2019) or even higher than previous studies (Feliciano et al., 2018). Furthermore, sleep efficiency predicted both perceived body image and body image discrepancy. To our knowledge, this is the first study to explore this connection in adolescents using accelerometers to assess sleep behaviour. This finding could be considered noteworthy, because it showed that sleep efficiency it is related about how adolescent´s perceive their body and their satisfaction with it. On this regard, more researches are needed to confirm this connection and to explore its direction.

Regarding psychological variables, results showed that about 25% of adolescents had signs of psychological disorder, which is similar to results obtained in other countries (Moehlecke, Blume, Cureau, Kieling, & Schaan, 2018; Otakpor & Ehimigbai, 2016). The fact that a quarter of the adolescents suffered from one or several psychological problems (i.e., anxiety disorders, depression, stress, low self-esteem) could be considered a wake-up call to continue investigating and develop intervention programs tailored to their needs. The WHO (2019) pointed out the key importance of psychological well-being for the adolescents' physical and psychological health, and into their adulthood.

Correlational analysis also showed that body image discrepancy was significantly and negatively related to physical self-concept. In the adolescence stage, the importance of physical appearance makes physical

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self-concept a key element of general self-concept (Harter, 1998). This inverse relationship has been found in previous studies (Fernández-Bustos, Infantes-Paniagua, Cuevas & Contreras, 2019; Polivy & Herman, 2002). On the other hand, body image discrepancy was positively related to psychological well-being. Previous studies observed the same connection (Moehlecke et al., 2018), which shows how those adolescents most dissatisfied with their body image can develop psychological problems too. This pattern is maintained from the pre-pubertal stage until the end of adolescence (Borges, de Matos & Diniz, 2013).

Regarding social variables like adherence to a Mediterranean diet, a large percentage of participants had optimum adherence (53,7%). Results were similar to previous studies (Ayechu-Díaz & Durá-Travé, 2009; Mariscal-Arcas et al., 2009), or even better (Bibiloni, Pons & Tur, 2016). The Mediterranean diet has been proven to be one of the healthiest and it has been associated to a reduction in cardiovascular and neurodegenerative diseases, type 2 diabetes and certain types of cancer (Sofi et al., 2010), better sleep patterns (Ferranti et al., 2016) and better academic performance (Esteban-Cornejo et al., 2016). In this study, no correlation was found between adherence to the Mediterranean diet and BMI. However, previous results have been contradictory: some found inverse correlations between both variables (Kontogianni et al., 2008; Novak et al., 2017), while others found no significant correlation (Bibiloni, Pons & Tur, 2016). Perhaps, differences came from contextual factors such as participants' SES, cultural food patterns or geographic situation. In this study, participants lived in a city with an important fishing port, which could have influenced their diet, increasing the amount of fresh fish. No connection was found between Mediterranean diet and body image discrepancy. To our knowledge, few studies have explored this connection in adolescents. Nevertheless, body dissatisfaction has been linked to eating disorders (Stice, Marti & Durant, 2011), and adolescents dissatisfied with their body image modified certain dietary behaviours to lose weight (Middleman, Vazquez & Durant, 1998).

On the other hand, results from the present study indicated that body image discrepancy did not change based on family SES. Previous research has been contradictory: Pereira et al. (2009) found that adolescents of high SES were more likely to feel dissatisfied with their body, while Duncan, Al-Nakeeb, Nevill & Jones (2004) did not observe significant differences. In a recent systematic review, Pereira et al. (2011) explained that there is a lack of studies that directly relate these two variables in the adolescent population. In addition, the variety of instruments used to assess both variables it makes comparisons difficult. Cultural differences could be considered a confounding variable in this relationship (O'Dea & Caputi, 2001). Standardized instruments and replicated studies in different countries are necessary to confirm or reject this hypothesis.

Regarding gender, results indicated that men perceived themselves with larger silhouettes and women with thinner. This is in line with the ideal of beauty prevalent in Western culture, where the physically ideal man is an inverted V-shaped body with broad shoulders, well-defined musculature and narrow waist (Gattario, Frisén, & Anderson- Fye, 2014), and the ideal woman must be thin, creating an obsession with thinness, which is what Hesse-Biber (2007) calls "the cult of thinness". However, recent research suggested that this ideal is moving from thinness to a figure that is also muscularly defined (Grogan, 2017). There seems to be a need to explore this new venue to know more about this "new" ideal and its possible causes and consequences. Results from the present study also showed that adolescent women showed greater body image discrepancy than men, which is supported by previous research (Dion et al., 2015). Some authors suggested that gender differences may be caused by the morphological changes of the adolescence period, where women tend to accumulate fat and men muscle mass, strength and motor skills (González-Montero et al., 2010). In parallel, girls tend to be more sensitive to the pressures of significant others (i.e., friends, media) in relation to the ideals of beauty (Eisenberg, Neumark-Sztainer, & Story, 2003). However, recent research showed men to be affected by this problem too (Murray & Lewis, 2014), and some revealed a similar degree of dissatisfaction in both sexes (Cruz-Licea et al., 2018).

The present study has some limitations. First, the cross-sectional nature of the study prevents cause and

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effect conclusions to be drawn. Second, only quantitative research methods were used. It would be interesting to explore in depth the results obtained using qualitative research methods. Third, the generalizability of findings is restricted given the size of the sample and its cultural specific context.

CONCLUSIONS

BMI is a factor closely linked to adolescents' body dissatisfaction. Body image dissatisfaction had high prevalence among adolescents with negative implications on their psychological well-being and physical self-concept. On this regard, educational programs in schools aimed to awareness about body image and advertising, may help to decrease body dissatisfaction among adolescents. Sleep efficiency predicted both perceived body image and body image discrepancy. This matter opens a new line of research that could be interesting to explore in future articles, for example including sleep efficiency in cluster analysis with other health behaviors such us physical activity or screen time. No connection was found between body image discrepancy and SES or Mediterranean diet. Finally, the the high prevalence of psychological disorders among adolescents is a wake-up call for researchers to explore the factors that could be involved.

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