INQUIRY: The Journal of Health Care Organization, Provision, and Financing
Volume 62: 1–9

DOI: 10.1177/00469580251339395
journals.sagepub.com/home/inq
Sage

Psychometric Evaluation of the Malay Version of Weight Stigma Exposure Inventory (WeSEI) Among Malaysian Young Adults

Wan Ying Gan, PhD[1], I-Hua Chen, PhD[2], Serene En Hui Tung, PhD[3], Ru-Yi Huang, MD[4,5,6], Wai Chuen Poon, PhD[7], Yan-Li Siaw, PhD[8], Wenjia Li, PhD[9], Jung-Sheng Chen, PhD[10], Kerry M. O'Brien, PhD[11], Mark D. Griffiths, PhD[12], and Chung-Ying Lin, PhD[13,14,15]

Abstract

The present study translated the Weight Stigma Exposure Inventory (WeSEI), an instrument assessing observed weight stigma, into Malay, and evaluated its psychometric properties among Malaysian young adults. Young adults who were Malaysian university students provided their informed consent electronically and completed an online survey hosted on *Google Forms*. Data were collected by recruiting participants via emails or *WhatsApp* between March and August 2024. The mean age of the participants (N = 691; 26.0% males) was 21.3 years (SD = 2.42). The online survey included the Malay version of WeSEI and demographic information (ie, gender, height, and weight). Height and weight were used to calculate body mass index and classified into 2 weight status groups (higher weight or non-higher weight). Psychometric evaluations included confirmatory factor analysis (CFA), internal consistency, multigroup CFA across gender and weight status groups, and known-group validity between higher weight and non-higher weight groups. The CFA results supported the 7-factor structure for the WeSEI. All subscales of the WeSEI and the entire WeSEI had good internal consistency ($\omega > 0.85$). Multigroup CFA results supported measurement invariance across gender (ie, males vs females) and weight status (ie, higher weight vs non-higher weight) groups. Also, known-group validity was supported because significantly higher WeSEI scores were observed among those in the higher weight group compared to those in the non-higher weight group. The WeSEI is a promising psychometric instrument that can assess observed weight stigma among Malaysian young adults.

Keywords

weight bias, psychometrics, observed weight stigma, weight, young adults

Highlights

- The Weight Stigma Exposure Inventory (WeSEI) assesses observed weight stigma.
- The Malay version of WeSEI was found to be psychometrically sound among Malaysian young adults.
- The Malay version of WeSEI was found to be measurement invariant across groups with different genders or weight status.

Introduction

Weight stigma refers to the negative attitudes, beliefs, stereotypes, and discrimination that are directed toward individuals who are higher weight or have obesity.[1] It is not just a personal issue, but a growing societal problem with significant cultural and public health implications. In a world increasingly shaped by social media, unrealistic beauty standards, and a growing emphasis on thinness,[2] individuals with larger body sizes often face stigma, contributing to widespread bias and social exclusion.[1] A systematic review and meta-analysis of observational studies found that 19.2% of individuals with class I obesity and 41.8% of those with class II obesity reported perceived weight discrimination.[3] Similarly, Puhl et al[4] found that 1 in 5 adults in the general U.S. population and over half of adults with obesity (52%) reported experiences of weight stigma. This issue is particularly prevalent among young adults, including both individuals with higher weight and those with non-higher body weight.[5]

The sources of weight stigma are diverse and deeply embedded in societal structures. Educators, employers,

healthcare professionals, the media (both social media and traditional media), peers, and even family members contribute to its perpetuation, highlighting the pervasive and multifaceted nature of weight stigma.[5] Its consequences are significant, leading to psychological distress,[6] decreased social and academic performance, and adverse physical health outcomes, including disordered eating, comfort eating, irregular eating patterns, alcohol-related disorder, sleep disturbance, decreased physical activity, and weight gain.[5] These consequences not only harm individuals, but also place a significant burden on healthcare systems and society. Therefore, addressing weight stigma and its pervasive consequences is an urgent public health priority.

The Weight Self-Stigma Questionnaire (WSSQ) and the Perceived Weight Stigma Scale (PWSS) are widely recognized for their validity and reliability in assessing weight stigma across diverse cultures and countries. The WSSQ assesses internalized weight stigma, focusing on how individuals perceive and adopt negative stereotypes about obesity. It has been translated and validated in multiple languages, including Chinese,[7] Italian,[8] French,[9] Spanish,[10] Persian,[11] Arabic,[12] and Thai.[13] On the other hand, the PWSS assesses an individual's level of perceived weight stigma and has been validated in Indonesian,[14] Chinese,[15] and Malay.[16] Both psychometric instruments have been widely used in research settings and have shown effectiveness in assessing weight stigma. Despite their widespread use, these instruments face notable limitations.

These existing instruments were largely developed and validated in Western contexts, limiting their applicability to non-Western populations. Consequently, there remains a critical lack of culturally adapted instruments that reflect the cultural, social, and family dynamics of non-Western populations. In addition, the existing instruments for assessing weight stigma often focus primarily on traditional sources, such as interpersonal or societal discrimination, while overlooking emerging influences, such as social media and family members or significant others, that can significantly affect self-perception and mental health. Given the growing impact of digital platforms in shaping societal attitudes and body image, there is a critical need for assessment tools that incorporate modern influences such as social media to provide a more comprehensive understanding of weight stigma. Moreover, a systematic review found that most existing measures of weight stigma were rated as "very low" quality due to inadequate assessments of instrument development and content validity,[17] emphasizing the critical need for well-designed and culturally relevant instruments to accurately assess weight stigma.

In non-Western contexts such as Malaysia, there is an absence of validated instruments specifically adapted to assess weight stigma exposure. Cultural norms, family structures, and societal attitudes toward body weight in these societies may differ significantly from those in Western societies.[2] In collectivist Asian cultures, family expectations and an emphasis on social harmony often contribute to weight-related pressures, leading to internalized stigma and distress. Weight stigma typically begins in childhood and continues into adulthood, with family members holding negative stereotypes that result in constant nagging and insults.[18] In addition, Asian beauty standards, shaped by cultural traditions and reinforced by media and social platforms, always emphasize features such as thinness, fair and flawless skin, V-shaped faces, and double eyelids.[19] The rapid rise of social media has exacerbated these pressures, highlighting the need for assessment tools that capture the unique experiences of

[1]Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Selangor, Malaysia
[2]Chinese Academy of Education Big Data, Qufu Normal University, China
[3]Division of Nutrition, Dietetics, and Food Science, School of Health Sciences, IMU University, Bukit Jalil, Kuala Lumpur, Malaysia
[4]Division of Family Medicine, Taipei Tzu Chi Hospital, Buddhist Tzu Chi Medical Foundation, Hualien, Taiwan
[5]School of Medicine, Tzu Chi University, Hualien, Taiwan
[6]Data Science Degree Program, National Taiwan University and Academia Sinica, Taipei, Taiwan
[7]Sunway Business School, Sunway University, Selangor, Malaysia
[8]Department of Educational Psychology and Counselling, Faculty of Education, Universiti Malaya, Kuala Lumpur, Malaysia
[9]International College, Kirk University, Bangkok, Thailand
[10]Department of Medical Research, E-Da Hospital, I-Shou University, Kaohsiung, Taiwan
[11]School of Social Sciences, Faculty of Arts, Monash University, Melbourne VIC, Australia
[12]International Gaming Research Unit, Psychology Department, Nottingham Trent University, Nottingham, UK
[13]Institute of Allied Health Sciences, College of Medicine, National Cheng Kung University, Tainan, Taiwan
[14]School of Nursing, College of Nursing, Kaohsiung Medical University, Kaohsiung, Taiwan
[15]Biostatistics Consulting Center, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan.

Received: February 5, 2025; revised: April 11, 2025; accepted: 16 April 2025

Corresponding Authors:
Ru-Yi Huang, Taipei Tzu Chi Hospital, No.289, Jianguo Rd., Xindian District., New Taipei City 23142, Taiwan.
Email: ruyi.star@gmail.com

Wenjia Li, International College, Kirk University, Bangkok 10220, Thailand.
Email: liwenjiacool@163.com

Chung-Ying Lin, Institute of Allied Health Sciences, College of Medicine, National Cheng Kung University, 1 University Road, East District, Tainan 701401, Taiwan.
Email: cylin36933@gmail.com

weight stigma in non-Western populations. Therefore, there is a need for psychometrically validated instruments that encompass diverse cultural contexts to provide a more comprehensive understanding of the diverse sources and impacts of weight stigma in today's social landscape.

The Weight Stigma Exposure Inventory (WeSEI) is a newly developed instrument designed to assess exposure to weight stigma from various sources, including social media, traditional media, movies, parents, friends, significant others, and strangers.[20] Unlike many weight stigma assessment instruments developed in Western contexts, the WeSEI was designed specifically for Asian populations, reflecting cultural differences and societal factors that may differ significantly from those in Western societies.[20] For instance, family and community dynamics, beauty standards, and attitudes toward body weight may shape the experience and perception of weight stigma differently in Asian cultures.[21] Its validation among Taiwanese[20] and Turkish[22] populations demonstrates its cultural relevance, making it a valuable instrument for assessing weight stigma in Asia. Further validation in other Asian contexts, such as Malaysia (where the present study was conducted), may provide critical insights into these cultural differences, enhancing its cross-cultural applicability while addressing unique regional experiences of weight stigma. Moreover, conducting a validation study of the WeSEI among Malaysian populations will also enable healthcare professionals to address weight stigma more effectively.

In addition to validation, assessment of measurement invariance across gender (ie, male vs female) and weight status groups (ie, higher weight vs non-higher weight) is critical to evaluating the psychometric properties of the WeSEI. This ensures that any observed differences in WeSEI scores reflect differences in experience rather than biases introduced by the instrument itself. Establishing measurement invariance confirms that the instrument functions consistently across subgroups.[23-25]

The present cross-sectional study evaluated the psychometric properties of the Malay version of the WeSEI among Malaysian young adults. First, the validity of the WeSEI was examined using confirmatory factor analysis (CFA). Findings from CFA could help healthcare providers better understand how individuals perceive the observed weight stigma in different forms. Second, convergent and discriminant validity of the WeSEI were determined. Convergent and discriminant validity help identify that the WeSEI can assess observed weight stigma rather than other types of weight stigma. It is important for healthcare providers to know what specific construct is being assessed when using a measure. Third, the measurement invariance of the WeSEI across gender and weight status groups was examined. Measurement invariance tested using CFA ensures that the WeSEI is fair and unbiased across different groups. This is critical when applying this measure among populations with diverse conditions (eg, multiethnicity in Malaysia). Finally, known group validity (a type of construct validity) was used to determine whether WeSEI scores differed between higher weight and non-higher weight groups. Known-group validity helps healthcare providers know that the WeSEI can be sensitive in distinguishing different types of individuals.

Methods

Participants and Data Collection Procedure

The study protocol was approved by the Ethics Committee for Research Involving Human Subjects in Universiti Putra Malaysia (JKEUPM; Reference Number: JKEUPM-2023-1324) prior to the data collection. The study comprised an online survey with a cross-sectional design, and followed the STROBE checklist (please see Supplemental Material A) proposed by the EQUATOR team.[26] All participants were recruited using convenience sampling between 12 March and 31 August 2024 through emails or *WhatsApp* messages sent by the student representative councils of the universities. The participants completed the online survey at any place they felt comfortable to use their device (eg, smartphone, tablet, or laptop) to answer the questions. The average time taken to complete the survey was 10 minutes. The online survey was hosted on *Google Forms.* University students (N=691; 180 males [26.0%]; mean age=21.3 years [SD=2.42] years) were included in the study if they met the following inclusion criteria: (i) being Malaysian; (ii) being aged 19 years and above; (iii) currently studying undergraduate programs at a university in Malaysia; and (iv) having access to the internet. The age cutoff of 19 years and above was selected based on the typical age range of university students in Malaysia given that students typically enter undergraduate programs at this age. As for focusing exclusively on undergraduate students, this decision was made to target individuals who were currently enrolled in university-level education, which is often associated with specific developmental, social, and academic experiences that could influence weight stigma. This period is crucial for identity development and increased awareness of societal beauty standards, particularly in Malaysia's multicultural context. This focus allowed for a more homogeneous sample and helped to reduce variability that might arise from including graduate students, who may have different life experiences and exposures. Those who agreed and were willing to voluntarily participate in the study were required to provide informed consent and endorse the statement *"I agree to participate in the study"* electronically on the online consent form before being directed to complete the online survey.

Measures (Please see Supplemental Material B for all questions asked)

Weight Stigma Exposure Inventory (WeSEI). The 35-item WeSEI is a newly developed instrument that assesses observed weight stigma (or weight stigma exposure) from different sources, including social media, traditional media, television, parents, friends, significant others, and strangers.[20] Each source is assessed using 5 items and can be summed as a subscale score. All items are rated using a

five-point Likert scale from 1 (*never*) to 5 (*almost always*), and a higher score indicates a greater level of observed weight stigma in that source. The WeSEI has shown promising psychometric properties, with CFA demonstrating a 7-factor structure.[20,22]

The WeSEI was translated into the Malay language using a standardized translation procedure.[27] More specifically, 2 translators independently translated the WeSEI from English to Malay. Then, a consensus was made between the 2 forward translations to generate an initial Malay language version with the help of the first author. The initial Malay language version was then back-translated to English by another 2 translators who were not familiar with the WeSEI. Then, an expert panel (including nutritionists, educators, psychometricians, and weight stigma experts) reviewed the original English WeSEI, the 2 forward translated Malay versions of WeSEI, the initial Malay version of WeSI, and the 2 back-translated English versions of WeSEI. There were no specific challenges encountered during the translation process. The items in WeSEI were clear and easy to understand, which facilitated an easy translation into Malay. Although no major issues arose, minor adjustments were made to ensure that the phrasing was culturally appropriate and easily understood within the Malaysian context. A prefinal version of Malay WeSEI was then generated. A number of university students were then asked to read the prefinal version of Malay WeSEI and they confirmed that its readability was satisfactory.

Demographics and Background Information. The participants self-reported their gender (male or female) and anthropometric information. For the anthropometric information, they reported their height in cm and weight in kg. Then, body mass index (BMI) was calculated using the self-reported height and weight. The participants were then further classified into a higher weight group ($BMI \geq 23\,kg/m^2$) or a non-higher weight group ($BMI < 23\,kg/m^2$) according to the BMI cutoffs for Asian individuals.[28]

Data Analysis

The analytical approach comprised several steps to comprehensively evaluate the WeSEI. First, descriptive statistics (means and standard deviations) were calculated for all WeSEI items. To compare differences among the 7 subscales, a within-participants analysis of variance (ANOVA) was used, which examined differences in exposure levels across the various sources of weight stigma. Then, the relationships between subscales were examined using Pearson correlation coefficients for all possible pairs of the 7 subscales. The strength and pattern of these correlations provided insight into the interconnections between different sources of weight stigma exposure.

CFA was performed to assess the factor structure of the WeSEI (ie, the 7-factor structure reported by Ruckwongpatr et al[20] and Çarkıt et al.[22]). Model fit was evaluated using multiple indices: comparative fit index (CFI), Tucker-Lewis index (TLI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) with 90% confidence intervals (CIs). Following Kline's[29] recommendations, the following criteria were adopted for acceptable fit: CFI and TLI > 0.90, with appropriate values < 0.08 for RMSEA and SRMR. For convergent validity, composite reliability (CR) and average variance extracted (AVE) were used, and $CR > 0.6$[30] with $AVEs > 0.45$ were considered acceptable for a newly developed scale.[31] Discriminant validity was evaluated using the heterotrait-monotrait ratio (HTMT), adopting Henseler et al's[32] criterion of values below 0.85 to indicate sufficient discriminant validity. Internal consistency was evaluated at both the scale and item levels using ω. Also, ω-if-item-dropped coefficients were calculated to assess the contribution of individual items to scale internal consistency.

To examine measurement invariance across gender (male vs female) and weight status (higher weight vs non-higher weight), multiple-group CFAs were used. The multiple-group CFAs involved comparing 3 nested models: configural invariance (baseline model), metric invariance (factor loadings constrained), and scalar invariance (factor loadings and item intercepts constrained). Following Chen's[33] recommendations, measurement invariance was supported if ΔCFI (ie, the CFI difference between every 2 nested models) > -0.01, ΔRMSEA (ie, the RMSEA difference between every 2 nested models) < 0.015, and ΔSRMR (ie, the SRMR difference between every 2 nested models) < 0.03 for factor loadings or < 0.01 for item intercepts.

Finally, known-groups validity (a type of construct validity) was used to examine if WeSEI scores were different between higher weight and non-higher weight groups using independent samples *t*-tests. These analyses were conducted for both the overall scale and individual subscales, with effect sizes calculated using Cohen's *d* (0.2 indicates small, 0.5 moderate, and 0.8 large effects).[34]

Results

Analysis of the WeSEI showed distinct patterns across different sources (see Table 1). Social media and television emerged as the predominant sources of weight stigma exposure, with mean scores exceeding 2.0 for all items within these subscales. Statistical analysis demonstrated that both social media and television sources exhibited significantly higher exposure levels compared to the other subscales ($F(6, 4140) = 403.56$, $P < .001$). Internal consistency of the WeSEI was supported by high ω values, with all subscales demonstrating values above 0.85. Furthermore, the ω-if-item-dropped coefficients exceeded 0.80 for all items, indicating strong internal consistency across the scale (see Table 1).

Examination of interrelationships among the 7 subscales showed significantly positive correlations (see Supplemental Table S1). The strongest correlations were observed between

Table 1. Psychometric Properties of Items in the Weight Stigma Exposure Inventory.

Factor name or item number	Mean	SD	ω or ω-if-items dropped	Factor loading
Social media source	16.56	4.68	0.88	
Item 1	3.01	1.16	0.86	0.71
Item 2	3.78	1.11	0.87	0.71
Item 3	3.45	1.07	0.84	0.80
Item 4	3.25	1.19	0.84	0.82
Item 5	3.07	1.19	0.85	0.79
Traditional media source	12.79	5.14	0.93	
Item 6	2.37	1.05	0.91	0.84
Item 7	2.99	1.21	0.93	0.78
Item 8	2.61	1.18	0.90	0.89
Item 9	2.48	1.21	0.90	0.86
Item 10	2.34	1.21	0.91	0.85
Television source	16.08	4.97	0.92	
Item 11	2.97	1.07	0.91	0.83
Item 12	3.63	1.17	0.92	0.72
Item 13	3.03	1.13	0.90	0.86
Item 14	3.21	1.14	0.89	0.89
Item 15	3.24	1.19	0.90	0.87
Parents source	10.93	4.99	0.90	
Item 16	2.35	1.2	0.87	0.86
Item 17	2.78	1.3	0.89	0.82
Item 18	1.98	1.16	0.87	0.79
Item 19	2.15	1.2	0.87	0.81
Item 20	1.66	1.06	0.90	0.68
Friends source	11.31	4.78	0.90	
Item 21	2.31	1.1	0.87	0.88
Item 22	3.01	1.28	0.92	0.75
Item 23	2.03	1.12	0.86	0.76
Item 24	2.16	1.16	0.86	0.78
Item 25	1.80	1.07	0.88	0.69
Significant others source	8.91	4.78	0.93	
Item 26	1.78	1.04	0.91	0.92
Item 27	2.15	1.32	0.94	0.80
Item 28	1.76	1.07	0.91	0.89
Item 29	1.69	1.02	0.91	0.87
Item 30	1.52	0.95	0.93	0.77
Strangers source	14.68	5.27	0.93	
Item 31	2.91	1.16	0.92	0.89
Item 32	3.31	1.24	0.93	0.78
Item 33	2.87	1.16	0.91	0.91
Item 34	2.88	1.19	0.91	0.86
Item 35	2.71	1.18	0.92	0.85

social media and traditional media sources ($r = .55$), and between social media and television sources ($r = .55$). In contrast, weaker correlations were found between social media and significant others ($r = .27$), as well as between television and significant others ($r = .26$). Moreover, the convergent validity of the WeSEI was supported by CRs ranging from 0.88 to 0.93 and AVEs ranging from 0.59 to 0.74. Discriminant validity of the WeSEI was supported by the HTMT, with all intercorrelations falling below the threshold of 0.85 (see Supplemental Table S1).

Table 2 presents the fit indices for the WeSEI. The CFA showed satisfactory model fit across all indices: $\chi^2(539) = 1257.62$, CFI = 0.985, TLI = 0.983, RMSEA = 0.044, and SRMR = 0.059, supporting the 7-factor structure for the WeSEI. Moreover, all items demonstrated robust factor loadings exceeding 0.65, with the majority surpassing 0.80 (see Table 1). The supported 7-factor structure was then examined for its measurement invariance across gender (male vs female) and weight status (higher weight vs non-higher weight) groups. As shown in Table 2, each group demonstrated acceptable

Table 2. Model Fit Indices Across Different Sample Groups.

Fit indices	Total sample	Male	Female	Normal weight	Overweight
χ^2 (df)	1257.62 (539)	505.51 (539)	949.20 (539)	1108.72 (539)	352.91 (539)
P-value of χ^2	<.001	<.001	<.001	<.001	1.000
CFI	0.985	0.999	0.989	0.981	0.999
TLI	0.983	0.999	0.987	0.980	0.999
RMSEA (90% CI)	0.044 (0.041, 0.047)	0.059 (0.056, 0.063)	0.039 (0.035, 0.043)	0.047 (0.043, 0.050)	0.046 (0.043, 0.048)
SRMR	0.059	0.071	0.061	0.067	0.056

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

Table 3. Fit Indexes in Measurement Invariance Across Different Groups.

Male and female									
Model	χ^2	df	CFI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	ΔCFI	ΔRMSEA	ΔSRMR
M0	1454.71	1078	0.992	0.032	0.063					
M1	1522.95	1106	0.991	0.033	0.065	68.24	28	−0.001	0.001	0.002
M2	1546.53	1134	0.991	0.032	0.065	23.58	28	0.000	−0.001	0.000
Normal weight and higher weight										
Model	χ^2	df	CFI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	ΔCFI	ΔRMSEA	ΔSRMR
M0	1461.63	1078	0.992	0.032	0.064					
M1	1606.07	1106	0.989	0.036	0.066	144.44	28	−0.003	0.004	0.002
M2	1623.76	1134	0.990	0.035	0.066	17.69	28	0.001	−0.001	0.000

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; M0 = model testing configural invariance; M1 = model with factor loadings constrained; M2 = model with factor loadings and intercept constrained.

model fit, establishing the prerequisite configural invariance for subsequent invariance testing. Table 3 summarizes the comparison of nested models. The results supported measurement invariance across both gender and weight status groups, with metric invariance (equal factor loadings) and scalar invariance (equal item intercepts) demonstrated by changes in fit indices (ΔCFI, ΔRMSEA, and ΔSRMR) falling within acceptable ranges.

Known-groups validity was examined by comparing weight stigma exposure between higher weight and non-higher weight groups. The higher weight group had significantly higher scores on the overall WeSEI (t=3.72, P<.001, Cohen's d=0.31). This pattern was consistent across most of the subscales (t=2.67-3.89, *P*-values ranging from <.001 to .008, Cohen's d ranging from 0.22 to 0.33), with the exception of the "significant others" subscale. These findings provided support that the WeSEI has good known-groups validity.

Discussion

The present study is the first in Malaysia to examine the psychometric properties of the Malay WeSEI among Malaysian young adults. The findings indicated good psychometric properties for the WeSEI, including confirmation of its 7-factor structure, internal consistency of the 7 factors and the entire WeSEI, convergent and discriminant validity of the 7 factors, measurement invariance across gender and weight status groups, and known-group validity. Given the promising psychometric properties found in the present study, the WeSEI could be used by healthcare providers to help identify weight stigma exposure among young adults and provide early intervention to avoid negative consequences caused by such observed weight stigma.

The present findings are comparable to the previous WeSEI psychometric testing studies among Chinese, Taiwanese,[20] and Turkish young adults[22] More specifically, the present study confirmed the same 7-factor structure as the previous psychometric evaluation studies.[20,22] The 7 factors indicated that social media, traditional media, movies, parents, friends, significant others, and strangers contributed their specific and unique weight bias information to the participants. More specifically, social media and television were the most significant sources of weight stigma in the present study, reflecting the growing influence of digital platforms and media in shaping the exposures of weight stigma. In Malaysia, cultural norms significantly shape weight stigma, with social media and television content playing key roles in reinforcing collectivist values, food-centric traditions, and promoting unrealistic body ideals.[18] Media content often promotes thinness as the ideal body shape, especially through influencers, celebrities and television shows. This widespread exposure, particularly among young adults who are highly engaged with digital platforms, can exacerbate the exposure of weight stigma. These cultural influences highlight the need for culturally adapted tools such as the WeSEI.

In addition to the 7-factor structure, the present findings echo similar internal consistency scores (ω=0.88-0.93) to

those reported by Ruckwongpatr et al[20] (ω = 0.894-0.980) and Çarkıt et al.[22] (ω = 0.872-0.947). Similar to Ruckwongpatr et al,[20] the present study also supported the known-group validity of the WeSEI across higher weight and non-higher weight groups. In contrast to the high HTMT ratios (ie, >0.9) reported by Ruckwongpatr et al,[20] the present findings showed that all HTMT ratios were <0.9, consistent with the findings of Çarkıt et al.[22] Therefore, Malaysians may consider the 7 factors as being more distinct than young adults from China and Taiwan. However, future studies are needed to examine if culture/ethnicity plays a role in individuals interpreting the 7 factors differently.

Moreover, the 7-factor structure was invariant across gender and weight status groups. Therefore, individuals with different gender/weight status all considered these sources as providing different information regarding weight bias. This indicates the appropriateness of comparing WeSEI scores between gender and weight status groups. Previous studies have shown that females report experiencing weight stigma more frequently than males,[35,36] and individuals with higher weight or who have obesity often experience more frequent and intense weight stigma compared to those with a healthy weight.[1,37,38]

Practical Implications

The WeSEI can be of use to various different stakeholders, including clinicians/healthcare providers, universities, and researchers. More specifically, (i) for clinicians/healthcare providers, the WeSEI can help them better understand the specific weight stigma experiences of different groups (by gender and weight status) and subsequently develop more tailored interventions. For instance, healthcare providers could use the WeSEI subscales (eg, high score in social media subscale) to identify individuals who experience significant weight stigma and develop personalized support strategies, such as counseling or behavioral interventions, to address its psychological consequences; (ii) for universities, the WeSEI can be integrated into the health screenings of new students due to the rising mental health concerns among Malaysian university students; and (iii) for researchers, they can consider pairing quantitative WeSEI data with qualitative interviews to explore why media-driven stigma is prominent. The application of the WeSEI in scientific research could help identify and analyze the various sources of weight stigma, providing important insights for reducing its effects. Overall, the WeSEI has the potential to enhance clinical practice, shape public health strategies, and inform research aimed at reducing weight stigma and improving overall well-being.

Future Research Directions

Future studies should focus on validating WeSEI in different cultural and demographic contexts to determine its application among diverse populations. For instance, future studies could validate WeSEI in other populations such as adolescents, adults, or individuals from different ethnic backgrounds to determine its cross-cultural applicability and to identify any age- or culture-specific differences in weight stigma experiences. In addition, examining the WeSEI in different settings such as schools, workplaces, and clinical settings (among patients with obesity) could provide insights into the experience of weight stigma in different social contexts. Longitudinal studies examining changes in weight stigma over time would also strengthen the responsiveness and predictive validity of WeSEI.

Strengths and Limitations

The present study had both strengths and limitations. The strengths included (i) studying a relatively new instrument assessing observed weight stigma; (ii) having a relatively large sample size; (iii) applying advanced psychometric testing methods (ie, CFA and multigroup CFA) to examine the WeSEI psychometric properties; and (iv) being the first study to examine Malay version of the WeSEI (finding it appropriate to be used with young Malaysian adults).

However, there are some limitations to the study. First, some psychometric properties (eg, test-retest reliability, responsiveness, and other types of validity such as concurrent and predictive validity) were not examined. Future research should aim to address this limitation by evaluating other psychometric properties to provide a more robust evaluation of the WeSEI. Second, the study sample was heavily skewed toward females, which may limit the generalizability of the findings to male populations. Given that weight stigma may be experienced differently by different genders, the overrepresentation of females may have influenced the results. Future studies should recruit more gender-balanced samples to ensure that the findings are representative of both males and females.

Third, the sample was collected using an online convenience sampling and therefore not representative of either the university population or the Malay population more benerally. Convenience sampling can introduce selection bias, because participants with internet access and are willing to engage in online surveys may differ from those who do not. Future studies could use more rigorous sampling methods, such as stratified random sampling, to ensure a more representative sample and increase the generalizability of the findings. Fourth, the data regarding weight and height were both self-reported. This may have introduced potential biases, such as social desirability bias, in which participants may underreport their weight or overreport their height to conform to societal expectations. This could lead to an underestimation of BMI, particularly among individuals with higher weight, which could potentially affect the accuracy of the comparisons between weight status groups. Future studies should use objective measurements of weight and height to ensure more accurate BMI data. Lastly, the present study did not perform a priori sample size calculation. Future studies should include a power analysis to guide sample size determination to ensure the reliability of the findings.

Conclusion

In conclusion, the present study found that the newly developed psychometric instrument assessing observed weight stigma (ie, the WeSEI) is a promising instrument to be used among Malaysian young adults. The WeSEI was translated into Malay using a rigorous procedure to ensure its linguistic validity, which was further supported by the good psychometric properties examined in the present study. Healthcare providers in Malaysia may use the WeSEI to identify if any individual has high levels of observed weight stigma. Appropriate programs can be designed to address observed weight stigma in Malaysians to prevent subsequent problems (eg, mental health problems) caused by weight stigma.

ORCID iDs

Wan Ying Gan https://orcid.org/0000-0002-9016-3414
Serene En Hui Tung https://orcid.org/0000-0001-9122-7523
Wai Chuen Poon https://orcid.org/0000-0003-1258-3576
Yan-Li Siaw https://orcid.org/0000-0002-2815-4867
Chung-Ying Lin https://orcid.org/0000-0002-2129-4242

Ethical Considerations

This study involving human participants was performed in accordance with the principles of the Helsinki Declaration. Approval was granted by the Ethics Committee for Research Involving Human Subjects in Universiti Putra Malaysia (JKEUPM; Reference Number: JKEUPM-2023-1324).

Consent to Participate

Written informed consent was obtained from all individual participants included in the study.

Consent for Publication

All authors consented to the publication of the manuscript.

Author Contributions

Conceptualization: WYG, I-HC, SEHT, R-YH, WL, J-SC, KMO, JDL, MDG, and C-YL; Methodology: WYG, WCP, YLS, KMO, JDL, and C-YL; Investigation: WYG, I-HC, R-YH, WL, and C-YL; Validation: WYG, SEHT, R-YH, WCP, YLS, WL, J-SC, KMO, JDL, and MDG; Writing—original draft: WYG, I-HC, and C-YL; Writing—review & editing: WYG, I-HC, SEHT, R-YH, WCP, YLS, WL, J-SC, KMO, JDL, MDG, and C-YL; Statistical analysis: I-HC and C-YL; Visualization: I-HC; Supervision: C-YL. All authors read and approved the final manuscript.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Financial support was received from the National Science and Technology Council, Taiwan (NSTC 112-2410-H-006-089-SS2), the Higher Education Sprout Project, Ministry of Education to the Headquarters of University Advancement at National Cheng Kung University (NCKU), and the 2021 Southeast and South Asia and Taiwan Universities Joint Research Scheme (NCKU 31).

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Supplemental Material

Supplemental material for this article is available online.

References

1. Puhl RM, Heuer CA. Obesity stigma: important considerations for public health. *Am J Public Health*. 2010;100(6):1019-1028. doi:10.2105/AJPH.2009.159491
2. Merino M, Tornero-Aguilera JF, Rubio-Zarapuz A, Villanueva-Tobaldo CV, Martín-Rodríguez A, Clemente-Suárez VJ. Body perceptions and psychological well-being: a review of the impact of social media and physical measurements on self-esteem and mental health with a focus on body image satisfaction and its relationship with cultural and gender factors. *Healthcare*. 2024;12(14):1396. doi:10.3390/healthcare12141396
3. Spahlholz J, Baer N, König HH, Riedel-Heller SG, Luck-Sikorski C. Obesity and discrimination - a systematic review and meta-analysis of observational studies. *Obes Rev*. 2016;17(1):43-55. doi:10.1111/obr.12343
4. Puhl RM, Himmelstein MS, Quinn DM. Internalizing weight stigma: prevalence and sociodemographic considerations in US adults. *Obesity*. 2018;26(1):167-175. doi:10.1002/oby.22029
5. Puhl RM, Lessard LM. Weight stigma in youth: prevalence, consequences, and considerations for clinical practice. *Curr Obes Rep*. 2020;9(4):402-411. doi:10.1007/s13679-020-00408-8
6. Alimoradi Z, Golboni F, Griffiths MD, Broström A, Lin CY, Pakpour AH. Weight-related stigma and psychological distress: a systematic review and meta-analysis. *Clin Nutr*. 2020;39(7):2001-2013. doi:10.1016/j.clnu.2019.10.016
7. Lin KP, Lee ML. Validating a Chinese version of the Weight Self-Stigma Questionnaire for use with obese adults. *Int J Nurs Pract*. 2017;23(4):e12537. doi:10.1111/ijn.12537
8. Rossi AA, Manzoni GM, Pietrabissa G, Di Pauli D, Mannarini S, Castelnuovo G. Weight stigma in patients with overweight and obesity: validation of the Italian Weight Self-Stigma Questionnaire (WSSQ). *Eat Weight Disord*. 2022;27(7):2459-2472. doi:10.1007/s40519-022-01385-8
9. Maïano C, Aimé A, Lepage G, Morin AJS. Psychometric properties of the Weight Self-Stigma Questionnaire (WSSQ) among a sample of overweight/obese French-speaking adolescents. *Eat Weight Disord*. 2019;24(3):575-583. doi:10.1007/s40519-017-0382-0
10. Magallares A, de Valle PB, Irles JA, Recio P, Jáuregui-Lobera I. Psychometric properties of the Spanish version of the Weight Self-Stigma Questionnaire (S-WSSQ) in a sample of participants

with obesity seeking weight loss treatment. *Eat Weight Disord*. 2022;27(8):3685-3693. doi:10.1007/s40519-022-01511-6
11. Lin CY, Imani V, Cheung P, Pakpour AH. Psychometric testing on two weight stigma instruments in Iran: weight self-stigma questionnaire and weight bias internalized scale. *Eat Weight Disord*. 2020;25(4):889-901. doi:10.1007/s40519-019-00699-4
12. BinDhim NF, Althumiri NA, Basyouni MH, Sims OT, Alhusseini N, Alqahtani SA. Arabic translation of the Weight Self-Stigma Questionnaire: instrument validation study of factor structure and reliability. *JMIR Form Res*. 2020;4(11):e24169. doi:10.2196/24169
13. Chirawat P, Kamolthip R, Rattaprach R, et al. Weight stigma among young adults in Thailand: reliability, validation, and measurement invariance of the Thai-translated Weight Self Stigma Questionnaire and perceived weight stigma scale. *Int J Environ Res Public Health*. 2022;19(23):15868. doi:10.3390/ijerph192315868
14. Nadhiroh SR, Nurmala I, Pramukti I, Tivany ST, Tyas LW, Zari AP, et al. Weight stigma in Indonesian young adults: validating the Indonesian versions of the Weight Self-Stigma Questionnaire and Perceived Weight Stigma Scale. *Asian J Soc Health Behav*. 2022;5(4):169-179. doi:10.4103/shb.shb_189_22
15. Ahorsu DK, Chen CY, Chen IH, et al. The Perceived Weight Stigma Scale and Weight Self-Stigma Questionnaire: Rasch analysis, confirmatory factor analysis, and network analysis among Chinese adolescents. *Public Health*. 2024;236:373-380. doi:10.1016/j.puhe.2024.08.016
16. Gan WY, Tung SEH, Ruckwongpatr K, et al. Evaluation of two weight stigma scales in Malaysian university students: weight self-stigma questionnaire and perceived weight stigma scale. *Eat Weight Disord*. 2022;27(7):2595-2604. doi:10.1007/s40519-022-01398-3
17. Papadopoulos S, de la Piedad Garcia X, Brennan L. Evaluation of the psychometric properties of self-reported weight stigma measures: a systematic literature review. *Obes Rev*. 2021;22(8):e13267. doi:10.1111/obr.13267
18. Mathialagan S, Lau PL. Weightism in Asia: a narrative review and implications for practice. *J Obes Metab Syndr*. 2024;33(4):314-325. doi:10.7570/jomes24033
19. Lang M, Ye Y. Beauty ideals and body positivity: a qualitative investigation of young women's perspectives on social media content in China. *Front Psychol*. 2024;15:1389935. doi:10.3389/fpsyg.2024.1389935
20. Ruckwongpatr K, Chen IH, Pramukti I, et al. Assessing exposure to weight stigma: development and initial validation of the Weight Stigma Exposure Inventory (WeSEI). *J Eat Disord*. 2025;13:2. doi:10.1186/s40337-024-01168-9
21. Yunus NA, Russell G, Muhamad R, Chai TL, Ahmad Zawawi MAF, Sturgiss E. The experience of living with obesity for adults in Asian countries: a scoping review of qualitative studies. *Obes Rev*. 2023;24(11):e13619. doi:10.1111/obr.13619
22. Çarkıt C, Gan WY, Koç H, Bevan N, Avcı E, Lin YC. Weight stigma exposure inventory (WeSEI): adaptation to Turkish culture, validity and reliability study. *J Soc Media Res*. 2025;2(1):24-34. doi:10.29329/jsomer.27
23. Ghazi FR, Gan WY, Tung SEH, et al. Problematic gaming in Malaysian university students: translation and psychometric evaluation of the Malay language versions of Gaming Disorder Test and Gaming Disorder Scale for young adults. *Eval Health Prof*. 2024;47(1):93-104. doi:10.1177/01632787231185845
24. Pakpour AH, Tsai MC, Lin YC, et al. Psychometric properties and measurement invariance of the Weight Self-Stigma Questionnaire and Weight Bias Internalization Scale in children and adolescents. *Int J Clin Health Psychol*. 2019;19(2):150-159. doi:10.1016/j.ijchp.2019.03.001
25. Rozzell-Voss KN, Marshall RD, Lin CY, Latner JD. The modified Weight Bias Internalization Scale: measurement invariance by weight status and race among undergraduate women. *Int J Obes*. 2024;48(12):1705-1710. doi:10.1038/s41366-024-01602-7
26. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The strengthening the reporting of observational studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Ann Intern Med*. 2007;147(8):573-577. doi:10.7326/0003-4819-147-8-200710160-00010
27. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*. 2000;25(24):3186-3191. doi:10.1097/00007632-200012150-00014
28. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet*. 2004;363(9403):157-163. doi:10.1016/S0140-6736(03)15268-3
29. Kline RB. *Principles and Practice of Structural Equation Modeling*. Guilford Publications; 2023.
30. Shrestha N. Factor analysis as a tool for survey analysis. *Am J Appl Math Stat*. 2021;9(1):4-11. doi:10.12691/ajams-9-1-2
31. Netemeyer RG, Bearden WO, Sharma S. *Scaling Procedures: Issues and Applications*. Sage Publications; 2003.
32. Henseler J, Ringle CM, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J Acad Mark Sci*. 2015;43:115-135. doi:10.1007/s11747-014-0403-8
33. Chen FF. Sensitivity of goodness of fit indexes to lack of measurement invariance. *Struct Equ Modeling*. 2007;14(3):464-504. doi:10.1080/10705510701301834
34. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Lawrence Erlbaum Associates, Publishers; 1988.
35. Sattler KM, Deane FP, Tapsell L, Kelly PJ. Gender differences in the relationship of weight-based stigmatisation with motivation to exercise and physical activity in overweight individuals. *Health Psychol Open*. 2018;5(1):2055102918759691. doi:10.1177/2055102918759691
36. Xu P, Chen JS, Chang YL, et al. Gender differences in the associations between physical activity, smartphone use, and weight stigma. *Front Public Health*. 2022;10:862829. doi:10.3389/fpubh.2022.862829
37. Gmeiner MS, Warschburger P. Interrelation between weight and weight stigma in youth: is there evidence for an obesogenic vicious cycle? *Eur Child Adolesc Psychiatry*. 2023;32(4):697-704. doi:10.1007/s00787-021-01922-3
38. Lin YC, Lin CY, Saffari M, et al. Weight stigma is associated with body mass index among college students in Taiwan: the mediated role of internalized weight stigma. *BMC Psychol*. 2023;11(1):365. doi:10.1186/s40359-023-01414-w