

# ■ Weight bias internalization among adolescents in Spain: psychological correlates across gender diversity and weight status

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## Abstract

Weight bias internalization refers to the negative weight-related attributions applied to oneself, but it does not just occur in the highest weight statuses, but rather exists across the entire weight spectrum. There is a negative impact associated to increase psychological problems in adults, however, it has been less studied among the adolescent Spanish population. In this study, we assess the relationship between the internalization of weight bias, social attitudes towards appearance, body appreciation and self-esteem, and potential differences regarding gender and weight status. A community sample of 1258 Spanish adolescents between 12 and 18 years old (46.3% male gender;  $M_{age} = 15.58$ ;  $SD = 1.59$ ; 49.5% female gender;  $M_{age} = 15.59$ ;  $SD = 1.67$ ; and 4.1% non-binary gender;  $M_{age} = 14.86$ ;  $SD = 2.86$ ) participated in the study. The Modified Weight Bias Internalization Scale (WBIS-M), the Rosenberg Self-Esteem Scale (RSES), and the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-4) were used. ANOVA's test and bivariate correlations were performed. The results suggest that females ( $t = -.55$ ;  $p \leq .001$ ) and non-binary adolescents ( $t = .64$ ;  $p \leq .01$ ) have higher levels of WBIS-M compared to males. Regarding weight status, the group with obesity ( $t = 1.39$ ;  $p \leq .001$ ) and the group with overweight ( $t = -.81$ ;  $p \leq .001$ ) have higher levels of WBIS-M compared to the normal weight group. Significant correlations between WBIS-M and the assessed psychological variables were found in the total sample, and across all-gender and weight categories, except for the underweight group. These results are a first approximation to the internalization of weight bias in a Spanish adolescent sample and highlight the need to introduce this concept in prevention and psychological interventions in school context.

*Keywords: weight bias internalization, self-esteem, body image, adolescence, gender.*

## Resumen

*La internalización de los prejuicios de peso entre los y las adolescentes en España: correlatos psicológicos en función del género y el estatus de peso.* La internalización de los prejuicios de peso hace referencia a las atribuciones negativas relacionadas con el peso aplicadas a uno mismo/a, lo cual no ocurre únicamente en las personas con un estatus de peso elevado, sino en todo el rango de pesos. En adultos, existe evidencia de su impacto negativo asociados a incrementar problemas psicológicos; aunque se ha estudiado en menor medida en la población adolescente. El objetivo de este estudio fue examinar la relación entre la internalización de prejuicios de peso, las actitudes socioculturales hacia la apariencia, la apreciación corporal y el nivel de autoestima, y analizar las posibles diferencias en función del género y del estatus de peso. Participaron 1.258 adolescentes españoles de una muestra comunitaria entre 12 y 18 años (46.3% género masculino;  $M_{edad} = 15.58$ ;  $DT = 1.59$ ; 49,5% género femenino;  $M_{edad} = 15.59$ ;  $DT = 1.67$ ; y 4.1% género no binario;  $Medad = 14.86$ ;  $DT = 2.86$ ). Se utilizaron la escala de internalización de prejuicios de peso modificado (WBIS-M), la escala de autoestima de Rosenberg (RSES) y el cuestionario de actitudes socioculturales hacia la apariencia (SATAQ-4). Se realizó la prueba ANOVA y correlaciones bivariadas. Los resultados sugieren que el grupo identificado con el género femenino ( $t = -.55$ ;  $p \leq .001$ ) y con el no binario ( $t = .64$ ;  $p \leq .01$ ) muestran niveles más altos de internalización del sesgo de peso en comparación con el género masculino. En cuanto al estado ponderal, el grupo con obesidad ( $t = 1.39$ ;  $p \leq .001$ ) y el grupo con sobrepeso ( $t = -.81$ ;  $p \leq .001$ ) presentan niveles más altos de internalización de prejuicios de peso en comparación con el grupo con normopeso. Se encontraron correlaciones significativas entre las puntuaciones del WBIS-M y las variables psicológicas evaluadas en la muestra total y en todas las categorías de género y peso, con la excepción del grupo de bajo peso. Estos resultados son una primera aproximación a la interiorización del estigma del peso en una muestra adolescente española y resalta la necesidad de incluir esta dimensión en la prevención de las alteraciones de la imagen corporal y los problemas psicológicos relacionados con la autoestima entre adolescentes en el contexto escolar.

*Palabras clave: interiorización prejuicios de peso; autoestima; imagen corporal; adolescencia; género.*

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Weight stigma is a widespread issue in Western societies (Puhl et al., 2021) that entails the social devaluation of people because of their weight. This stigma is associated with negative beliefs and prejudices (e.g., laziness, incompetence, or lack of willpower) against those individuals who deviate from the sociocultural standards of thinness, so-called weight bias (WB) (Puhl & Heuer, 2009). The awareness and agreement with these negative weight-related attributions applied to oneself, and subsequent self-devaluation is known as “weight-bias internalization” (WBI) (Puhl et al., 2007).

WBI is influenced by sociocultural pressure toward the prevailing aesthetic ideals in our society (i.e., thin-ideal for females and muscularity for males) (Stewart & Ogden, 2021b). In this regard, people who internalize weight biases and aesthetic ideals are more vulnerable to present body dissatisfaction (Murnen & College, 2019), which is a common risk factor for eating and depressive symptomatology in adolescents (Bornioli et al., 2021; McLean & Paxton, 2019). Accordingly, a recent systematic review (Pearl & Puhl, 2018) states that WBI is consistently related to negative mental health outcomes such as eating disorders and depression, and other psychological issues (e.g., anxiety symptoms, body, and self-esteem). Indeed, it is worth noting that WBI has received considerable research attention due to its greater explanatory power on psychopathology compared to weight-related stigmatizing experiences alone (Latner et al., 2014; Pearl et al., 2015; Pearl & Puhl, 2016).

To date, most of the literature on WBI has focused on adults (Godoy-Izquierdo et al., 2020; Macho et al., 2021). Although research on adolescents is still scarce, the extant literature points out that WBI also occurs during the teen years (Puhl & Himmelstein, 2018), a period of risk due to the salience of body image and engagement with body weight-related messages (Nelson et al., 2018). Moreover, recent evidence on adolescents has reported psychological consequences of WBI similar to those reported in adults (Chen & Ye, 2021; Ciupitu-Plath et al., 2018; Puhl & Himmelstein, 2018; Puhl & Lessard, 2020; Roberto et al., 2012). Further research on the adolescent population is warranted.

Regarding weight status, the studies on WBI have initially focused on individuals with overweight and with obesity (Durso & Latner, 2008; Phelan et al., 2015; Roberto et al., 2012). However, the internalization of weight stigma and its negative impact on mental health have also been found across diverse body sizes (Kurth & Ellert, 2008; Lin et al., 2019; Pearl & Puhl, 2014; Romano et al., 2021). Moreover, while both men and women are vulnerable to WBI, most notably, women seem to report higher levels than men (Andreyeva et al., 2008; Boswell & White, 2015; Pearl et al., 2014; Pearl & Puhl, 2016; Schvey et al., 2011; Schvey et al., 2013). However, the results are not conclusive due to the lack of studies examining gender differences, and limited gender diversity beyond traditional female and male categories (i.e., non-binary gender identity) (Pearl & Puhl, 2018). Concretely, recent studies suggest a great prevalence of social discrimination and WBI in the non-binary population (Mayer et al., 2008; Prunty et al., 2020; Puhl & Lessard, 2020).

Overall, despite the already recognized importance of WBI in the well-being of adolescents, there is a lack of studies on this population. In Spain, to our knowledge, there is a first study carried out with a sample of 298 adolescents aimed at validating the “Weight Bias Internalization” scale (Andres et al., 2022). Thus, the general aim of the current study is to extend the scientific evidence regarding WBI and its psychological impairments among a community sample of Spanish adolescents. Specifically, we aim to explore WBI differences regarding gender and weight status categories and examine the relationship between WBI and psychological-related variables. Based on previous findings, we hypothesized that: (H1) adolescents identified

as female and non-binary gender will show lower levels of WBI than males, (H2) higher levels of WBI will be found in those groups deviated from the standard mean of weight (i.e., underweight, overweight and obesity groups) compared with the group with normal-weight, (H3) WBI will be positively associated with perceived social pressure and appearance ideals internalization, and negatively associated with global self-esteem and body appreciation.

## Methods

### Participants

1258 adolescents aged from 12 to 18 years old ( $M_{age} = 15.56$ ;  $SD_{age} = 1.69$ ) from five secondary schools in Madrid (Spain) participated in the study. Regarding gender, 49.5% identified themselves as female ( $n = 623$ ;  $M_{age} = 15.50$ ;  $SD_{age} = 1.67$ ), 46.3% as male ( $n = 582$ ;  $M_{age} = 15.58$ ;  $SD_{age} = 1.59$ ) and 4.1% as non-binary ( $n = 50$ ;  $M_{age} = 14.86$ ;  $SD_{age} = 2.76$ ). Concerning weight status, participants were classified in four groups according to their weight status: “underweight” (1.4%,  $n = 13$ ); “normal weight” (84.9%,  $n = 788$ ); “overweight” (9.6%,  $n = 89$ ); “obesity” (4.1%,  $n = 38$ ) (See Table 1).

### Instruments

*Sociodemographic data.* Participants provided self-reported data about date of birth, gender, and academic year. The exact age of the participant was calculated from the birth date and the evaluation date.

*Anthropometric data.* Height and weight were self-reported data. Body Mass Index (BMI) was calculated ( $\text{kg}/\text{m}^2$ ), and BMI standard deviations scores (BMI z-scores) were computed by comparing the subject’s BMI with the BMI of the Spanish general population of the same sex and age based on the growth tables of the Orbegozo Foundation (Sobradillo et al., 2004): underweight (z-score < -1), normal weight (z-score [-1]-1), overweight (z-score  $\geq 1$  < 2) and obesity (z-score  $\geq 2$ ). BMI z-score for non-binary gender individuals was not calculated as sex at birth was not collected.

*The Modified Weight Bias Internalization Scale (WBIS-M;* Pearl & Puhl, 2014; Spanish sample validation by Andres et al., 2022) was used to assess self-reported levels of weight bias internalization. The original scale by Pearl & Puhl (2014) was based on the initial 11 items from the WBIS (Durso & Latner, 2008). The Spanish version is composed of 10 items rated on a 7-point Likert scale (1 = Strongly Disagree; 7 = Strongly Agree) (“I am less attractive than most other people because of my weight”; “I don’t feel that I deserve to have a really fulfilling social life, because of my weight”). The score range is 1-7 and higher scores indicate higher internalized weight bias. The instrument has shown good psychometric properties (Cronbach’s  $\alpha = .93$ ), and good reliability in the present study (Cronbach’s  $\alpha = .82$ ).

*The Rosenberg Self-Esteem Scale (RSE;* Rosenberg, 1965; Spanish validation by Martín-Albo et al., 2007) was used to assess self-esteem. This scale is composed of 10 items (“Sometimes I think I’m not good for anything”) with a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). In the Spanish validation, adequate internal consistency of the scale was obtained (Cronbach’s  $\alpha = .85 - .88$ ). In the present study, good reliability was found ( $\alpha = .87$ ).

*The Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-4;* Schaefer et al., 2015; Spanish validation by Llorente et al., 2015) was used to assess the level of approval of Western cultural standards concerning appearance. It has 22 Likert-type items (1 = completely disagree, 5 = completely agree), classified into three sub-

scales measuring perceived social pressure (family, FP; peers, PP; and media, MP), and two subscales of appearance ideals internalization (thinness, TI; and muscular, MI). Higher scores suggest greater acceptance of beauty standards. The Spanish version showed good reliability with an  $\alpha$  between .88 and .97. In this study, Cronbach's  $\alpha$  was .93.

The *Body Appreciation Scale* (BAS; Avalos et al., 2005; Spanish validation by Jáuregui & Bolaños, 2011) was used to assess the acceptance, respect, and care of one's own body. The Spanish-adapted version for adolescents has 13 items on a 5-point Likert scale (1 = never, 5 = always) ("I feel that my body has at least some good qualities"). Higher scores indicate higher levels of body appreciation. The scale showed an adequate internal consistency ( $\alpha = .94$ ).

## Procedure

The study design was cross-sectional. Recruitment was carried out between October 2020 and May 2021 through five secondary schools (public  $n = 1$ ; charter  $n = 2$ ; private  $n = 2$ ) located in the area of Madrid (Spain), using a convenience sampling procedure. After the approval of the centers' management teams, an informative circular was sent to the families and informed consent was collected. Student participation was voluntary and anonymous. Data collection took place during school hours in the presence of a member of the research team. The participants completed a battery of questionnaires through an online survey platform (Qualtrics.com) (it lasted approximately 30 minutes).

Table 3. Descriptive results and differences in sociodemographic, weight status, and psychological variables by gender.

	TOTAL (N=1255) M (SD)	Male n=582 M (SD)	Female n=623 M (SD)	Non-binary n=50 M (SD)	$\chi^2 / t / F$	Post-hoc
Age	15.56 (1.69)	15.58 (1.59)	15.59 (1.67)	14.86 (2.76)	$F = 4.45^{**}$	Male=Fem.>NB
BMI (kg/m <sup>2</sup> )	20.63 (3.88)	21.04 (4.25)	20.37 (3.33)	18.53 (2.67)	$F = 8.49^*$	Male>Fem.>NB
z-BMI score	-.06 (1.25)	-.046 (1.33)	-.08 (1.18)	---		
	%	%	%	%	$\chi^2 / t / F$	Post-hoc
Weight Status						
Underweight (<5 <sup>th</sup> percentile)	1.40	1.50	1.30			
Normal weight (5 <sup>th</sup> to 85 <sup>th</sup> )	84.90	83.60	86.10	100		
With overweight (85 <sup>th</sup> to 95 <sup>th</sup> )	7.10	10.10	9.20			
With obesity (>95 <sup>th</sup> percentile)	3	4.70	3.5			
WBIS	2.48 (1.51)	2.18 (1.34)	2.74 (1.59)	2.82 (1.77)	$F = 21.3^{***}$	Male<Fem.=NB
RSES	25.65 (6,3)	31.12 (5.84)	28.55 (6.28)	26.57 (7.59)	$F = 32.91^{***}$	NB<Fem.<Male
SATAQ						
Muscular Internalization	13.79 (4.93)	14.5 (5.11)	12.66 (4.51)	12.31 (5.64)	$F = 22.97^{***}$	Male>Fem.=NB
Thin Internalization	14.44 (5.47)	13.06 (4.97)	15.80 (5.54)	13.49 (6.15)	$F = 40.42^{***}$	Fem.>Male=NB
Familiar Pressure	8.71 (4.08)	8.46 (3.78)	8.92 (4.3)	9.14 (5.46)	$F = 2.18$	
Peers Pressure	7.12 (3.7)	6.93 (3.64)	7.21 (3.62)	8.23 (4.86)	$F = 3.28^*$	NB>Fem.>Male
Media Pressure	9.21 (5.29)	7.28 (4.31)	10.97 (5.51)	9.39 (5.23)	$F = 81.84^{***}$	Fem.>NB>Male
BAS	49.54 (12.27)	52.6 (11.36)	47.04 (11.96)	45.72 (17.16)	$F = 34.67^{***}$	Male>Fem.=NB

Note: Abbreviations: M= Mean, SD= Standard deviation, BMI= Body Mass Index, WBIS= Weight Bias Internalization Scale, RSE= Rosenberg Self-Esteem Scale, SATAQ= Sociocultural Attitudes Towards Appearance Questionnaire, BAS= Body Appreciation Scale. Significance= \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ; "—" indicates that information was not collected.

Table 2. WBI score differences by gender and weight status.

	WBIS-M (Total N=1255)		
	M (SD)	F, overall p value	Post-hoc
Gender (n=1196)	2.48 (1.51)	$F (2.12) = 21.3$ , $p \leq .001$	NB=Fem.>Male Male-Fem.: $t = -.55$ , $p \leq .001$ , CI: $-.76$ -- $-.35$ NB-Male: $t = .64$ , $p \leq .010$ , CI: $-2.02$ -- $-.07$
Male (n=552)	2.18 (1.34)		
Female (n=595)	2.73 (1.59)		
Non-binary (n=49)	2.82 (1.77)		
Weight status (n=876)		$F (3.87) = 17.6$ , $p \leq .001$	OB=OW>NW, UW NW-OW: $t = -.81$ ; $p \leq .001$ ; CI: $-1.24$ -- $-.37$ NW-OB: $t = 1.39$ ; $p \leq .001$ ; $-2.02$ -- $-.75$
Underweight (n=12)	3.05 (2.12)		
Normal weight (n=744)	2.32 (1.43)		
With overweight (n=83)	3.14 (1.52)		
With obesity (n=37)	3.71 (1.78)		

Note: Pairwise comparisons were performed using the Dunnett's test when the assumption of equal variances was violated, Tukey's HSD test when the assumption was not violated. All pairwise comparisons listed were significant at least at  $p < .05$ .

C.I. = Confidence Interval. Abbreviations: M= Mean, SD= Standard deviation, M: male, Fem: female, N-b: non-binary. UW: underweight, NW: normal weight, OW: with overweight, OB: with obesity. Underweight: z-BMI P<5th, Normal weight: z-BMI P5th to 85th, With overweight: z-BMI P85th to 95th, With obesity: z-BMI P>95th

## Statistical analysis

Descriptive analyses (means, standard deviations, or percentages) were used to explore data in the total sample. ANOVA's test was performed to study differences by gender and by weight status in the variables studied. z-BMI data was missing in participants who did not report anthropometric data ( $n = 303$ ), and in non-binary/another gender group ( $n = 50$ ), because of the need-to-know participants' sex assigned at birth to be calculated. The Spearman bivariate correlation ( $\rho$ ) was used to analyze the correlations between several psychological correlates: weight bias internalization, self-esteem, attitudes towards appearance, and body appreciation. Spearman correlation ranges go from -1 to 1, being considered as "very weak" (00 - .19); "weak" (.20 - .39); "moderate" (.40 - .59); "strong" (.60 - .79); "very strong" (.80 - 1.00) (Akoglu, 2018). The subgroup analyses will be conducted separated by gender and by weight status.  $P$ -values were two-sided and statistical significance was set at  $p < .05$ . For statistical analysis, we used SPSS (Statistical Package for the Social Sciences, Version 25) for Mac.

## Results

Descriptive analyses of weight bias internalization and differences between groups.

Descriptive analysis for Weight Bias Internalization (WBI) levels for the total sample, gender, and weight status categories are described in Table 2. The mean score of WBI for the total sample was 2.48 ( $SD = 1.51$ ). Statistically significant differences were found in WBI levels as a function of gender [ $F(2,12) = 21.30; p = .001$ ]. Concretely, the female group reported a mean of 2.74 ( $SD = 1.34$ ),  $M = 2.18$  ( $SD = 1.59$ ) for the male group, and  $M = 2.82$ ,  $SD = 1.77$  for the non-binary gender group. Post-hoc analyses suggest differences between adolescents identified as non-binary group and male group ( $t = .64; p = .01$ ) (Table 1). Regarding weight status, the mean WBI score was 3.05 ( $SD = 2.12$ ) in the group of adolescents with underweight,  $M = 2.33$  ( $SD = 1.43$ ) in the "normal weight" group,  $M = 3.13$  ( $SD = 1.52$ ) in the "overweight" and  $M = 3.71$  ( $SD = 1.78$ ) in the group of adolescents with obesity. Differences between groups were statistically significant ( $F = 17.62; p = .001$ ). Post-hoc analyses revealed differences in levels of internalized weight bias between adolescents with overweight and normal weight, with a higher mean for the overweight group ( $t = .81; p = .001$ ). In addition, the adolescents with obesity showed a higher mean of WBI compared to those adolescents classified in the "normal weight group" ( $t = 1.39; p = .001$ ).

Spearman correlations between WBIS and body-related variables.

Considering the total sample, significant Spearman positive correlations ( $p < .001$ ) of a moderate to high strength, were found for WBI with attitudes towards appearance (SATAQ-4 subscales:  $MI\rho = .20$ ;  $TI\rho = .51$ ;  $PP\rho = -.43$ ;  $FP\rho = .41$ ; and  $MP\rho = -.48$ ). Moreover, significant negative correlations ( $p < .001$ ) were found between WBI and self-esteem ( $RSES\rho = -.51$ ) and appreciation of one's own body ( $BAS\rho = -.63$ ) (see Table 3).

For the male group, the strongest association found in WBIS was an inverse correlation with the appreciation of own body ( $BAS\rho = -.54; p < .001$ ), and a direct correlation with the Familiar Pressure ( $SATAQ-FPP\rho = .42; p < .001$ ). In the female group, direct correlations were found between attitudes towards appearance (SATAQ-4 subscales) and WBI scores. A strong negative correlation between WBI and level of self-esteem ( $RSES\rho = -.56; p < .001$ ) was found.

The female group showed higher correlations of the WBIS with

Table 3. Spearman correlations between the Spanish WBIS-M and psychological-related variables for the total sample and by gender.

	WBIS-M Total sample (n=1196)	WBIS-M Male (n=552)	WBIS-M Female (n=623)	WBIS-M Non- binary (n=49)
RSE-Self-esteem	-.51**	-.43***	-.56**	-.32*
BAS-Body appreciation	-.63**	-.54***	-.69***	-.49***
<i>Beauty standards concerns</i>				
SATAQ-MI	.20***	.14***	.32***	.33*
SATAQ-TI	.51***	.34***	.63***	.35*
SATAQ-PP	.43***	.40***	.46***	.27
SATAQ-FM	.41***	.42***	.39***	.47***
SATAQ-MP	.48***	.39***	.51***	.39**
z-BMI-scores	.27***	.26***	.28***	---

Note: Significance: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ . BAS: Body Appreciation Scale, RSE: Rosenberg Self-esteem Scale; SATAQ: Sociocultural Attitudes Towards Appearance Questionnaire; MI: Muscular Internalization; TI: Thin Internalization; PP: Peers pressure; FM: Family Pressure; MP: Media Pressure; z-BMI: Body Mass Index z-scores. "---" = data not collected.

the rest of the scales, compared with the other two groups. For non-binary gender participants, significant positive correlations were found between WBIS and SATAQ-4 subscales ( $MI\rho = .33, p = .022$ ;  $TI\rho = .35, p = .013$ ;  $FP\rho = .47, p = .001$ ; and  $MP\rho = .39; p = .006$ ). The only subscale of SATAQ-4 that was not significant was "Peers Pressure" ( $PP\rho = .27; p = .057$ ). On the other hand, inverse correlations between WBIS and appreciation of one's own body ( $BAS\rho = -.49; p < .001$ ) and self-esteem ( $RSES\rho = -.32; p < .024$ ) were found (see Table).

Table 4. Correlations between the Spanish WBIS-M and the other psychological-related variables by weight status.

Total Group (n=876)				
	WBIS-M Obesity (n=37)	WBIS-M Overweight (n=83)	WBIS-M Normal weight (n=744)	WBIS-M Underweight (n=12)
RSE-Self-esteem	-.49**	-.58***	-.54***	-.52
BAS-Body appreciation	-.78**	-.68**	-.66**	-.74**
<i>Beauty standards concerns</i>				
SATAQ-MI	-.01*	.33**	.18***	.33
SATAQ-TI	.68**	.68***	.49***	.55
SATAQ-PP	.47**	.54***	.41**	.47
SATAQ-FM	.52**	.52***	.36***	.35
SATAQ-MP	.53***	.51***	.48***	.36

Note: Significance: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ . BAS: Body Appreciation Scale, RSE: Rosenberg Self-esteem Scale; SATAQ: Sociocultural Attitudes Towards Appearance Questionnaire; MI: Muscular Internalization; TI: Thin Internalization; PP: Peers pressure; FM: Family Pressure; MP: Media Pressure; z-BMI: Body Mass Index z-scores.

In table 4 correlations between WBIS and body-related scales across weight status categories are shown. For those participants in the underweight group, just a significant inverse correlation between WBIS and the appearance of one's own body was found ( $BAS\rho = -.74; p < .006$ ). For those participants in the range of normal weight, all the correlations were strong between -.63 to .49. The strongest direct relationship was between WBIS and SATAQ-4 Thin Internalization subscale ( $TI\rho = .49; p = .001$ ), while inversely, the strongest relationship was with body appreciation ( $BAS\rho = -.63; p < .001$ ). Every WBIS correlation with the other proposed scales was significant (see table 3).

Participants with overweight showed moderate and high direct correlations of WBIS with each SATAQ-4 subscale. Inverse and strong correlations were shown between WBIS and self-esteem ( $RSESp = -.58; p < .001$ ) and appreciation of one's own body ( $BASp = -.68; p < .001$ ). Adolescents with obesity showed strong associations of WBIS with the body related scales, being the strongest direct correlation with SATAQ-4 Thin Internalization subscale ( $TIp = .71; p < .001$ ) and the strongest inverse correlation with body appreciation ( $BASp = -.78; p < .001$ ). Differences were only observed in the muscular subscale in the participants "with obesity" group, in which no significant correlations were found (see Table 1 to consult the means, SD, and differences between groups in all the psychological variables).

## Discussion

The current study provides novel insights into the scant evidence on WBI in the Spanish adolescent population, identifying WBI differences by gender and weight status, and addressing WBI psychological correlates.

Regarding gender-related differences, our findings support the first hypothesis. Both female and non-binary groups obtained significantly higher levels of WBI compared to the male group. Our results follow previous literature (Boswell & White, 2015; Ciupitu-Plath et al., 2018; Mayer et al., 2008; Prunty et al., 2020; Puhl & Lessard, 2020). Several reasons may explain WBI differences in the female and male gender. On the one hand, the sociocultural pressure to comply with aesthetic canons is higher in women than men, further pointing out that this aesthetic ideal seeks a low weight in women, while for men it focuses on muscularity (Schaefer et al., 2019). In addition, women attach too much value and judgment to body size and weight, being more likely to compare with others on the basis of physical appearance (Haferkamp & Krämer, 2011; Ratcliffe & Ellison, 2015). Overall, women's self-worth is largely weight-based (Stefanone et al., 2011). Most of the studies do not include gender diversity and only compare female and male genders (Pearl & Puhl, 2018). Considering that body image (which includes both weight and appearance) takes a central role in identity formation during adolescence (Nelson et al., 2018), and the experience of body image differs based on gender identities (Grogan, 2021), we would hypothesize that this might partly explain a higher WBI in non-binary gender individuals, who do not sit comfortably with 'man' or 'woman' related identities and may place a high focus on body image, a multidimensional construct that involves thoughts, feelings and perceptions about the body, as prior research has shown (Burnette et al., 2019; Jones et al., 2016; Murray et al., 2013; Tabaac et al., 2018; VanKim et al., 2016; Vocks et al., 2009). Further research is required to understand the role of weight bias internalization among non-binary adolescents.

The results of the present study provide evidence in favor of our second hypothesis related to WBI differences between weight-status categories. Specifically, the obesity group obtained the highest scores of internalized weight bias, followed by the groups with overweight, underweight, and normal-weight. This "U-shaped" pattern of weight stigma at the lowest and highest BMIs has been found in a previous study (Pearl & Puhl, 2014). Moreover, significant differences were found between the group with normal weight, and the groups with overweight and obesity. As prior studies (Kurth & Ellert, 2008; Lin et al., 2019; Pearl & Puhl, 2014; Romano et al., 2021), our findings support that WBI is present throughout the weight status spectrum and higher z-BMIs place a higher vulnerability to WBI. This is reasonable considering that adolescents with overweight and with obesity are

particularly likely to be exposed to weight discrimination and weight bias experiences (Bucchianeri et al., 2013; Puhl et al., 2013).

In relation to the third hypothesis, we found that higher levels of WBI correlate with higher levels of sociocultural pressure and internalization of beauty standards (thinness and muscularity). These results agree with previous comprehensive theoretical models that have pointed out the internalization of societal body ideals and appearance-related pressures as relevant contributors to the greater internalization of weight bias (Lee et al., 2019; Stewart & Ogden, 2021a). Moreover, negative correlations between WBI and self-esteem and body appreciation were consistently found in the total sample, across all-gender identities, and almost all weight categories with the exception of the group with underweight. This suggests the significance of WBI in relation to global self-esteem and body appreciation, which are protective factors of major psychopathology (e.g., eating disorders and depression) (Almutairi et al., 2021; Hayward et al., 2018; Marshall et al., 2020; Walsh et al., 2018; Zeigler-Hill, 2011) which has been associated with WBI in prior research (Bidstrup et al., 2022; Chen & Gonzales, 2022; Gmeiner & Warschburger, 2022; Withnell, 2021).

Overall, our study provides new data on WBI by including variables that could potentially account for its relationship with psychopathology and constitute the first approach for future studies involving adolescent populations. After puberty, girls are more likely to develop depressive and eating disordered symptoms compared to boys (Pace & Muzi, 2019; Stumper & Alloy, 2021); and some studies suggest that sexual and gender minority groups experience a higher risk of disordered eating and depression compared to the heterosexual and cis-gender (i.e., gender identity correspondence with the birth sex) population (Thorne et al., 2018; Parker & Harriger, 2020; Gordon et al., 2021). Further research is encouraged to assess the role of weight bias internalization as a predictor of eating symptomatology and depression and gender-related differences.

This study is not exempt from limitations. Given the cross-sectional nature of the study, causality could not be assessed. Moreover, the sample was chosen for convenience, consequently, the characteristics of the secondary schools may bias the results of the study. Although the overall sample size is adequate, certain sub-groups by gender and weight status are small (non-binary gender, underweight, overweight, and obese), which limits the statistical feasibility to compare sub-samples, therefore, conclusions must be drawn with caution. Another possible explanation for the underrepresentation of overweight and obesity categories may be related to the bias of using self-reported measures for height and weight, despite being a valid cost-effective alternative (Ekström et al., 2015; Sherry et al., 2007).

By contrast, this is a pioneering study regarding WBI among Spanish adolescents. Furthermore, one of the main strengths of the present study is the assessment of non-binary adolescents, which improves the ability to generalize findings to broader gender groups. Moreover, these findings have important clinical and research implications. The internalization of weight bias is a potential risk factor that should be addressed in prevention and intervention strategies carried out by healthcare providers and teachers. Since the internalization of weight bias is related to body appreciation and general self-esteem, regardless of gender or weight status, it seems appropriate to carry out preventive efforts in community samples, and not only in the population with overweight and obesity. In addition, such interventions should especially be carried out during preadolescence and adolescence, given the increased risk during these stages. Moreover,

at the research level, future studies should include WBI as a variable in predictive models of general psychopathology to understand the mediating or moderating role it may play in the development of psychological problems (Christian et al., 2020; Levine, 2022; Schaumberg et al., 2019; Trompeter et al., 2019).

## Acknowledgements

We would like to thank the team of psychologists that collaborated with the ANOBAS research group ([www.anobas.es](http://www.anobas.es)): S. Rodríguez; A. Cataño; E. Mercado, for their help in recruiting the sample and C. Del Blanco for helping with data encoding. The authors would like to thank the schools (Colegio IDEO, IES Ramiro de Maeztu, Colegio BRAINS Madrid, Colegio Salesianos Atocha, Nuestra Señora de Loreto) for their participation in this research, both the management team, teachers, and students.

## Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## Conflicts of interest

The authors have no conflict of interest

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