

The relationship between weight bias internalization and psychological distress and health behaviors among obese high school students in Maha Sarakham Province, Thailand

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ABSTRACT

Adolescents with obesity are vulnerable to weight bias internalization (WBI) and may face its psychological and behavioral health consequences. However, little is known about WBI and its effects on psychological distress and poor health behaviors among obese Thai students. Thus, this study aimed to examine the association of WBI with psychological distress and health behaviors among obese Thai high school students. A cross-sectional study was carried out from August 2023 to March 2024 among 785 obese high school students in Mahasarakham, Thailand, with a multistage sampling method. The data were collected using a self-administered questionnaire. Hierarchical linear regression analyses and multiple logistic regression analyses were used to examine the association of WBI with psychological distress and health behaviors. Most students were girls (47.1%), with a mean age of 14.7 years (SD = 1.2) and a mean body mass index of 29.8 kg/m² (SD = 1.6). The mean WBI, depression, and self-esteem scores were 38.9 (SD = 8.4), 20.1 (SD = 4.5), and 25.0 (SD = 5.0), respectively. Most participants reported unhealthy eating habits (52.2%) and inadequate physical activity (51.3%). WBI was associated with severe depressive symptoms ($\beta = 0.292$; $P < 0.01$), low self-esteem ($\beta = -0.221$; $P < 0.01$), unhealthy eating behaviors (adjusted OR = 1.15; 95% CI: 1.13, 1.18), and inadequate physical activity (adjusted OR = 1.14; 95% CI: 1.12, 1.17). WBI was associated with adverse psychological and behavioral health among these obese students. Thus, future interventions to prevent or reduce WBI are needed, such as individual- or school-based interventions or school anti-stigma campaign strategies.

Keywords:

weight bias internalization, depression, self-esteem, health behaviors, obese

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INTRODUCTION

Obesity in adolescents is a crucial global public health issue. The World Health Organization (WHO) reported that the prevalence of obesity among children and adolescents had risen from 2% in 1990 to over 8% in 2022.¹ In Thailand, between 2014 and 2020, the prevalence of children and adolescents who are obese has increased from 25.3 to 33.9% in girls and 25.5 to 31.6% in boys.² Adolescents with obesity have a high risk of obesity-related societal bias and weight bias internalization (WBI).³ WBI occurs when individuals accept negative weight-related stigma and stereotypes.⁴ For adolescents, these often manifest as weight-based teasing, bullying, and victimization by peers and family members.^{3,5} WBI has been associated with health-related outcomes, including psychological health outcomes (e.g., depression, low self-esteem) and health behaviors (e.g., eating disorders, poor diet, low physical activity, and less motivation to exercise).^{4,6}

WBI may be important to understand in adolescents. The heightened focus on physical appearance, exposure to weight-related messages, and desire for peer acceptance during this developmental period may make them susceptible to WBI.^{3,5} In particular, adolescents with obesity are more vulnerable to weight-based victimization and WBI. Hence, obese adolescents who experience WBI face societal devaluation and negative stereotypes and may encounter negative effects including weight-related health problems.^{4,7}

In Thailand, previous studies have shown that approximately 30.8% of high school students experienced cyberbullying about their weight, and 37.8% of adolescents with overweight or obesity exhibited higher levels of WBI^{8,9} and psychological distress (e.g., depression, low self-esteem) compared to

their non-overweight peers.¹⁰ These findings suggest that obese Thai adolescents may experience WBI, which negatively impacts their psychological and behavioral health. Thus, further examining WBI and its effects on this population is critical.^{8,9}

The relationships between WBI, psychological distress, eating behaviors, and physical activity have been reported in other countries.^{4,7,11,12} For example, a study conducted in the USA^{4,7}, UK^{11,12}, Australia^{4,12}, Canada^{4,12}, and Germany^{4,7,12} have shown that high WBI is associated with depressive symptoms, low self-esteem, unhealthy dietary habits, and reduced physical activity. Similarly, studies in China¹² and Iran^{11,12} have suggested that higher WBI may be linked to lower levels of physical activity and poorer dietary habits. However, the evidence regarding WBI consequences among obese adolescents is influenced by cultural contexts, such as cultural differences in attitudes and stigma toward obesity and social expectations for body appearance.⁴ Given the cultural context differences, more research is needed to explore this issue in Thailand. Additionally, research on the impacts of WBI on psychological distress and health behaviors among Thai obese high school students remains limited.^{8,9} Therefore, this study aimed to examine the association of WBI with psychological distress and health behaviors. This may be useful to identify individuals at risk of WBI and provide a better understanding of its impacts on psychological and behavioral health.

METHODS

Study design and settings

This cross-sectional study was conducted from August 2023 to March 2024 at ten high schools in Mahasarakham Province, Thailand.

Study participants

Eligible participants were (1) high school students aged 13-18 years with obesity as classified by body mass index (BMI) for age according to WHO cut-offs,¹³ (2) with no reported communication or mental health problems, and (3) who were willing to participate. Individuals who provided incomplete responses were excluded. The sample size estimation was calculated using Cochran's formula¹⁴ with the percentage of high school students experiencing weight stigma (30.8%) reported by Thumronglaohapun et al.,⁸ considering 95% confidence intervals and a precision of 3%. The minimum sample size was 667 students, plus an additional 15% for nonresponse adjustment: the total sample size was 785 students. The multistage sampling method was used to select eligible students. First, the high schools in Mahasarakham Province were categorized into four sizes (extra-large, large, medium, and small) according to the number of students. The researcher used the lottery method to select 10 high schools in proportion to the size of all 35 high schools. Second, six classrooms from each high school were randomly selected from a list. Third, students within each selected school who met the inclusion criteria were chosen using computer-generated random numbers. If a student was absent or unwilling to participate, the next student on the list was contacted for participation.

Instruments

A self-administered questionnaire was developed based on the literature review and consisted of three parts.

Predictor variables

Part 1: Socio-demographic factors included age, gender, and BMI (weight [kg]/height [m²]). Portable meters were used to measure the students' height and weight. The standard deviation (SD) score (BMI Z-

score) was derived using the age- and sex-specific BMI for WHO reference (2007) for children aged 5-19 years.¹³ BMI for age was classified as obese (BMI Z-score of >2 SD). WBI was assessed using the Weight Bias Internalization Scale (WBIS)¹⁵ to assess the extent to which students blamed themselves for stigma and internalized negative weight-based stereotypes. The WBIS is an 11-item tool rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The total scores were computed by summing all items, with higher scores indicating higher WBI. The scale has strong internal consistency, with a Cronbach's alpha of 0.87. Body image dissatisfaction (BD) was measured using the Body Shape Questionnaire (BSQ-8c),¹⁶ which is a widely used self-report questionnaire to assess dissatisfaction with body shape. This 8-item tool is rated on a 6-point Likert scale ranging from 1 (never) to 6 (always). The total score ranges from 8 to 48 points. Higher scores indicate greater BD (Cronbach's alpha = 0.79, indicating good internal consistency).

Outcome variables

Part 2: Psychological factors comprised depression and self-esteem.

Depression: The 21-item Beck Depression Inventory-II¹⁷ was used to assess depression symptoms. The students were asked to respond to each item for the past weeks based on their experiences. This tool is rated with a 4-point scale, ranging from 0 to 3. The total score ranges from 0 to 63, with higher scores indicating greater severity of depression symptoms. The scale showed good internal consistency (Cronbach's alpha was 0.85).

Self-esteem: We administered the Rosenberg Self-Esteem Scale^{18,19} to measure students' self-esteem. This is a 10-item questionnaire using a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). Total scores range from 10 to 40, with higher scores indicating higher self-esteem. The scale demonstrated good

internal consistency (Cronbach's alpha was 0.87).

Part 3: Health behavior factors comprised dietary behavior (DB) and physical activity (PA).

Dietary behavior was measured using the Thai Recommended Daily Intake scale (Thai RDI).²⁰ This scale consists of 36 items with a total possible score of 216. The DB scores were categorized into two levels:²¹ healthy eating habits (scores of 97–216) and unhealthy eating habits (scores of 36–96). Cronbach's alpha was 0.89, indicating good internal consistency.

Physical activity was assessed by the Thailand PA Children Survey scale to record PA in the past 7 days, including weekdays and weekends. The scale comprises 13 questions recording activity patterns and durations in minutes for each day.²² Adequate PA was an average of 60 minutes of moderate- to vigorous, mostly aerobic, PA across the week (e. g. , strengthening or aerobic exercises, walking, running, swimming, and playing sports). Vigorous-intensity aerobic activities and those that strengthen muscles and bones should be incorporated at least 3 days a week²³ (Cronbach's $\alpha = 0.74$ indicated that the scale had good internal consistency).

Statistical analysis

Descriptive analyses were applied to analyze the participants' characteristics. Next, the correlations between the selected variables were analyzed. The Kolmogorov-Smirnov test was used for

normality testing; all continuous variables were normally distributed. We applied point biserial correlation for gender and all other variables using Pearson's correlation to examine the correlations between the selected variables. Then, hierarchical linear regression analyses were used to assess the association between psychological factors and WBI after adjusting for all other predictors. The variables were entered into the model as follows: In Model 1, age, gender, BMI, and BD were added; in Model 2 (final model), we added WBI to Model 1. Next, multiple logistic regression was used to examine the associations between health behaviors, physical activity factors, and WBI after adjustment for all other predictors. All statistical analyses were conducted using SPSS version 25.0 (IBM Corp., Armonk, NY, USA), with P-values of <0.05 considered statistically significant.

RESULTS

Sample characteristics:

As shown in Table 1, approximately 52.9% of the respondents were girls. The mean (SD) age and BMI were 14.7 years (1.2) and 29.8 kg/m² (1.6), respectively. The mean WBI and BD scores were 38.9 (SD = 8.4) and 20.6 (SD = 4.9), respectively. The mean scores for depression and self-esteem were 20.1 (SD = 4.5) and 25.0 (SD = 5.0), respectively. Additionally, more than half of the participants reported unhealthy eating habits (52.2%) and inadequate physical activity (51.3%; Table 1).

Table 1: Distribution of socio-demographic, psychological, and health behavior factors (n=785)

Variable	Total
Socio-demographic factors	
Age (years), mean (SD)	14.7 (1.2)
Gender	
Boy, n (%)	370 (47.1)
Girl, n (%)	415 (52.9)

Variable	Total
BMI (kg/m ²), mean (SD)	29.8 (1.6)
BD, mean (SD)	20.6 (4.9)
WBI, mean (SD)	38.9 (8.4)
Psychological factors	
Depression, mean (SD)	20.1 (4.5)
Self-esteem, mean (SD)	25.0 (5.0)
Health behavior factors	
Dietary behavior	
Healthy, n (%)	375 (47.8)
Unhealthy, n (%)	410 (52.2)
Physical activity	
Adequate, n (%)	382 (48.7)
Inadequate, n (%)	403 (51.3)

Note: WBI, weight bias internalization; BMI, Body mass index; BD, Body image dissatisfaction; SD, Standard deviation

Bivariate correlations:

Female gender, greater WBI and BD, and higher BMI were positively correlated

with depressive symptoms ($P < 0.01$), whereas they were negatively correlated with self-esteem ($P < 0.01$; Table 2).

Table 2: Correlation between selected variables

Variables	1	2	3	4	5	6	7
1. Age	1						
2. Gender	-0.052	1					
3. BMI	0.080*	0.246**	1				
4. BD	0.074*	0.352**	0.336**	1			
5. WBI	-0.049	0.203**	0.196**	0.266**	1		
6. Depression	0.047	0.114**	0.248**	0.245**	0.345**	1	
7. Self-esteem	0.028	-0.205**	-0.266**	-0.310**	-0.311**	-0.113**	1

Note: WBI, weight bias internalization; BMI, Body mass index; BD, Body image dissatisfaction. * $P < 0.05$;

** $P < 0.01$; Gender (1= Boy, 2=Girl)

Associations of WBI with psychological factors:

The hierarchical linear regression analysis showed that in Model 1, higher BMI and BD were independently positively associated with depression, while they were negatively associated with self-esteem, except by age and gender, which were not observed. After adjusting for all other

predictors, Model 2 (the final model) showed that greater WBI was associated with more depressive symptoms ($\beta = 0.292$; $P < 0.01$). Levels of WBI increased the effect of depression by 0.292. Conversely, greater WBI was associated with low self-esteem ($\beta = -0.221$; $P < 0.01$). Levels of WBI decreased the effect of self-esteem by 0.221 (Table 3).

Table 3: Hierarchical multiple linear regression toward psychological factors

Variables	Model 1									
	Depression					Self- esteem				
	B	SE	β	95%CI of B	P	B	SE	β	95%CI	P
Age	0.063	0.126	0.017	-0.18, 0.31	0.615	0.229	0.135	0.057	-0.36, 0.49	0.090
Gender	0.151	0.320	0.016	-0.47, 0.77	0.638	0.531	0.343	0.053	-0.14, 1.20	0.121
BMI	0.521	0.102	0.186	0.32, 0.72	<0.001	-0.564	0.109	-0.184	-0.77, -0.35	<0.001
BD	0.169	0.034	0.184	0.10, 0.23	<0.001	-0.243	0.036	-0.242	-0.31, -0.17	<0.001
Model Summary	R² Change depression 0.091, F=19.638, <i>P</i> <0.001					R² Change Self-esteem 0.132, F=29.710, <i>P</i> = <0.001				

Variables	Model 2 (final)									
	Depression					Self- esteem				
	B	SE	β	95%CI of B	P	B	SE	β	95%CI of B	P
Age	0.136	0.121	0.037	-0.10, 0.37	0.261	0.169	0.132	0.042	-0.09, 0.42	0.200
Gender	0.423	0.308	0.046	-0.18, 1.02	0.170	0.305	0.336	0.030	-0.35, 0.96	0.363
BMI	0.423	0.098	0.151	0.23, 0.61	<0.001	-0.483	0.107	-0.157	-0.69, -0.27	<0.001
BD	0.113	0.033	0.123	0.04, 0.17	0.001	-0.197	0.036	-0.196	-0.26, -0.12	<0.001
WBI	0.158	0.019	0.292	0.12, 0.19	<0.001	-0.131	0.020	-0.221	-0.17, -0.09	<0.001
Model Summary	R² Change depression 0.168, F=31.512, <i>P</i> <0.001					R² Change Self-esteem 0.176, F=33.298, <i>P</i> = <0.001				

Note: WBI, weight bias internalization; BMI, Body mass index; BD, Body image dissatisfaction.

B, unstandardized coefficients; SE, standard error; β , standardized coefficients; *P*, P-value

Associations of WBI with health behavior factors:

In the logistic regression analysis, for bivariate models, a statistically significant increase was observed in unhealthy eating habits and inadequate physical activity among students who had

higher WBI, BD, and BMI (*P*<0.001). The multivariate analyses revealed that students with higher BMI, BD, and WBI were more likely to report unhealthy eating habits and inadequate physical activity, identical to those in the bivariate model (Table 4).

Table 4: Multiple logistic regression with unhealthy health behavior and inadequate physical activity

Variables	Bivariate model					
	Unhealthy dietary behavior			Inadequate physical activity		
	Unadjusted OR	95% CI	P-value	Unadjusted OR	95% CI	P-value
Age (years)	1.01	0.90, 1.13	0.862	0.98	0.88, 1.10	0.836
Girl (ref: boy)	1.42	1.07, 1.88	0.014	1.47	1.11, 1.95	0.007
BMI (kg/m ²)	1.52	1.36, 1.71	<0.001	1.49	1.34, 1.67	<0.001
BD	1.20	1.16, 1.24	<0.001	1.18	1.15, 1.22	<0.001
WBI	1.17	1.14, 1.19	<0.001	1.16	1.14, 1.19	<0.001

Variables	Multivariate model					
	Unhealthy dietary behavior			Inadequate physical activity		
	Adjusted OR	95% CI	P-value	Adjusted OR	95% CI	P-value
Age (years)	1.01	0.87,1.17	0.877	1.01	0.87,1.17	0.853
Girl (ref: boy)	1.01	0.70,1.46	0.949	1.09	0.76,1.56	0.635
BMI (kg/m ²)	1.26	1.11,1.41	<0.001	1.23	1.09,1.39	<0.001
BD	1.14	1.09,1.19	<0.001	1.12	1.08,1.16	<0.001
WBI	1.15	1.13,1.18	<0.001	1.14	1.12,1.17	<0.001

Note: WBI, weight bias internalization; BMI, Body mass index; BD, Body image dissatisfaction; CI, Confidence interval; OR, Odds ratio

DISCUSSION

Greater WBI was associated with negative psychological outcomes. Students with higher WBI were significantly associated with higher depressive symptoms. This finding is consistent with previous studies^{24,25} demonstrating that greater WBI was associated with higher depressive symptoms. A possible explanation is that obese adolescents who experience WBI face societal devaluation, negative stereotypes, and prejudicial attitudes toward their body or weight. Because these may result in a loss of self-confidence, encouraging self-criticism, or self-devaluation due to their weight or size, this may affect the onset of depression.^{7,24}

Higher WBI was associated with lower self-esteem. According to previous research,^{7,26} individuals who have high WBI have lower self-esteem. One explanation is that obese adolescents with WBI may face negative weight-based stereotypes (e.g., teasing, prejudice, and discrimination), leading to shame, self-blame, and poor self-worth.^{7,27} These negative stereotypes may change the development of an individual's self-concept. If the interpretation of self to others is inconsistent with the self-concept, it may result in decreased self-esteem.²⁷

Students with higher WBI were more likely to have unhealthy eating behaviors. According to previous studies,^{6,12,28} greater WBI is associated with unhealthy eating behavior (e.g.,

maladaptive eating, poor diet, and non-adherence to dietary guidelines). Obese adolescents with higher WBI may be more likely to experience weight-related stigmatization, teasing, and bullying, which can contribute to adverse eating behaviors, lower self-efficacy for engaging in healthy behaviors, and worse dietary adherence.^{12,28} Furthermore, some evidence suggests that WBI was associated with emotional distress (e.g., depression, body dissatisfaction, and lower self-esteem), which may lead to engaging in more unhealthy coping behaviors, including disordered eating (e.g., extreme restriction of food intake, poor dietary adherence, and eating to cope with distress).²⁹

Interestingly, greater WBI was related to insufficient physical activity, which is in line with prior research^{4,30,31} indicating that adolescents exposed to WBI were more likely to avoid physical activity and have less motivation to exercise. Individuals with greater levels of WBI likely feel negative weight-related stereotypes, which may decrease self-efficacy and cause unwillingness to engage in a healthy lifestyle, including physical activity avoidance, lower exercise self-efficacy, and low intention to exercise.³⁰⁻³¹ Moreover, some studies have indicated that individuals with WBI were less likely to believe weight is controllable, which might reduce their motivation to engage in exercise. Additionally, obese students have reported feeling embarrassed, perceiving

themselves as too fat to exercise, and being reluctant to participate in school-based physical activity because of concerns over potential weight-related teasing, which led them to avoid physical activity.³²

This study has some limitations. First, it was a cross-sectional design; thus, a causal relationship could not be concluded. Hence, longitudinal research to examine the causal relationships is needed. Second, we used the WBIS for measuring WBI; thus, the findings may differ from those using other measurement scales. However, the WBIS is widely used in community samples and is applicable to individuals across different body weight statuses.^{33,34} Third, the self-reported measurement may have been vulnerable to social desirability bias. To minimize self-report bias, validated and standardized instruments were used. Fourth, our participants were drawn from obese high school students who may have had different experiences with WBI than adults or treatment-seeking adolescents. Thus, caution must be used when generalizing the results to other groups. Despite these limitations, our findings provide a better understanding that obese students are vulnerable to WBI and may be facing its negative impacts, including psychological distress and poor health behaviors. Therefore, reducing weight stigma could potentially improve their health. Further, developing appropriate and effective interventions to reduce WBI and its adverse health outcomes is needed.

RECOMMENDATIONS

This study demonstrated that WBI was prevalent among obese students, and it was significantly associated with negative psychological health outcomes (e.g., depression and low self-esteem) and poor health behaviors (e.g., unhealthy eating habits and inadequate physical activity). This suggests that WBI has a potential

effect on health behaviors and mental health. Thus, schools should establish policies or strategies to promote healthy eating and physical activity and address WBI and its negative health consequences (e.g., anti-stigma or anti-bullying campaigns). Additionally, healthcare providers and teachers should be more aware of WBI and its consequences when dealing with weight issues among obese students, such as weight-bias education and counseling. Furthermore, they should develop interventions to reduce WBI and enhance psychological well-being and health behaviors, which may help obese students cope with their WBI-related health challenges. Additionally, family and friends should be supportive and encourage healthy eating and increased physical activity, which may lead to positive behavior changes for students with obesity.

AUTHOR CONTRIBUTIONS

S.K: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing—original draft, Writing—review & editing; S.Y: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing—original draft, Writing—review & editing and T. S.: Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing—review & editing

ETHICAL CONSIDERATION

The participants received information on the research and its voluntary nature, as well as a declaration of anonymity and

confidentiality. All participants then provided written informed consent and completed a self-report questionnaire. This study was reviewed and approved by the Ethics Committee for Research Involving Human Subjects at Mahasarakham University on 27 July 2023 (ref. no. 269-263/2566).

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CONFLICTS OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

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