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Original Article

Weight Stigma in Indonesian Young Adults: Validating the Indonesian Versions of the Weight Self-Stigma Questionnaire and Perceived Weight Stigma Scale

Abstract

Introduction: Weight stigma, a psychological-related health issue associated with obesity or weight problems, is one of the major concerns within public health. Indeed, weight stigma may cause health and behavioral problems, such as a lack of motivation to exercise. Assessing weight stigma is thus essential. Both the Weight Self-Stigma Questionnaire (WSSQ) and the Perceived Weight Stigma Scale (PWSS) are valid and reliable instruments that have been used in several countries. However, WSSQ and PWSS have never been used in Indonesia. Therefore, this study aimed to translate and validate both WSSQ and PWSS in Indonesian for Indonesian young adults. **Methods:** Via an online survey with convenience sampling, Indonesian college students ($n = 438$) completed the Indonesian WSSQ, PWSS, and depression anxiety stress scale-21 (DASS-21), and provided their height and weight. Confirmatory factor analysis (CFA), Rasch analysis, internal consistency, and concurrent validity were used for data analysis. **Results:** The internal consistency was satisfactory for the WSSQ ($\alpha = 0.90$ and $\omega = 0.93$). One PWSS item did not fit well and was removed. The revised 9-item PWSS had satisfactory internal consistency ($\alpha = 0.82$ and $\omega = 0.87$). The CFA and Rasch results supported a two-factor structure for the WSSQ, and a one-factor structure for the PWSS. WSSQ and PWSS were significantly and positively correlated ($r = 0.32$; $P < 0.001$). Both WSSQ and PWSS were significantly and positively associated with the DASS-21 score ($r = 0.18$ to $r = 0.48$; all $P < 0.001$); WSSQ was significantly and positively associated with body mass index (BMI) ($r = 0.17$ to $r = 0.50$; all $P < 0.01$). **Conclusion:** The translated Indonesian versions of WSSQ and PWSS can be used as instruments to assess weight stigma in Indonesian young adults.

Keywords: *Indonesia, obesity, validation, weight stigma, well-being, young adults*

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Introduction

Obesity is a global health problem with serious complications due to the significant relationship with several diseases, such as cancer, stroke, asthma, and the decline of fertility.[1] As stated by the World Health Organization (WHO) in 2016, globally, as many as 39% of adolescents (aged 18 years or more) are overweight and 13% are obese.[2] Obesity is correlated with body dissatisfaction, low self-esteem, and emotional distress, such as anxiety and depressive syndrome.[3] In addition, being overweight is associated with weight stigma, which is a stressful experience.[4]

In recent decades, the soaring obesity level has been related to the increasing weight stigma.[5] The term "stigma" represents a physical characteristic or quality that marks a person's low social value.[6] Weight stigma reflects an individual's attitude and negative bias about their weight,[7] enabling the emergence of several forms of discrimination that can trigger social inequities,[8] as well as affecting, worsening, damaging, or inhibiting a number of processes, including social relationships, stress, and psychological and behavioral responses.[9,10] Moreover, a study from

Iran showed that negative impacts from weight stigma contribute to low quality of life and psychological distress among women who are overweight or obese.[11]

Several interventions with a multidisciplinary approach have been proposed to improve weight loss and to reduce weight stigma; however, weight stigma may affect certain aspects of health,[12] including a lack of motivation to exercise. In other words, individuals are likely not to engage in health behaviors related to physical activity due to weight stigma.[13] In order to address the problems of weight stigma and to fill in the gap in this field, researchers may use the Weight Self-Stigma Questionnaire (WSSQ) as an instrument to understand the weight stigma problem. WSSQ has been evidenced as being valid and reliable to assess self-stigma towards weight (or weight-related self-stigma).[14] Weight-related self-stigma is defined as the acceptance or endorsement of negative weight-related stereotypes.[15] Moreover, WSSQ has been adapted and translated into several languages, including German,[16] Arabic,[11] France,[17] Chinese for Taiwanese,[18] Chinese for Hong Kong children,[19] Persian for Iranians,[20] and Italian.[12] All of the translations show that WSSQ is a valid and reliable measurement scale.

In addition to self-stigma, perceived weight stigma is another important type of weight stigma.[21] Prior evidence also shows that perceived weight stigma may cause problems such as psychological distress[22] and unhealthy behaviors such as eating disorders.[23,24] Accordingly, some evidence shows that perceived weight stigma is associated with a lack of enjoyment in healthy behaviors such as physical activity.[25,26] Although perceived weight stigma seems to involve similar concepts to weight-related self-stigma, perceived weight stigma is different from weight-related self-stigma. Specifically, perceived weight stigma is defined as the awareness of others' stereotypes regarding weight problems,[15] instead of the acceptance and endorsement of stereotypes regarding weight problems. Therefore, healthcare providers need to understand perceived weight stigma and weight-related self-stigma separately for any individuals who experience weight stigma problems. Subsequently, tailor-made interventions for weight stigma (i.e., treatment focusing on perceived weight stigma or on weight-related self-stigma) can be designed. Currently, the Perceived Weight Stigma Scale (PWSS) is an available instrument assessing perceived weight stigma, with good reliability and validity across different language versions, including English for Malaysians,[15] Chinese for Taiwanese,[22] and Chinese for Hong Kong individuals.[27]

Nowadays, there is no standard validated version of WSSQ or PWSS for the population of Indonesia. Hence, this study is a cross-cultural study aiming to translate and assess the validity of the WSSQ and PWSS for the Indonesian cultural context by following a systematic translation method. We especially focused on young adults to develop the Indonesian WSSQ and PWSS, because empirical evidence shows that young adults are at a high risk of developing weight stigma, regardless of their sociodemographic features.[15]

Methods

Participants

The participants of this study were 438 active college/university students (including undergraduate and postgraduate students) in Indonesia, from several fields. The inclusion criteria of this cross-sectional study were college students with active status and willing to participate in this project. Participants were recruited through a university database starting from June 29, until December 29, 2021. Specifically, this study used convenience sampling with the following procedure: first, using the database from the university to identify potential target participants; second, sending emails to the target participants. In the email, the study information was described and a link to the online survey was provided. When a participant was interested in participation, he or she could click on the link to access the online survey. The first page of the online survey provided detailed information, including the right to withdrawal at any time for the participants. Afterward, the participants were asked to click on an "agree" icon if they wished to continue the online survey.

Study design

This study involved cultural adaptation research with the translation and validation of the Indonesian versions of WSSQ/PWSS. The scales were customized with the cultural context of Indonesia using systematic translation methods.[28] Systematic translation methods also have been used recently in translating the smartphone application-based addiction scale among Indonesian college students.[29]

Translation procedure for Weight Self-Stigma Questionnaire and Perceived Weight Stigma Scale

This study used WSSQ and PWSS as the main instruments to be translated into Bahasa Indonesia. WSSQ and PWSS are instruments assessing weight stigma (weight-related self-stigma and perceived weight stigma) in the past week. Detailed information of the WSSQ and PWSS is reported in the Primary Measures section. This research followed the translation procedures from Cheung *et al*.,[28] which refers to the guidelines and recommendations that exist in research across health cultures and medicine. Detailed information on the translation procedure is presented in Appendix A.

Sample size consideration for formal psychometric testing

The present study adopted two advanced psychometric testing methods (i.e., Confirmatory factor analysis [CFA]

and Rasch analysis); therefore, we considered having a sample larger than 400 to achieve sufficient power in these types of psychometric testing methods. Specifically, Kline has recommended having 200 or more participants for a CFA model.[30] Moreover, using the rule of thumb in the item–participant ratio at 20, 240 participants should be recruited for the factor structure of WSSQ (i.e., 12 WSSQ items times 20 participants per item equal to 240 participants for the WSSQ).

Primary measures

Weight Self-Stigma Questionnaire

WSSQ contains 12 Likert-type scale items that assess how an individual perceives and endorses weight-based stigmatization experiences via a self-administration method. The scores of the WSSQ items included 1 (indicates strongly disagree) to 5 (indicates strongly agree) and the WSSQ item scores were summed to indicate the level of weight stigma (higher scores indicate greater level of stigma). WSSQ was found to have two factors, including factor 1 (self-devaluation) and factor 2 (fear of enacted stigma).[14] One WSSQ example item is "People think that I am to blame for my weight problems." Prior psychometric evidence of the WSSQ regarding its good internal consistency and two-factor structure has been documented for different language versions, including the Chinese version,[19] French version,[17] German version,[16] Portuguese version,[31] Turkish version,[32] and Iranian version.[20]

Perceived Weight Stigma Scale

PWSS contains 10 dichotomous items that assess how an individual perceives weight-based stigmatization experiences via a self-administration method. The dichotomous scores of the PWSS items included 0 (indicates no) and 1 (indicates yes) and the PWSS item scores were summed to indicate the level of perceived weight stigma (higher scores indicate greater level of stigma). One PWSS example item is "People behave as if you are inferior because of your weight status." Prior psychometric evidence of the PWSS has been documented for its Chinese version for both Taiwanese and Hong Kong, including internal consistency (α = 0.84) and unidimensional factor structure.[22]

External criterion measures

Demographics with anthropometric information. The participants were asked to complete several questions regarding their background information, including anthropometric information. Specifically, these items asked about age (self-report with the unit of year), gender (dichotomous answers of woman or man), marital status (three options of single, married, or other), major at university (self-report in words), study program (dichotomous answers of undergraduate or postgraduate), height (self-report with the unit of cm), and

weight (self-report with the unit of kg). Body mass index (BMI) was calculated using the self-reported height and weight; then, nutritional status was classified based on BMI from WHO criteria for Asian population: underweight (<18.5 kg/m^2), normal (between 18.5 kg/m^2 and 22.9 kg/m^2), and overweight ($\geq$23 kg/m^2).[33]

Depression, Anxiety, and Stress Scale-21

The Depression, Anxiety, and Stress Scale-21 (DASS-21) contains 21 Likert-type-scale items that assess how an individual experiences psychological distress in three forms, namely depression, annuity, and stress, via a self-administration method.[34] The scores of the DASS-21 items included 0 (indicates did not apply to me at all) to 3 (indicates applied to me very much or most of the time), and the DASS-21 item scores were summed to indicate the level of psychological distress (higher scores indicate greater level of stress). One DASS-21 example item is "I found it hard to wind down." Prior psychometric evidence of the DASS-21 has been documented for its Indonesian version, such as internal consistency (α = 0.91).[35]

Ethical consideration

Ethical clearance was obtained from the Health Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga, with registration number 2318-KEPK.

Statistical analysis

The present sample and the two weight stigma measures were firstly analyzed using descriptive statistics of mean (with standard deviation [SD]) and frequency (with percentage). Thus, the sample characteristics and basic item properties (e.g., score distributions) were summarized. The psychometric testing methods used to examine the properties of both WSSQ and PWSS were carried out. These analyses included CFA, Rasch analysis, internal consistency, and concurrent validity.

Given that WSSQ was rated on a Likert-type scale and PWSS on a dichotomous scale, a diagonally weighted least squares estimator was used for CFA. WSSQ was tested on a two-factor structure (with the first six items loaded on factor 1 of self-devaluation and the last six items loaded on factor 2 of fear of enacted stigma); PWS was tested on a unidimensional factor structure. Fit indices including the comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square (SRMR) were used to check whether the proposed factor structure fit well with the instruments (i.e., WSSQ and PWSS). Specifically, CFI and TLI are recommended to be >0.9; RMSEA and SRMR are recommended to be <0.08.[36,37] The factor loading derived from CFA was then applied to evaluate whether an item should be retained in the instruments. CFA was used to test the factor structures of WSSQ and PWSS because most prior evidence on their factor structures was based

on factor analysis (including CFA and exploratory factor analysis).[12,14-20] Therefore, the use of CFA can make the present study's findings comparable to prior evidence.[12,14-20]

WSSQ was analyzed using the partial credit model (PCM) in the Rasch analysis, while PWSS was analyzed using the traditional Rasch model. Because WSSQ contains two factors, two PCM Rasch analyses were conducted: one for the first factor and another for the second factor. PWS only has one factor and only one traditional Rasch model was conducted. All the Rasch models provided the outfit mean square (MnSq) and an infit MnSq to evaluate the item fitness for each model. When an item had an outfit and infit MnSq that both ranged between 0.5 and 1.5, the item was embedded in the proposed construct. Moreover, a MnSq (either outfit or infit) smaller than 0.5 indicates redundancy and a MnSq larger than 1.5 indicates misfit.[20,38,39] After using both CFA factor loadings and Rasch MnSq, the retained items for each instrument were examined for internal consistency. Cronbach's α and McDonald's ω were used, and an acceptable value was 0.7 or above.[40] Lastly, Pearson correlation was used to examine whether WSSQ and PWSS were associated with each other, and whether WSSQ and PWSS were associated with the external criteria of DASS-21 and BMI, to verify the evidence of concurrent validity for WSSQ and PWSS.

All the statistical analyses were performed using IBM SPSS 20.0 (IBM Corp.: Armonk, NY, USA) or R software with the lavaan, Psych, or eRm packages.[41-43]

Results

The participants were university students who were studying in an Indonesian university (N = 438; 323 [73.7%] males; mean [SD] age = 22.7 [8.2] years). The majority of the participants were studying in an undergraduate program (n = 357 [81.5%]) and slightly over half of the participants were majoring in a health-related program (n = 241 [55.0%]). The participants had a mean BMI of 22.5 (4.5) kg/m², and nearly half of them had an average weight (n = 208 [47.5%]). Moreover, over one-third of the participants were overweight [n = 168 (38.4%); Table 1].

The distributions of the item responses for both WSSQ and PWSS are presented in Table 2. Specifically, the WSSQ items had a normal distribution (skewness = −0.56 to 1.02; kurtosis = −1.04 to 0.79), while most responses to PWSS items did not (81.3% to 95.9%). Table 3 presents the CFA results for both WSSQ and PWSS. Specifically, WSSQ was found to fit well with a two-factor structure (Factor 1 = self-devaluation; Factor 2 = fear of enacted stigma), with all item factor loadings >0.3 (ranged between 0.51 and 0.87). The fit indices of the two-factor structure of WSSQ were CFI and TLI >0.99; RMSEA and SRMR <0.06. The unidimensional structure of PWSS was found to have good CFA fit indices

Table 1: Characteristics of the participants (*n*=438)

	n (%) or mean (SD)
Age (years)	22.7 (8.2)
Gender	
Female	323 (73.7)
Male	115 (26.3)
Study major	
Health-related	241 (55.0)
Nonhealth-related	197 (45.0)
Study program	
Undergraduate	357 (81.5)
Postgraduate	81 (18.5)
Marital status	
Single	368 (84.0)
Married	67 (15.3)
Other	3 (0.7)
Height (cm)	160.4 (7.5)
Weight (kg)	58.0 (13.6)
BMI (kg/m²)	22.5 (4.5)
Nutritional status	
Underweight	62 (14.2)
Normal	208 (47.5)
Overweight	168 (38.4)

SD: Standard deviation, BMI: Body mass index

(CFI and TLI >0.99; RMSEA and SRMR <0.06). However, a low factor loading was found for PWS item 3 (0.07). Therefore, this item was removed to fit the unidimensional structure of PWSS again. The fit indices became slightly lower but were still satisfactory (i.e., CFI and TLI were still >0.99; RMSEA and SRMR still <0.06). Moreover, all the factor loadings were good in the revised PWS structure (ranged between 0.29 and 0.72).

The Rasch analysis results replicated the CFA findings for both WSSQ and PWSS in terms of the item properties [Table 4]. Specifically, all the WSSQ items had their infit and outfit MnSq values between 0.50 and 1.50 (outfit MnSq = 0.63 to 1.28 and infit MnSq = 0.64 to 1.30 for factor 1 [self-devaluation]; outfit MnSq = 0.55 to 1.47 and infit MnSq = 0.55 to 1.39 for factor 2 [fear of enacted stigma]). All the PWSS items had their infit and outfit MnSq values between 0.50 and 1.50, except for item 3 ("*People act as if they are afraid of you*"; outfit MnSq = 2.20 and infit MnSq = 1.80).

The internal consistency was evaluated and found to be satisfactory for WSSQ (Cronbach's α = 0.86 and McDonald's ω = 0.91 for factor 1 [self-devaluation]; Cronbach's α = 0.87 and McDonald's ω = 0.92 for factor 2 [fear of enacted stigma]; Cronbach's α = 0.90 and McDonald's ω = 0.93 for the entire WSSQ). Given that item 3 was found to have poor item properties for PWSS, this item was removed from PWSS for internal consistency calculation. The revised PWSS with 9 retained items was found to have satisfactory internal consistency: Cronbach's α = 0.82 and McDonald's ω = 0.87.

Table 2: Distributions for the items of the weight self stigma questionnaire and perceived weight stigma scale

WSSQ	Strongly disagree, *n* (%)	Disagree, *n* (%)	Neutral, *n* (%)	Agree, *n* (%)	Strongly agree, *n* (%)
Item W1	99 (22.6)	94 (21.5)	121 (27.6)	96 (21.9)	28 (6.4)
Item W2	55 (12.6)	86 (19.6)	108 (24.7)	148 (33.8)	41 (9.4)
Item W3	62 (14.2)	118 (26.9)	105 (24.0)	122 (27.9)	31 (7.1)
Item W4	123 (28.1)	134 (30.6)	91 (20.8)	69 (15.8)	21 (4.8)
Item W5	32 (7.3)	43 (9.8)	134 (30.6)	165 (37.7)	64 (14.6)
Item W6	49 (11.2)	105 (24.0)	121 (27.6)	136 (31.1)	27 (6.2)
Item W7	57 (13.0)	103 (23.5)	143 (32.6)	102 (23.3)	33 (7.5)
Item W8	140 (32.0)	155 (35.4)	87 (19.9)	44 (10.0)	12 (2.7)
Item W9	82 (18.7)	113 (25.8)	143 (32.6)	80 (18.3)	20 (4.6)
Item W10	104 (23.7)	149 (34.0)	112 (25.6)	57 (13.0)	16 (3.7)
Item W11	92 (21.0)	126 (28.8)	119 (27.2)	78 (17.8)	23 (5.3)
Item W12	203 (46.3)	140 (32.0)	80 (18.3)	9 (2.1)	6 (1.4)
PWSS	**No, *n* (%)**			**Yes, *n* (%)**	
Item P1	356 (81.3)			82 (18.7)	
Item P2	360 (82.2)			78 (17.8)	
Item P3	385 (87.9)			53 (12.1)	
Item P4	382 (87.2)			56 (12.8)	
Item P5	381 (87.0)			57 (13.0)	
Item P6	424 (96.8)			14 (3.2)	
Item P7	415 (94.7)			23 (5.3)	
Item P8	379 (86.5)			59 (13.5)	
Item P9	420 (95.9)			18 (4.1)	
Item P10	393 (89.7)			45 (10.3)	

WSSQ answered using 5-point Likert Scale, PWSS answered using Dichotomous Scale. WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale

Finally, the good concurrent validity of both WSSQ and PWSS was confirmed, as they had significantly positive correlations with each other ($r = 0.17$ between WSSQ factor 1 [self-devaluation] and PWSS; = 0.40 between WSSQ factor 2 [fear of enacted stigma] and PWS; and = 0.32 between WSSQ total score and PWS; all $P < 0.001$). Moreover, both WSSQ and PWSS were significantly and positively associated with the DASS-21 score ($r = 0.18$ to $r = 0.48$; all $P < 0.001$); WSSQ was significantly and positively associated with BMI [$r = 0.17$ to $r = 0.50$; all $P < 0.01$; Table 5].

Discussion

The results of this study indicate that both Indonesian versions of WSSQ and PWSS had satisfactory validity and reliability among Indonesian university students. Specifically, the internal consistency values (including Cronbach's α and McDonald's ω) were all above 0.8 for the Indonesian WSSQ, and above 0.7 for the Indonesian PWSS. Both the CFA results and Rasch analysis results supported a two-factor structure of the Indonesian WSSQ and a single-factor structure of the Indonesian PWSS. Moreover, there is a significant correlation between WSSQ and PWSS; a significant correlation between WSSQ and BMI; and significant correlations between WSSQ/PWSS and DASS-21. These results are in line with prior research.

Prior research, comparing the WSSQ and weight bias instruments scale (WBIS), both of which are valid for

assessing weight bias,[19] found that WSSQ together with WBIS had satisfactory psychometric properties. Moreover, the two-factor structure found in the present study echoes the findings of Pakpour *et al.*,[19] who also used CFA to find a good fit between a two-factor structure and WSSQ. Other WSSQ findings in the present study are comparable to the existing evidence. For example, WSSQ research in England showed that the Cronbach's α of WSSQ was >0.8, and WSSQ is significantly correlated with BMI.[14] A WSSQ study in Germany found that the Cronbach's α of WSSQ was 0.84.[16] Although Hain *et al*.[16] did not find a significant correlation between total WSSQ and BMI, when controlling for age and gender, participants with BMI >50 kg/m² had significantly higher WSSQ scores compared to those with BMI 30–50 kg/m².[16] The WSSQ in Italian also showed good internal consistency (Cronbach's α 0.81), with a significant correlation with BMI.[44] The WSSQ in Chinese also had good internal consistency (Cronbach's α 0.89 and 0.88) and a significant correlation with BMI.[18] Similar findings for WSSQ have been reported regarding its Turkish version; the Cronbach's α of WSSQ was 0.83, with WSSQ and BMI being significantly correlated.[32] Recently, the English version of WSSQ has been validated among Malaysian young adults, showing excellent internal consistency (Cronbach's α 0.94) and a significant correlation between WSSQ and BMI.[15]

In addition to the psychometric evidence for WSSQ, the present study showed that the PWSS findings were

Table 3: Psychometric results derived from confirmatory factor analysis on the internet-related instruments

	WSSQ		PWSS	PWSS_
	WSSQ_F1	WSSQ_F2		revised
Factor loading				
Item 1	0.67	-	0.70	0.70
Item 2	0.78	-	0.70	0.70
Item 3	0.87	-	0.07	-[b]
Item 4	0.79	-	0.72	0.72
Item 5	0.51	-	0.71	0.72
Item 6	0.70	-	0.29	0.29
Item 7	-	0.58	0.38	0.38
Item 8	-	0.79	0.56	0.56
Item 9	-	0.73	0.52	0.52
Item 10	-	0.87	0.59	0.59
Item 11	-	0.82	-[a]	-[a]
Item 12	-	0.58	-[a]	-[a]
Fit indices				
χ^2 (df)	81.34 (53)		21.47 (35)	17.64 (27)
P	0.01		0.97	0.91
CFI	0.994		1.000	1.000
TLI	0.992		1.027	1.019
RMSEA	0.035		0.000	0.000
90% CI of RMSEA	0.018-0.050		0.000-0.000	0.000-0.014
SRMR	0.054		0.054	0.057

[a]PWSS does not have items 11 and 12, [b]PWSS item 3 was deleted due to low factor loadings. WSSQ answered using 5-point Likert Scale, PWSS answered using Dichotomous Scale. WSSQ_F1: Self-devaluation, WSSQ_F2: Fear of enacted stigma, WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale, CFI: Comparative fit index, TLI: Tucker-Lewis index, RMSEA: Root mean square error of approximation, SRMR: Standardized root mean square residual, CI: Confidence interval

Table 4: Psychometric results derived from Rasch analysis on the internet-related instruments

	χ^2 (df)	P	Outfit MnSq	Infit MnSq
WSSQ_F1				
Item W1	357.50 (413)	0.98	0.86	0.89
Item W2	271.10 (413)	1.00	0.66	0.64
Item W3	314.34 (413)	1.00	0.76	0.72
Item W4	261.96 (413)	1.00	0.63	0.66
Item W5	531.17 (413)	<0.001	1.28	1.30
Item W6	388.48 (413)	0.80	0.94	0.93
WSSQ_F2				
Item W7	593.94 (402)	<0.001	1.47	1.39
Item W8	222.77 (402)	1.00	0.55	0.55
Item W9	302.74 (402)	1.00	0.75	0.75
Item W10	254.36 (402)	1.00	0.63	0.61
Item W11	355.47 (402)	0.95	0.88	0.86
Item W12	370.04 (402)	0.87	0.92	1.03
PWSS				
Item P1	133.54 (184)	0.99	0.75	0.82
Item P2	146.66 (184)	0.98	0.79	0.84
Item P3	406.51 (184)	<0.001	2.20	1.80
Item P4	132.21 (184)	1.00	0.72	0.79
Item P5	136.31 (184)	1.00	0.74	0.81
Item P6	221.58 (184)	0.03	1.20	1.00
Item P7	228.31 (184)	0.02	1.23	1.01
Item P8	195.27 (184)	0.27	1.06	1.00
Item P9	115.93 (184)	1.00	0.63	0.72
Item P10	156.44 (184)	0.93	0.85	0.87

WSSQ answered using 5-point Likert Scale, PWSS answered using Dichotomous Scale. WSSQ_F1: Self-devaluation, WSSQ_F2: Fear of enacted stigma, WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale, MnSq: Mean square

comparable to those of prior research, showing good validity. However, item 3 on PWSS should be omitted because it is psychometrically inappropriate. These results are the same as those of the research conducted in Malaysia.[15] PWSS item 3 could be inappropriate because the percentage of overweight participants in this study was only 38.4%. The PWSS instrument is more appropriate to use among participants who are overweight or obese. The revised PWSS with 9 retained items was found to have satisfactory internal consistency: Cronbach's α was 0.82, and this finding is comparable to another study reporting a Cronbach's α of PWSS at 0.83. Because PWSS is related to eating disturbances and emotional distress in participants with normal weight or a high weight, it can be inferred that BMI is not related to PWSS.[45] Indeed, a prior study[27] found that PWSS is associated with inappropriate eating behaviors, anxiety in adolescents with overweight,[45] and depression. In addition, a prior study[45] found that perceived weight stigma was related to weight-related self-stigma regardless of weight status.

Limitations and strengths

This study has some limitations. First, this was a cross-sectional study, in which participants provided their own weight and height data; thus, it is possible that the BMI results were under- or overestimated. In other words, readers may question the accuracy of the BMI information. However, given that the present study applied an online survey, it was impossible to use other objective measures to assess height and weight. Although the use of self-reported height and weight is somewhat acceptable in weight-related research,[46] it would be preferable if a future study measured body weight and height using standardized objective measures (e.g., weight scales). Second, participants were students and they could not constitute a representative sample for the general Indonesian population. Similar studies are thus needed with participants of various age groups. Third, the CFA used in the present study possesses an assumption that there is an underlying normal distribution. Although we believe that this might be the case for weight stigma (either self-stigma or perceived stigma), to the best of our knowledge, no scientific evidence has shown a clear pattern of normal

Table 5: Concurrent validity of Weight Self-Stigma Questionnaire and Perceived Weight Stigma Scale using Pearson correlations

	WSSQ_F1	WSSQ_F2	WSSQ_total	PWSS	DASS-21	BMI
				r (*P*)		
WSSQ_F1	-					
WSSQ_F2	0.54 (<0.001)	-				
WSSQ_total	0.89 (<0.001)	0.87 (<0.001)	-			
PWSS	0.17 (<0.001)	0.40 (<0.001)	0.32 (<0.001)	-		
DASS-21	0.18 (<0.001)	0.32 (<0.001)	0.28 (<0.001)	0.48 (<0.001)	-	
BMI	0.50 (<0.001)	0.17 (0.001)	0.39 (<0.001)	0.05 (0.26)	−0.11 (0.03)	-

WSSQ_F1: Self-devaluation, WSSQ_F2: Fear of enacted stigma, WSSQ total: Total score on the Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale, DASS-21: Depression, Anxiety, and Stress Scale-21, BMI: Body mass index

distribution for weight stigma. Therefore, readers should be cautious regarding the potential biases in the CFA findings (i.e., the possibilities of reporting misspecified factor structures).

The strength of this research is that it had a sufficient sample size to conduct different types of psychometric testing. Moreover, the present study used a rigorous translation procedure to ensure the linguistic validity of the two instruments (i.e., WSSQ and PWSS). Therefore, it can be tentatively concluded that the results of this study are robust and can be applied to university students in Indonesia. In addition, to the best of the present authors' knowledge, in this study, research related to the translation and validation of WSSQ and PWSS was carried out for the first time in Indonesia.

Conclusions

The results of the translation of WSSQ and PWSS into Indonesian represent good validation findings. Therefore, both instruments can be used to assess weight stigma in terms of different aspects among Indonesian university students. Nevertheless, future research is suggested to recruit a heterogeneous sample with a large sample size to provide further psychometric property information on both WSSQ and PWSS, in order to achieve better external validity for the Indonesian WSSQ and PWSS.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Appendix A: Translation procedure of the WSSQ and PWSS into Bahasa Indonesian. WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale

Step 1: Recruit Translation Team. The first step was recruiting translation team, which was formed with the aim to produce a translation with high quality with cultural adaptation. In the recruitment process, it was very important to weigh in on the experienced ability to produce translation with high quality. Therefore, translation team must be having a minimum of four people with each having a different skill.

In this study, researcher recruited four translators that had divided based on their skills. Translation team (a) consisted of a translator A1 from Universitas Airlangga who understood problems related to weight stigma and a translator A2 who was an expert in English translation from Surabaya city. Translation team (b) consisted of a translator B1 who understood problems related to Universitas Airlangga and a translator B2 who was an expert in English translation from Bandung city.

Step 2: Forward Translation. The second stage was to ask translator team A, including translator A1 (who understood the issue) and translator A2 (English expert), to translate both WSSQ and PWSS into Indonesian language. The two translators translated the English versions of original WSSQ and PWSS within a week, subsequently submitted document 1 (translator A1) and document 2 (translator A2 who is English expert). Afterward, the researcher team met with translators A1 and A2 to search for differences in each translation to propose alternatives in language selection based on the surrounding culture. In this step, researcher team produced a translation that reconciled documents 1 and 2 (i.e., document 3). In this study, each of the two translators produced an independent translation [Appendix Table S1]. WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale.

Step 3: Back-Translation. The third step from this study was to translate document 3 (Indonesian WSSQ and PWSS) into English versions. Document 3 was submitted for translation by an expert having knowledge in health (Translator B1) and an expert in English language translation (Translator B2). Translator B1 produced document 4 and translator B3 produced document 5. In this stage, both translators were not aware of the original questionnaire when they back-translated the questionnaires. Finally, two back-translated English versions were made [Appendix Table S2]. WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale.

Step 4: Committee Consolidation. In this stage, a committee which consisted of researcher and all translators, gathered to examine the similarities and differences between the source of the instrument and translated documents. The documents examined were document 0 (English version), documents 1, 2, and 3 (forward translations), and documents 4 and 5 (backward translations). In order to overcome the differences at the back-translation, researcher and all translators agreed to accept the translation and maintained it according to the concept of the original scale.

Step 5: Pilot test and confirming Indonesian Weight Self-Stigma Questionnaire and Perceived Weight Stigma Scale. The pilot test was conducted to correct errors in scale and ensured that the final translation result had maintained equality before researcher deployed the instrument to the respondents. In this study, a trial was done on 33 students who were willing to become participants from selected universities in Indonesia on July 14th, 2021. The trial was distributed online through Google Forms. After distributing the scales online, validity and reliability test of the translated version of WSSQ and PWSS were conducted using SPSS software. The internal consistency of the Indonesian WSSQ was acceptable (Cronbach's $\alpha = 0.92$), and the internal consistency of the Indonesian PWSS was acceptable (Cronbach's $\alpha = 0.71$) which mean that the scale was reliable. Furthermore, both instruments were sent for a formal psychometric test. WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale.

Appendix Table S1: Process of forward translation of Weight Self-Stigma Questionnaire and Perceived Weight Stigma Scale into Bahasa by translation Team A

Original document in English	Forward translation into Bahasa Indonesia		
	Translator A1	Translator A2	Reconciled A1+A2
	WSSQ		
I'll always go back to being overweight	Saya akan selalu kembali menjadi kelebihan berat badan	Saya akan selalu mengalami kelebihan berat badan	Saya selalu kembali mengalami kelebihan berat badan
I caused my weight problems	Saya yang menyebabkan masalah berat badan saya	Saya adalah penyebab masalah berat badan saya	Saya adalah penyebab masalah berat badan saya
I feel guilty because of my weight problems	Saya merasa bersalah karena masalah berat badan saya	Saya merasa bersalah karena masalah berat badan saya	Saya merasa bersalah karena masalah berat badan saya
I became overweight because I'm a weak person	Saya menjadi kelebihan berat badan karena saya orang yang lemah	Saya mengalami kelebihan berat badan karena saya orang yang lemah	Saya mengalami kelebihan berat badan karena saya orang bertekad lemah
I would never have any problems with weight if I were stronger	Saya tidak akan pernah memiliki masalah berat badan apabila saya lebih kuat	Saya tidak akan pernah memiliki masalah berat badan jika saya lebih kuat	Saya tidak akan pernah memiliki masalah berat badan jika saya lebih bertekad kuat
I don't have enough self-control to maintain a healthy weight	Saya tidak memiliki kontrol diri yang cukup untuk menjaga berat badan saya	Saya tidak memiliki kontrol diri yang cukup untuk menjaga berat badan ideal sebelumnya	Saya tidak memiliki kontrol diri yang cukup untuk menjaga berat badan yang sehat
I feel insecure about others opinions of me	Saya merasa tidak percaya diri tentang pendapat orang lain terhadap saya	Saya merasa tidak nyaman dengan pendapat orang lain tentang saya	Saya merasa tidak percaya diri dengan pendapat orang lain tentang saya
People discriminate against me because I've had weight problems	Orang-orang mendiskriminasi saya karena saya memiliki masalah berat badan	Orang-orang mendiskriminasi saya karena masalah berat badan saya	Orang-orang mendiskriminasikan saya karena saya memiliki masalah berat badan
It's difficult for people who haven't had weight problems to relate me	Sulit bagi orang yang tidak memiliki masalah berat badan untuk dapat mengerti saya	Saya sulit berhubungan dengan orang yang tidak memiliki masalah berat badan seperti saya	Orang yang tidak memiliki masalah berat badan sulit untuk mengerti saya
Others will think I lack self-control because of my weight problems	Orang orang berpikir saya kurang memiliki kontrol diri karena masalah berat badan saya	Orang lain akan berpikir saya kurang mengontrol diri sehingga saya mengalami masalah berat badan	Orang berpikir bahwa saya tidak memiliki kontrol diri karena saya memiliki masalah berat badan
People think that I am to blame for my weight problems	Orang-orang berpikir bahwa saya harus disalahkan atas masalah berat badan saya	Orang-orang berpikir bahwa saya adalah penyebab masalah berat badan saya	Orang berpikir bahwa saya adalah penyebab masalah berat badan saya
Others are ashamed to be around me because of my weight	Orang lain malu berada didekat saya karena berat badan saya	Orang lain malu berada di dekat saya karena masalah berat badan saya	Orang-orang malu berada di dekat saya karena masalah berat badan saya
Original document in English	Forward translation into Bahasa Indonesia		
	Translator A1	Translator A2	Reconciled A1+A2
	PWSS		
People act as if you are inferior	Orang-orang bertindak seolah-olah anda lebih rendah dibandingkan orang lain	Orang-orang menganggap seolah-olah anda lebih rendah	Orang-orang memperlakukan anda seolah-olah anda inferior (lebih rendah)
People act as if you are not smart	Orang-orang bertindak seolah-olah anda tidak pintar	Orang-orang menganggap seolah-olah anda tidak pintar	Orang-orang memperlakukan anda seolah-olah anda kurang cerdas
People act as if they are afraid of you	Orang-orang bertindak seolah-olah mereka takut padamu	Orang-orang bertingkah seolah-olah mereka takut pada anda	Orang-orang merasa takut pada anda
You are treated with less courtesy than others	Anda diperlakukan dengan kurang sopan dibandingkan orang lain	Anda diperlakukan dengan kurang sopan dibandingkan orang lain	Anda diperlakukan dengan kurang layak dibandingkan dengan orang lain
You are treated with less respect than others	Anda diperlakukan dengan kurang hormat daripada orang lain	Anda diperlakukan dengan kurang hormat dibandingkan orang lain	Anda diperlakukan dengan kurang hormat dibandingkan dengan orang lain
You receive poor service in stores/restaurants	Anda menerima layanan yang buruk di toko/restoran	Anda menerima layanan yang buruk di toko/restoran	Anda diperlakukan dengan tidak baik di toko/restoran
People act as if you are dishonest	Orang-orang bertindak seolah-olah anda tidak jujur	Orang-orang menganggap seolah-olah anda tidak jujur	Anda dianggap tidak jujur oleh orang lain

Contd...

Appendix Table S1: Contd...

Original document in English	Forward translation into Bahasa Indonesia		
	Translator A1	Translator A2	Reconciled A1+A2
	PWSS		
You are called names or insulted	Nama anda sering disebut atau dihina	Anda diolok-olok atau dihina	Anda mendapat ejekan atau hinaan
You are threatened or harassed	Anda diancam atau dilecehkan	Anda diancam atau dilecehkan	Anda diancam atau dilecehkan
You faced discrimination in a host of social setting (e.g., school)	Anda menghadapi diskriminasi di sejumlah lingkungan sosial (misalnya, sekolah)	Anda mengalami diskriminasi di sejumlah lingkungan sosial (misalnya, sekolah)	Anda mengalami diskriminasi di sejumlah lingkungan sosial (misalnya, sekolah)

WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale

Appendix Table S2: Process of back-translation of Weight Self-Stigma Questionnaire and Perceived Weight Stigma Scale into English version by translation Team B

Back-translation into English version		Final translation in Bahasa Indonesia
Translator B1	Translator B2	
WSSQ		
I always come back to be overweight	I always get back overweight	Saya selalu kembali mengalami kelebihan berat badan
I was the cause of my weight problem	I am the cause of my weight problems	Saya adalah penyebab masalah berat badan saya
I felt guilty of my weight problem	I feel guilty because of my weight problem	Saya merasa bersalah karena masalah berat badan saya
I have been overweight because I am a weak determined person	I'm overweight because I'm a weak determined person	Saya mengalami kelebihan berat badan karena saya orang bertekad lemah
I would never have a weight problem if I was more determined	I would never have a weight problem if I was more determined	Saya tidak akan pernah memiliki masalah berat badan jika saya lebih bertekad kuat
I had not enough self-control to maintain the healthy weight	I don't have enough self-control to maintain a healthy weight	Saya tidak memiliki kontrol diri yang cukup untuk menjaga berat badan yang sehat
I felt insecure about what others think of me	I feel insecure about what other people think of me	Saya merasa tidak percaya diri dengan pendapat orang lain tentang saya
People discriminated me because I have a weight problem	People discriminate against me because I have weight problems	Orang-orang mendiskriminasikan saya karena saya memiliki masalah berat badan
People who do not have a weight problem were hard to understand me	People who don't have weight problems have a hard time understanding me	Orang yang tidak memiliki masalah berat badan sulit untuk mengerti saya
People thought I have no self-control because I have a weight problem	People think that I have no self-control because I have weight problems	Orang berpikir bahwa saya tidak memiliki kontrol diri karena saya memiliki masalah berat badan
People thought I am the cause of my weight problem	People think that I am the cause of my weight problems	Orang berpikir bahwa saya adalah penyebab masalah berat badan saya
People were shy to be around me because of my weight problem	People around me are embarrassed because of my weight problem	Orang-orang malu berada di dekat saya karena masalah berat badan saya
PWSQ		
People assumed as if you are inferior/ lower	People think you're inferior (lower)	Orang-orang menganggap seolah-olah anda inferior (lebih rendah)
People assumed as if you are not smart	People think you're ignorant	Orang-orang menganggap seolah-olah anda tidak pintar
People acted as if they are afraid of you	People act as if they are scared of you	Orang-orang bersikap seolah-olah mereka takut pada anda
You are treated less politely than other people	You are treated less politely than others	Anda diperlakukan dengan kurang sopan dibandingkan orang lain
You are treated irreverent than others	You are treated with less respect than others	Anda diperlakukan dengan kurang hormat dibandingkan orang lain
You get bad services at the shop/restaurant	You get poor service in the shop/restaurant	Anda mendapat pelayanan yang buruk di toko/restoran
People assumed as if you are dishonest	People think you're being dishonest	Orang-orang menganggap seolah-olah anda tidak jujur
You got a mockery or insults	You get ridicule or insult	Anda mendapat ejekan atau hinaan
You were threatened or harassed	You are threatened or harassed	Anda diancam atau dilecehkan
You are experiencing the discrimination in some social settings (e.g., school)	You experience discrimination in some social settings (e.g., school)	Anda mengalami diskriminasi di sejumlah lingkungan sosial (misalnya, sekolah)

WSSQ: Weight Self-Stigma Questionnaire, PWSS: Perceived Weight Stigma Scale