

Validity and Reliability of the Malay Universal Measure of Bias-Fat among Staff and Students at Health Campus, Universiti Sains Malaysia

Zolkefili@Zulkifli NA^a, Ali A^a, Yunus NA^a, Ab Hamid SA^b, Abdul Rahman R^a, Ahmad I^a, Muhamad R^a

^aFamily Medicine Department, School of Medical Science, Universiti Sains Malaysia, Kelantan, Malaysia

^bBiostatistics and Research Methodology Unit, School of Medical Sciences, Universiti Sains Malaysia, Kelantan, Malaysia

Corresponding Author: Prof. Dr. Rosediani Muhamad

Family Medicine Department, School of Medical Sciences, Universiti Sains Malaysia, Kelantan, Malaysia.

Email: rosesyam@usm.my

ABSTRACT

INTRODUCTION: Weight stigma contributes to negative physical and psychological outcomes and reduced healthcare engagement. Obesity in Malaysia is increasing, yet exploration of weight stigma is scarce. This study aimed to translate and validate the Universal Measure of Bias-Fat (UMB-Fat) for assessing obesity stigma among Malaysians. **MATERIALS AND METHODS:** A cross-sectional study was conducted among 456 staff and students at USM Health Campus. The UMB-Fat was translated into Malay using forward and backward translation by research team members and a certified translator. The Malay UMB-Fat underwent face validity, construct validity using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), and reliability testing. **RESULTS:** Face validity demonstrated excellent clarity and comprehensibility, with item-level face validity indices (I-FVI) ranging from 0.90 to 1.00 and a scale-level average (S-FVI/Ave) of 0.94. EFA (n=206) using principal-axis factoring and Promax rotation yielded three factors with 16 items retained, all of which had satisfactory factor loadings with KMO = 0.841 ($p < 0.001$), and the total variance explained was 61.37%. Subsequent CFA analysis (n=250) revealed a three-factor model of 15 items with a goodness of fit index of comparative fit index = 0.952, Tucker-Lewis index = 0.938, chi-squared/degree of freedom = 2.11, and root mean square error of approximation = 0.068. The reliability testing using Cronbach's alpha was satisfactory for 3 factors (0.860, 0.836, and 0.852, respectively). **CONCLUSION:** The Malay version of UMB-Fat is a valid and reliable tool for assessing weight stigma among Malaysians.

KEYWORDS: Malay, Obesity stigma, UMB-Fat, Reliability, Validation.

INTRODUCTION

Obesity has become a major global public health concern, increasing the risk of chronic diseases and psychosocial burden.^{1,2} Beyond physical consequences, individuals with obesity often experience weight stigma, which can lead to psychological distress, social exclusion, and avoidance of healthcare.^{3,4} This may lead to poor mental health, unhealthy eating habits, and poor health-seeking behaviour.⁵

In Malaysia, the prevalence of overweight and obesity has been rising, with the National Health and Morbidity Survey⁶ reporting that 54.4% of Malaysian adults were either overweight or obese. Despite increased awareness of obesity recognised as a chronic disease, weight stigma remains prevalent, even among healthcare professionals.⁷⁻⁹ Understanding these attitudes is important for more effective interventions and promoting weight-inclusive care.

Many instruments have been developed to study weight stigma, including the Universal Measure of Bias (UMB-Fat).¹⁰ The instrument has been used and validated in Western populations and among healthcare providers in Malaysia.^{10,11} However, the questionnaire was in English language, which limits its use among

the Malaysian general population. The study also revealed local variations in some of the item functioning, emphasising the need for culturally adapted instruments.¹¹

Therefore, this study aimed to translate, adapt, and validate the Malay version of UMB-Fat among staff and students at the Health Campus, Universiti Sains Malaysia. The validation process followed established guidelines encompassing forward-backward translation, expert review, face validity testing, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA).^{12–15} A validated Malay UMB-Fat can serve as a reliable tool for measuring weight bias in the Malaysian context and guide future efforts to address weight stigma through research and education.

METHODS AND MATERIALS

Study Design and Participants

This cross-sectional study was carried out in two phases. Phase I involved translation and cultural adaptation of the instrument, while Phase II comprised face validity testing, exploratory factor analysis (EFA), and finally confirmatory factor analysis (CFA). The study involved 486 participants (Face validity, $n=30$, EFA, $n=206$; CFA, $n=250$), which was conveniently sampled from staff and students in the Health Campus of Universiti Sains Malaysia.

Sample Size Determination

Two separate samples were recruited based on a rule-of-thumb approach. For EFA, a minimum of five respondents per item was required. An additional 20% was added to account for dropout, resulting in a sample of 206 participants.¹⁶ For CFA, a minimum of 200 participants was considered adequate based on the recommended guideline,¹⁷ and the target sample size was set at 250 to allow for potential missing data.

Study Instruments

Proforma for Sociodemographic

A structured proforma was used to collect participants' sociodemographic information, including age, sex, ethnicity, marital status, education level, occupation, income level, weight and height. A formula for calculating body mass index (BMI) was also included in the proforma to facilitate the calculation of BMI.

Study Instrument- Universal Measure of Bias-Fat (UMB-Fat)

The Universal Measure of Bias-Fat (UMB-Fat)¹⁰ is a scale used to assess the magnitude of bias against people with obesity. It was developed in 2008 among undergraduate psychology students in New Zealand and Hawaii.¹⁰ This scale has demonstrated robust psychometric properties, including content validity, construct validity, convergent and discriminant validity, and internal consistency reliability. The instrument consists of 20 items with four domains rated on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree), with higher scores reflecting greater levels of weight bias. Each of the four domains consists of five items.¹⁰ The first domain, adverse judgment, assesses negative evaluations and stereotypes toward people with obesity. The second domain, social distance, measures social avoidance and discomfort in interpersonal interaction. The third domain, attraction, reflects interpersonal desirability and openness to closeness with individuals with obesity. The fourth, equal rights, evaluates fairness and beliefs about equal treatment for people with

obesity. The original instrument has undergone a validation study that demonstrated good construct validity, with all item loadings ≥ 0.40 , and strong reliability, with an overall Cronbach's α of 0.87.¹⁰

Phase I: Translation and Cultural Adaptation

The Malay UMB-Fat was adapted from the original English version following the recommended guidelines.^{12,13} Permission to use the UMB-Fat in this study was obtained from the author. The process included forward translation, reconciliation, backward translation, harmonisation, cognitive debriefing, and finalisation. Forward translations were conducted separately by a content expert (a family medicine specialist) and a non-content expert certified translator. Both translations were then combined into one version after discussion. Backward translations were carried out by another content expert from the Family Medicine faculty and a different non-content expert certified translator. The backward versions were compared with the original questionnaire (harmonisation) to ensure the meaning and intent were preserved.^{12,13} After the translation process, the expert committee, which consisted of the translators and study investigators, reviewed and finalised the pre-final Malay-UMB-Fat.

Then, cognitive debriefing was conducted among five respondents (two men and three women, aged 24–52 years) to check its clarity and comprehension. The feedback provided was discussed by the research team, and necessary changes were made. A few respondents found the phrase “*usaba khusus*” (special effort) in Items 1, 11, 14, and 18 unclear and suggested replacing it with “*inisiatif*”. Later, the phrase “*inisiatif*” was used throughout the questionnaire for consistency, replacing the earlier phrases.

Phase II: Validation and Reliability

Face validity of the final Malay version of UMB-Fat was assessed following Yusoff's method¹⁴ to determine its clarity and comprehensibility. Thirty respondents from the target users were recruited and rated each item for clarity and understanding on a 4-point scale. The Item-level Face Validity Index (I-FVI) was calculated by totalling the number of raters who agreed on the item and dividing it by the sample size. The Scale-level Face Validity Index, Average method (S-FVI/Ave), based on I-FVI used the sum of all I-FVI scores divided by the total number of items, and S-FVI/Ave based on the proportion of clarity and comprehension is obtained by dividing the total proportion of clarity and comprehension ratings by the number of raters. An I-FVI value of ≥ 0.8 and an S-FVI/Ave value of ≥ 0.9 indicate an acceptable level.¹⁴

A total of 456 participants were recruited (EFA, $n=206$; CFA, $n=250$), using a convenience sampling method. Eligible participants were aged 18 years or older, proficient in Bahasa Malaysia, able to use smart devices, and provided informed consent. Exclusion criteria included individuals who were unable to complete the assessment satisfactorily for any reason.

Participants were recruited by distributing the survey link among the researchers' academic and social contacts via messaging apps such as WhatsApp, e-mail, or face-to-face invitation. Recipients were encouraged to share the survey link with their own contacts within the population criteria to broaden participation.¹⁸ The participants were informed that their participation was voluntary and provided informed consent before answering the survey, which took around 15 minutes to complete. Test-retest reliability was not conducted due to time and financial constraints.

Statistical Analysis

Demographic Characteristics

Descriptive statistics were used to summarise the socio-demographic characteristics of the participants. Mean and standard deviation (SD) were used to describe the continuous demographic characteristics, while categorical characteristics were presented as frequencies and percentages (%).

Construct Validity and Reliability

EFA was conducted to explore the underlying factor structure of the Malay UMB-Fat. Sampling adequacy was assessed using the Kaiser–Meyer–Olkin (KMO) measure, while Bartlett’s test of sphericity was used to evaluate the appropriateness of factor analysis.¹⁹ Factors with eigenvalues greater than 1.0 were retained, and items with factor loadings ≥ 0.40 were considered acceptable.^{19,20} Item-level descriptive statistics were also examined to assess response distribution and variability.

CFA was conducted to validate the factor structure identified in EFA. The analysis used the Maximum Likelihood Robust (MLR) estimation method, which provides robust standard errors and chi-square statistics when data deviate from multivariate normality.¹⁵ A non-significant chi-square ($p > 0.05$) and a chi-square per degree of freedom (χ^2/df ratio) < 3 indicated acceptable fit. Additional fit indices included Comparative fit index (CFI) ≥ 0.90 , Tucker-Lewis index (TLI) ≥ 0.95 , Root-mean-square error approximation (RMSEA) ≤ 0.08 , and Standardised Root Mean Square Residual (SRMR) ≤ 0.08 were used to evaluate goodness of fit.^{15,21,22} Modification indices (MI) were also assessed to identify potential model improvements.

The internal consistency was evaluated using Cronbach’s alpha coefficients²⁴ with a Cronbach’s alpha value greater than 0.5 being considered acceptable, while ≥ 0.70 indicated good internal consistency. Construct reliability was assessed using Composite Reliability (CR) and Average Variance Extracted (AVE) in CFA.^{15,22,24} Convergent validity is demonstrated when the AVE is greater than 0.50, indicating that the construct accounts for more variance in its indicators than is attributed to measurement error, while CR ≥ 0.7 reflects a satisfactory level of internal consistency.^{15,19,24} All statistical analyses were done using SPSS software (v29) and R (lavaan package) (v4.4.3). A p-value of < 0.05 was considered statistically significant.

RESULTS

Face Validity

The face validity of the Malay version of UMB-Fat revealed that the I-FVI ranges from 0.9 to 1.0, indicating that most items were clearly understood by participants. The S-FVI/Ave based on I-FVI and the proportion of clarity and comprehension ratings were 0.94, demonstrating that the translated items were clear, comprehensible, and suitable for use among the target population.¹⁴ The results are presented in Table I.

Table I: The face validity index of Malay UMB-Fat item (n=30)

No.	Item	Raters in agreement	I-FVI
1.	<i>Inisiatif khusus perlu diambil untuk memastikan orang gemuk mempunyai hak dan keistimewaan yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same rights and privileges as other people”	28	0.93
2	<i>Saya selesa mempunyai orang gemuk dalam kumpulan kawan saya</i> “I would be comfortable having a fat person in my group of friends”	28	0.93
3	<i>Saya rasa orang gemuk itu menarik</i> “I find fat people attractive”	30	1.00
4	<i>Orang gemuk adalah pasangan romantik yang baik</i> “Fat people make good romantic partners”	28	0.93
5	<i>Orang gemuk mempunyai kebersihan yang buruk</i> “Fat people have bad hygiene”	28	0.93
6	<i>Saya rasa orang gemuk itu seksi</i> “I find fat people to be sexy”	27	0.90
7	<i>Orang gemuk cenderung kepada tingkah laku yang buruk</i> “Fat people tend towards bad behavior”	28	0.93
8	<i>Saya tidak mahu orang gemuk sebagai rakan sebilik</i> “I would not want to have a fat person as a roommate”	29	0.97
9	<i>Orang gemuk merencatkan nafsu syahwat</i> “Fat people are a turn-off”	27	0.90
10	<i>Saya rasa orang gemuk sedap dipandang</i> “I find fat people pleasant to look at”	28	0.93
11	<i>Inisiatif khusus perlu diambil untuk memastikan bahawa orang gemuk mempunyai gaji yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same salaries as other people”	28	0.93
12	<i>Kadang-kadang saya menganggap orang gemuk tidak jujur</i> “Sometimes I think that fat people are dishonest”	28	0.93
13	<i>Saya rasa orang gemuk itu menarik</i> “I find fat people attractive”	30	1.00
14	<i>Inisiatif khusus perlu diambil untuk memastikan bahawa orang gemuk mempunyai peluang pendidikan yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same educational opportunities as other people”	29	0.97
15	<i>Secara umum, orang gemuk tidak memikirkan keperluan orang lain</i> “In general, fat people don't think about the needs of other people”	29	0.97
16	<i>Orang gemuk adalah selekeh</i> “Fat people are sloppy”	28	0.93
17	<i>Saya suka orang gemuk</i> “I like fat people”	28	0.93
18	<i>Inisiatif khusus perlu diambil untuk memastikan bahawa orang gemuk mempunyai peluang perumahan yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same housing opportunities as other people”	28	0.93
19	<i>Saya tidak seronok berbual dengan orang gemuk</i> “I don't enjoy having a conversation with a fat person”	29	0.97
20	<i>Saya ingin mempunyai orang gemuk di tempat ibadat atau pusat komuniti saya</i> “I would like having a fat person at my place of worship or community centre”	28	0.93

*Note: The English wording of each item is from UMB-Fat¹⁰

Demographic characteristics

The demographic summary of the sample for the EFA (n=206) and the sample for the CFA (n=250) were presented in Table II. The mean (SD) age of the participants for EFA and CFA was 35.32 (8.44) years and 27.49 (7.61) years, respectively. The majority of participants were female (77.7% and 68.8%), Malay (83.5% and 74.8%), and had attained a tertiary level of education (90.8% and 88.8%).

Exploratory Factor Analysis (EFA)

All 20 items were included in the EFA analysis. Sampling adequacy was confirmed (KMO=0.848; Bartlett's test $p < 0.001$). Principal axis factoring with Promax rotation revealed a three-factor solution (eigenvalues >1), accounting for 54.4% of the total variance. Items 1, 9, 13, and 20 were removed due to poor factor loading (<0.4) and low communalities (<0.25).

Table II: Sociodemographic data of the participants

Variables	EFA (n=206) n (%)	CFA (n=250) n (%)
Age (years) – mean (SD)	35.32 (8.44)	27.49 (7.61)
BMI (kg/m²) – mean (SD)	23.48 (4.81)	23.78 (5.13)
Gender		
Male	46 (22.3)	78 (31.2)
Female	160 (77.7)	172 (68.8)
Ethnicity		
Malays	172 (83.5)	187 (74.8)
Chinese	11 (5.3)	25 (10.0)
Indians	13 (6.3)	29 (11.6)
Others	10 (4.9)	9 (3.6)
Education Level		
Primary School	0 (0.0)	1 (0.4)
Secondary School	8 (3.9)	12 (4.8)
Diploma	11 (5.3)	17 (6.8)
Degree/Master/PhD	187 (90.8)	220 (88.0)
Marital Status		
Single	175 (85)	172 (68.8)
Married	30 (14.6)	74 (29.6)
Divorced	1 (0.5)	4 (1.6)
Employment		
Undergraduate Students	165 (80.1)	154 (61.6)
Management and Professionals	27 (13.1)	72 (28.8)
Support and Operations	14 (6.8)	24 (9.6)
Monthly Income (RM)		
Undergraduate Students	165 (80.1)	154 (61.6)
<RM 2,000	8 (3.9)	8 (3.2)
RM 2,000-5,000	18 (8.7)	25 (10.0)
>RM5,000	15 (7.3)	63 (25.2)

The final EFA with 16 items yielded a stable three-factor solution, explaining 61.3% of the total variance with adequate sampling (KMO=0.841, $p<0.001$). The factors were interpreted as adverse judgment, attraction, and equal rights, consistent with the conceptual model of the original UMB-Fat. Items in the original social distance factor (items 2, 8, 17, 19, 20) were redistributed across two factors, with item 8 and item 19 merged with adverse judgment, while item 2 and item 17 loaded under attraction. The overall results showed the Malay version kept a clear factor structure, with some items shifting to different factors. (Table III).

Confirmatory Factor Analysis (CFA)

CFA was performed on the 16 items of the Malay UMB-Fat, using the MLR estimator, due to non-normality (Skewness =1981.59, $p<0.001$; Kurtosis =25.37, $p<0.001$).

Three models were tested based on the EFA structure. Model 1 included all 16 items, Model 2 removed item 2 due to poor loading, and Model 3 added a correlated residual between item 12 and 19. Model fit improved progressively, with the final model, Model 3, demonstrating an acceptable fit: $\chi^2/df=2.11$, CFI=0.952, TLI=0.938, RMSEA=0.068, and SRMR=0.048, and was therefore retained as the final measurement model for the Malay UMB-FAT (Table IV).

Table III: EFA for Malay UMB-FAT

Factor	Original factor	Items	Mean	SD	Factor loading	Communality	Cronbach's alpha
1	AJ	Item 5: <i>Orang gemuk mempunyai kebersihan yang buruk</i> “Fat people have bad hygiene”	4.63	1.623	0.546	0.306	0.860
	AJ	Item 7: <i>Orang gemuk cenderung kepada tingkah laku yang buruk</i> “Fat people tend towards bad behaviour”	5.51	1.477	0.713	0.502	
	SD	Item 8: <i>Saya tidak mahu orang gemuk sebagai rakan sebilik</i> “I would not want to have a fat person as a roommate”	5.17	1.688	0.467	0.433	
	AJ	Item 12: <i>Kadang-kadang saya menganggap orang gemuk tidak jujur</i> “Sometimes I think that fat people are dishonest”	5.88	1.392	0.789	0.604	
	AJ	Item 15: <i>Secara umum, orang gemuk tidak memikirkan keperluan orang lain</i> “In general, fat people don't think about the needs of other people”	5.36	1.637	0.764	0.572	
	AJ	Item 16: <i>Orang gemuk adalah selekeh</i> “Fat people are sloppy”	5.20	1.681	0.749	0.630	
	SD	Item 19: <i>Saya tidak seronok berbual dengan orang gemuk</i> “I don't enjoy having a conversation with a fat person”	5.86	1.450	0.769	0.602	
2	SD	Item 2: <i>Saya selesa mempunyai orang gemuk dalam kumpulan kawan saya</i> “I would be comfortable having a fat person in my group of friends”	2.22	1.365	0.547	0.376	0.836
	A	Item 3: <i>Saya rasa orang gemuk itu menarik</i> “I find fat people attractive”	3.78	1.672	0.846	0.696	
	A	Item 4: <i>Orang gemuk adalah pasangan romantik yang baik</i> “Fat people make good romantic partners”	3.81	1.564	0.667	0.461	
	A	Item 6: <i>Saya rasa orang gemuk itu seksi</i> “I find fat people to be sexy”	4.93	1.462	0.611	0.360	
	A	Item 10: <i>Saya rasa orang gemuk sedap dipandang</i> “I find fat people pleasant to look at”	4.48	1.477	0.647	0.428	
	SD	Item 17: <i>Saya suka orang gemuk</i> “I like fat people”	3.90	1.407	0.713	0.549	
	ER	Item 11: <i>Inisiatif khusus perlu diambil untuk memastikan bahawa orang gemuk mempunyai gaji yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same salaries as other people”	2.67	1.631	0.712	0.559	
3	ER	Item 14: <i>Inisiatif khusus perlu diambil untuk memastikan bahawa orang gemuk mempunyai peluang pendidikan yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same educational opportunities as other people”	2.09	1.406	0.790	0.620	0.852
	ER	Item 18: <i>Inisiatif khusus perlu diambil untuk memastikan bahawa orang gemuk mempunyai peluang perumahan yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same housing opportunities as other people”	2.45	1.496	0.910	0.842	
	ER	Item 1: <i>Inisiatif khusus perlu diambil untuk memastikan orang gemuk mempunyai hak dan keistimewaan yang sama seperti orang lain</i> “Special effort should be taken to make sure that fat people have the same rights and privileges as other people”	0.409	0.302	0.328	0.328	
	A	Item 9: <i>Orang gemuk merencatkan nafsu syahwat</i> “Fat people are a turn-off”	0.379	0.275	-0.015	0.337	
Deleted items	ER	Item 13: <i>Saya cuba memahami sudut pandangan orang gemuk</i> “I try to understand the perspective of fat people”	0.389	0.203	0.224	0.297	
	SD	Item 20: <i>Saya ingin mempunyai orang gemuk di tempat ibadat atau pusat komuniti saya</i> “I would like having a fat person at my place of worship or community center”	0.346	0.227	0.325	0.316	

*Note:

AJ: adverse judgement

SD: social distance

A: attraction

ER: equal rights

Table IV: Model fit and reliability indices of the Malay UMB-Fat

Model	χ^2/df ratio	90%					Cronbach's alpha	CR	AVE
		SRMR	RMSEA	CI	CFI	TLI			
1	2.69	0.059	0.860	0.490	0.856	0.901	0.860	0.490	0.856
2	2.47	0.052	0.075	0.061-0.088	0.935	0.920	0.836	0.557	0.860
3	2.11	0.048	0.068	0.053-0.082	0.952	0.938	0.852	0.739	0.894

Reliability

Cronbach's alpha indicated good reliability across all factors (0.860, 0.836, and 0.852, respectively). CR ranged from 0.490 to 0.739, with factor adverse judgment showing a marginally lower CR (0.490). However, given strong factor loadings (>0.60) and high AVE (0.856), the construct was retained, as overall evidence supported adequate reliability and convergent validity.²⁴

DISCUSSION

This is the first study to translate and validate the Malay version of UMB-Fat in Malaysia. The key findings showed a three-factor structure: adverse judgment, attraction, and equal rights as determined by EFA, which explained 61.3% of the total variance across 16 items. In contrast to the four factors in the original English version,¹⁰ the social distance did not emerge as an independent factor in this study. CFA further verified this structure, supported after model refinements with item 2 removed due to weak factor loading and inclusion of correlated residual covariance between items 12 and 19. The final Model 3 achieved the best overall fit indices and showed excellent internal consistency, comparable to the English version. The emergence of this three-factor model with strong reliability suggests that the core components of weight bias, such as negative evaluation, interpersonal desirability, and fairness-related perceptions, are broadly universal. However, in Malaysia, these attitudes may manifest in a more subtle way, influenced by cultural values, such as humility, self-control, and social harmony.^{9,25,26}

The translation and adaptation process of the UMB-FAT into the Malay language followed established guidelines for cross-cultural adaptation of psychometric instruments.^{12,13} The forward-backward translation and expert committee review ensured that the Malay version maintained conceptual consistency and cultural suitability with the original instrument. Cognitive debriefing demonstrated that the Malay version was clear and easy to understand, with minor phrasing adjustments made to improve its clarity. This was supported by excellent face validity (S-FVI/Ave=0.94), supporting the scale's content validity among Malay-speaking respondents and demonstrating that the translated items were conceptually and linguistically appropriate.¹⁴

EFA revealed a three-factor structure that consisted of adverse judgment, attraction, and equal rights, and accounted for 61.3% of the total variance. Although the original English version¹⁰ had four factors, including social distance, this factor did not emerge distinctly in the translated Malay version. Instead, items from the social distance domain were redistributed across the adverse judgment and attraction factors. This redistribution indicated that, within the Malaysian cultural context, social avoidance and attitudes toward individuals with obesity tend to overlap rather than exist as separate dimensions, as observed in Western contexts. Another cross-cultural examination of the UMB-Fat in a multinational study conducted across the United States, Canada, Iceland, and Australia, had demonstrated cultural variations in item patterns and mean bias levels while maintaining good internal consistency.^{10,27} Meanwhile, a recent Malaysian Rasch analysis among healthcare practitioners identified local variations in UMB-Fat item functioning, emphasising the significance of cultural adaptation in measuring attitudes.¹¹

In addition, four items (Items 1, 9, 13, and 20) were removed due to poor loadings and weak communalities, indicating that these items did not contribute well to the underlying factors in the sample. This decision was supported by item-level descriptive statistics. Items 1, 13, and 20, originally from the equal rights and social distance domains, showed skewed distributions and limited response variability, suggesting participants tended to respond in a socially acceptable manner rather than with discriminatory attitudes. Item 9, from the attraction domain, showed weaker alignment to its intended factor, possibly due to unclear interpretation. Such items with low variability, weak loadings, and poor communalities were commonly removed to improve factor clarity and measurement precision.^{15,19}

CFA further supported the three-factor structure using the robust MLR estimator to account for non-normal data. Three models were examined to evaluate structural adequacy and their coherence. The final model (Model 3), with item 2 removed due to weak loading and a correlated residual added between items 12 and 19, demonstrated the best overall fit indices. Although TLI (0.938) did not reach the stricter cut-off value of 0.95, the other fit indices, including CFI (0.952), RMSEA (0.068), SRMR (0.048), and χ^2/df (2.11), achieved an acceptable model fit. In applied psychometric research, the model fit should be assessed using several indices rather than relying on a single cut-off value.^{15,21}

In the original English version, item 12 belonged to the adverse judgment factor, while item 19 belonged to the social distance domain.¹⁰ However, in this study, both items appeared to measure similar evaluative judgment instead of separate behavioural avoidance. Allowing their residuals to correlate captures this shared meaning, which arose from the overlapping concept of negative judgment and interpersonal distance. According to established principles of structural equation modelling, these modifications are allowed when the correlated items reflect overlapping content within the same domain rather than a distinct new factor, thereby improving model parsimony and conceptual clarity.^{15,21}

The internal consistency and convergent validity of the Malay UMB-Fat were demonstrated to be satisfactory across 3 factors. Although the CR value for adverse judgment was slightly below the threshold of 0.50, the factor was retained because all of its items showed good loadings with a high AVE, indicating adequate internal consistency. The original validation¹⁰ reported good overall reliability, while the Malaysian Rasch validation conducted among healthcare professionals¹¹ also reported excellent internal consistency. Thus, these findings confirmed that the Malay UMB-Fat retained the psychometric strength established in previous validation studies.^{10,11}

The findings support the validity and reliability of the Malay UMB-Fat as an instrument for measuring weight bias in Malaysian settings. The redistribution of items from the original social distance domain suggests that cultural context influences how weight stigma is expressed. This emphasises the importance of local adaptation when applying psychometric tools across different populations. The validated Malay version can be used in future studies exploring weight bias among healthcare professionals, students, and the general public, thereby contributing to stigma reduction strategies and more inclusive health education.

The strength of this study was in its rigorous translation and adaptation procedures, which adhered to the established guidelines. This study had several limitations. Firstly, this study was conducted among staff and students within a single university setting, which may limit generalisability. Future research should explore

measurement invariance across different demographic groups and validate the scale in clinical or community populations. Furthermore, assessing test–retest reliability and criterion validity against related constructs (such as fat phobia and body image attitudes) can further strengthen the scale’s psychometric robustness.

CONCLUSION

The Malay UMB-FAT maintained its conceptual integrity with good structural and reliability evidence. Despite minor variations in factor composition, the adapted version remained consistent with international findings, supporting its use for assessing obesity stigma in Malaysia.

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CONFLICT OF INTEREST

There were no conflicts of interest between the contributors of this research

INSTITUTIONAL REVIEW BOARD (ETHICS COMMITTEE)

The study protocol was approved by the Human Research Ethics Committee of Universiti Sains Malaysia (USM/JEPeM/KK/23030216) before the study.

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AUTHORS CONTRIBUTION

NAZZ collected all the data from the participants, analysed the data, and wrote the manuscript. RM, NAY, SAAH, RAR, IA, and AA revised the manuscript for important intellectual content.

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