



Bahasa Indonesia version of Weight Stigma Exposure Inventory (WeSEI): Translation and validation among young adults

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ABSTRACT

Objectives: The Weight Stigma Exposure Inventory (WeSEI) is a newly developed tool that assesses observed weight stigma across different sources (i.e., interpersonal and non-interpersonal sources). Although the WeSEI is considered a useful instrument for assessing observed weight stigma, it has not been translated into Bahasa Indonesian. Therefore, the present study translated the WeSEI into Bahasa Indonesian and evaluated its psychometric properties.

Methods: A total of 1303 Indonesian university students were recruited via online survey between February and October 2024. They provided demographic information, and completed the WeSEI and the Weight Self-Stigma Questionnaire (WSSQ). Moreover, the factor structures, internal consistency, concurrent validity with external measures (i.e., WSSQ and body mass index, or BMI), and measurement invariance across sex (male vs. female) and weight status (non-overweight vs. overweight) of the translated WeSEI were evaluated.

Results: Confirmatory factor analysis showed that the WeSEI had a seven-factor structure (comparative fit index [CFI] = 0.984, Tucker-Lewis index [TLI] = 0.982, root mean square error of approximation [RMSEA] = 0.050, standardized root mean square residual [SRMR] = 0.058). The WeSEI showed very good internal consistency (ω = 0.86–0.93) among Indonesian young adults, and it had positive correlations with scores on the WSSQ and BMI. In addition, the seven-factor structure of WeSEI was invariant across sex and weight status.

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Conclusion: The Bahasa WeSEI demonstrated good validity and reliability and provided further evidence for assessing different sources of weight stigma exposure in an Indonesian context. Therefore, the WeSEI can be considered a robust tool for assessing observed weight stigma among Indonesian populations.

1. Introduction

Globally, the prevalence of being overweight has markedly increased from 25 % in 1990 to 43 % in 2023 (World Health Organization, 2025). Moreover, it has been predicted that the number of people who are overweight will increase from 0.81 billion in 2020 to 1.53 billion in 2035 (World Obesity, 2024). The World Health Organization (WHO) has reported that being overweight has become a serious health problem which contributes to a high risk of developing noncommunicable diseases (e.g., diabetes, cancers, cardiovascular diseases) (World Health Organization, 2025). Being overweight is also an important risk factor for poor psychological health (e.g., anxiety, depression, and body dissatisfaction) (Carraça et al., 2021). Further, being overweight has been associated with harmful social consequences (e.g., social isolation, weight bias, and weight discrimination) (Papadopoulos & Brennan, 2015; Puhl & Brownell, 2001, 2006).

Weight stigma (aka weight bias, weight discrimination, or weight prejudice) has been used to refer to social devaluation and denigration of individuals who are perceived as overweight. Among those who are overweight, weight stigma can contribute to stereotyping (i.e., individuals who are overweight are lazy, not very intelligent), negative attitudes (i.e., negative criticism of individuals being overweight), prejudice, and discrimination (i.e., being treated unfairly) (Fulton et al., 2023; Lacroix et al., 2017; Papadopoulos & Brennan, 2015; Tomiyama, 2014). Research on weight stigma has consistently shown that it is a stressful experience leading individuals to experience self-blame and feel shame about their weight (Fulton et al., 2023; Tomiyama, 2014). According to Tomiyama (2014), weight stigma can result in a vicious cycle where individuals are under stress (due to weight stigma). This stress response may cause a homeostasis imbalance and disordered eating that contributes to weight gain or weight loss maintenance challenges (Tomiyama, 2014). Subsequently, individuals who have gained weight are likely to continue to experience weight-based stigma (Tomiyama, 2014). Moreover, it has been found that weight stigma-related stress is associated with poorer health consequences (e.g., depression and anxiety, body dissatisfaction, lower self-esteem) (Papadopoulos & Brennan, 2015; Wu et al., 2020).

One possible psychopathological route for the development of weight stigma is observed weight stigma, which can be found in various sources (Puhl & Brownell, 2006; Sutin & Terracciano, 2017). Previous research has reported that individuals commonly and frequently observe weight stigma from interpersonal sources (i.e., family members, friends, healthcare providers, and strangers) (Puhl & Brownell, 2006; Ruckwongpatr et al., 2025). Moreover, individuals may observe weight stigma from non-interpersonal (media) sources (i.e., television, movies, and social media) (Bennett et al., 2020; Ruckwongpatr et al., 2025; Vartanian et al., 2014). Consequently, observed weight stigma can result in negative health-related outcomes (e.g., depression, low self-esteem, greater body dissatisfaction) (Sutin & Terracciano, 2017; Vartanian et al., 2014). Additionally, previous research has suggested that health-related consequences may vary depending on the specific source of experienced weight stigma (Sutin & Terracciano, 2017; Vartanian et al., 2014). Therefore, addressing sources of weight stigma may reduce the potential negative effects of stigma experiences.

Indonesia (where the present study was conducted) has a growing concern regarding individuals who are overweight, particularly among low-income families (Tee & Voon, 2024). Previous research has indicated that those who have low incomes tend to consume low-nutritional-quality food (e.g., processed food, snacks) due to the unaffordability of healthy foods (e.g., fruits, fresh foods) (Tee & Voon, 2024). In 2023, it

was reported that 23.4 % of the Indonesian adult population was overweight (Tee & Voon, 2024). According to World Obesity, the prevalence of being overweight has increased from 3.2 %–6.9 % (in 2010) to 10.0 %–14.8 % (in 2025) among Indonesian young adults (World Obesity, 2020). Previous Indonesian studies have shown that being overweight is associated with greater psychological distress (e.g., stress, anxiety, body dissatisfaction, and disordered eating) (Agustina et al., 2021; Ishak et al., 2023). It has also been reported that social and cultural factors have meaningful impacts on Indonesians' feelings about physical appearance (Ramadhani et al., 2022). Additionally, an individual's weight perception (i.e., "I feel overweight" or "I feel underweight") has significant effects on both psychological health and behavioral outcomes among the Indonesian population (Nadhiroh et al., 2022). Therefore, being stigmatised due to being overweight may contribute to poorer health consequences among Indonesian people.

Previous evidence has shown the power of sociocultural influences on Indonesian people's beliefs about body weight (Sukamto et al., 2018). More specifically, Indonesian research has shown that the major influences on physical appearance beliefs are the social interactions between young adults, interpersonal sources (e.g., parents, friends), and non-interpersonal sources (e.g., television, advertisements, social media) (Sukamto et al., 2018). Sociocultural influences can impact psychological distress (e.g., lower body dissatisfaction), which may contribute to unhealthy weight control behaviors (i.e., eating disorders, unhealthy eating) (Sukamto et al., 2018). In addition, individuals who perceive themselves as being overweight have an increased risk of body dissatisfaction, and this can contribute to extreme weight control behaviors (i.e., taking diet medication, self-induced vomiting) (Sukamto et al., 2018). However, Sukamto et al. (2018) also noted a lack of identification of the effects of each source of exposure to weight stigma. Therefore, additional evidence is needed to show the effects of each source of experienced weight stigma, which may support the development of effective prevention treatments to overcome weight stigma and its potential associated health consequences.

Although there is a growing number of studies examining weight stigma and its associated health consequences across many regions (i.e., North America, Europe, and Asia) (Eggerichs et al., 2024; Wu et al., 2020), there is a need for specific psychometric instruments to understand the sources of weight stigma. As far as the present authors are aware, there are only three psychometric instruments [i.e., Weight Self-Stigma Questionnaire (WSSQ), Perceived Weight Stigma Scale (PWSS), and Body Esteem Scale for Adults and Adolescents (BESAA)] that have been validated in Bahasa Indonesian to assess weight stigma (Garbett et al., 2024; Nadhiroh et al., 2022). Although the WSSQ, PWSS, and BESAA assess an individual's weight stigma experiences, scales that assess other factors relating to sources of exposure to weight stigma are lacking. Therefore, exploring the source of weight stigma would further help understand factors contributing to weight stigma, which in turn, may help reduce health-related consequences.

Recently, a new seven-factor psychometric instrument, the Weight Stigma Exposure Inventory (WeSEI), was developed to assess observed weight stigma from various sources, including interpersonal sources (i.e., parent, stranger, significant other, and friends) and non-interpersonal sources (i.e., television, traditional media, and social media sources) (Ruckwongpatr et al., 2025). The WeSEI has demonstrated good validity and reliability in evaluating the exposure of weight stigma among different populations, including Chinese adolescents and Chinese, Taiwanese, Malaysian, Turkish, and Hong Kong young adults (Çarkıt et al., 2025; Chen et al., 2025; Gan et al., 2025; Ruckwongpatr et al., 2025). Moreover, previous findings have reported strong validity and

reliability, together with acceptable model fit indices and measurement invariance, which suggest the WeSEI is a robust tool for cross-culturally assessing observed weight stigma across different cohorts (Çarkıt et al., 2025; Chen et al., 2025; Gan et al., 2025; Ruckwongpatr et al., 2025).

In addition, the WeSEI provides advantages over various other instruments assessing weight stigma (e.g., WSSQ and PWSS). The WeSEI focuses on and assesses exposure to weight stigma from many external sources (both interpersonal and non-interpersonal), whereas the WSSQ and PWSS primarily assess internal experiences, including feelings of shame, negative self-perceptions, and fear of judgement or discrimination about being overweight (Garbett et al., 2024; Nadhiroh et al., 2022; Ruckwongpatr et al., 2025). Therefore, the WeSEI is a more comprehensive measure of weight stigma experiences and contributes to the growing research examining weight stigma. Moreover, as aforementioned, Indonesians appear to be more concerned about body weight (due to sociocultural influences such as family expectation and media influence) (Sukanto et al., 2018). Therefore, the WeSEI may be utilized as a psychometric instrument to screen exposure to weight stigma across different sources among Indonesian populations.

Establishing measurement invariance demonstrates that items in the WeSEI are interpreted similarly across various groups, which would strengthen the validity of the study's findings. Therefore, the present study performed measurement invariance analyses to verify that the factor structure of WeSEI was the same across sex (male vs. female) and weight status (non-overweight vs. overweight) subgroups.

In sum, the purpose of the present study was to translate and then examine the psychometric properties of the Indonesian version of the WeSEI, including factorial structure, structural validity, and internal consistency. It also examined the relationship between WeSEI and WSSQ, body mass index (BMI), and sex, as well as evaluating measurement invariance across sex (male vs. female) and weight status (normal weight vs. overweight) subgroups. The present study hypothesized that the WeSEI would (i) present acceptable model fit indices for the seven-factor structure among Indonesian young adults; (ii) display measurement invariance across sex (male vs. female) and weight status (non-overweight vs. overweight) subgroups; and (iii) correlate with another psychometric instrument assessing weight stigma (i.e., the WSSQ).

2. Methods

2.1. Participants and procedure

A cross-sectional online survey (i.e., hosted on *SurveyMonkey*) was used to collect the data. Participants who were 18 years of age and older and studied at an Indonesian university were eligible to participate in the survey. The participants were recruited using convenience sampling using a survey link posted on online platforms (e.g., *Facebook* and university websites). Enumerators were trained research assistants who collaborated with faculty members and student affairs offices. They approached students during classes and academic activities and provided guidance on how to access the online survey. In the online survey, participants were informed of the study's aims and were provided an online informed consent form. After providing consent to participate, participants were requested to respond to the online questionnaire survey comprising demographic information, WeSEI, and WSSQ. All data were collected anonymously via a secure online platform, stored on a password-protected server, and accessible only to the core research team. The present study's procedures were approved by the Health Research Ethics Committee in Universitas Airlangga (Numbers: 3016-KEPK and 188/EA/KEPK/2024) prior to data collection. The data were collected between February and October 2024.

2.2. Measures

2.2.1. Demographics

The demographic measures included (i) age (in years); (ii) sex (male or female); (iii) height (in cm); and (iv) weight (in kg). Height and weight information was then used to calculate BMI with the unit of kg/m^2 . Participants were then classified as either overweight ($\text{BMI} \geq 25 \text{ kg}/\text{m}^2$) or non-overweight ($\text{BMI} < 25 \text{ kg}/\text{m}^2$).

2.2.2. Weight Stigma Exposure Inventory (WeSEI)

The WeSEI contains 35 items (e.g., “I have observed that people don't like overweight/obese individuals on social media”) rated on a five-point Likert scale (1 = Never; 5 = Almost always). It assesses weight stigma from seven sources (social media, traditional media, television, parents, friends, significant others, and strangers). Each source contains five items. The higher the score on the WeSEI, the greater the level of observed weight stigma. Previous evidence has shown that the WeSEI possesses good psychometric properties (e.g., Cronbach's $\alpha = 0.891$ to 0.939 among Taiwanese young adults) (Ruckwongpatr et al., 2025). The seven different sources have also been supported by good data-model fit in confirmatory factor analysis (CFA) findings (Ruckwongpatr et al., 2025).

Because there is no Bahasa Indonesian version for the WeSEI, it was first translated into Bahasa Indonesian based on international translation procedure guidelines, with some modifications (Beaton et al., 2000). The procedure involved the following steps: first, two translators independently translated the WeSEI from English to Bahasa Indonesian (i.e., the forward translation process). Second, the two aforementioned translators discussed their translated versions with the principal investigator in Indonesia to generate an initial Bahasa Indonesian WeSEI. Third, the Bahasa Indonesian WeSEI was translated back into English by a third translator who was not familiar with the WeSEI (i.e., backward translation process). Fourth, a panel consisting of experts from public health, education, psychometrics, and weight stigma was formed to evaluate all items of the translated WeSEI together (i.e., two forward translations, the initial Bahasa Indonesian, and two backward translations) with comparison to the original English WeSEI for a prefinal version of the Bahasa Indonesian WeSEI.

Moreover, the translation process via a standard forward-backward translation procedure was conducted with cultural adaptation from English to Bahasa Indonesian. The WeSEI was conceptually equivalent and culturally appropriate for Indonesian people. No content validity index (CVI) or inter-rater reliability coefficient was performed in the present study. However, the expert panel reviewed and discussed all items of the translated WeSEI and reached consensus to verify conceptual equivalence. Fifth, pilot testing was conducted among some university students to assess the readability of the prefinal version of the Bahasa Indonesia WeSEI. Moreover, 30 university students were recruited independently from the main validation study participants to prevent bias caused by the formal psychometric testing. Minor revisions were made to the items of the prefinal version of Bahasa WeSEI for clarity and cultural appropriateness.

2.2.3. Weight Self-Stigma Questionnaire (WSSQ)

The WSSQ contains 12 items on a five-point Likert scale (1 = Strongly disagree; 5 = Strongly agree). It assesses internalized weight stigma across two factors (self-devaluation [e.g., “I caused my weight problems”] and fear of enacted stigma [e.g., “People discriminate against me because I've had weight problems”]). The higher the score on the WSSQ, the greater the level of internalized weight stigma. Previous evidence has shown that the WSSQ possesses good psychometric properties among US samples (e.g., Cronbach's $\alpha = 0.812$ to 0.878) (Lillis et al., 2010). The two-factor model of the WSSQ has also been supported by good data-model fit in CFA findings (Gan et al., 2022). The Bahasa Indonesian WSSQ has been found to be a valid measure (Cronbach's $\alpha = 0.86$) (Nadhiroh et al., 2022).

2.3. Data analysis

The statistical analyses proceeded in several stages. First, descriptive statistics were calculated, including response frequencies for each WeSEI item category, followed by means, skewness, and kurtosis values for each subscale. To examine relationships within the WeSEI and evaluate concurrent validity, Pearson correlations were computed between the WeSEI score, WSSQ score, BMI, and sex. To provide a more comprehensive assessment of concurrent validity, the analyses were stratified by sex and weight status (normal weight versus overweight). Additionally, Pearson correlation effect sizes were interpreted using Cohen's guidelines as small ($r = 0.1$), medium ($r = 0.3$), and large ($r = 0.5$) effects (Cohen, 1988). Some scholars claim that Pearson correlation may not be appropriate when using Likert scale data, which is ordinal. However, it is widespread practice and acceptable in social sciences to compute Pearson correlation using ordinal data (Bishara & Hittner, 2015). Previous studies have demonstrated that it remains robust to violations of this assumption when summed scale scores of Likert items are analyzed (Norman, 2010). Therefore, the present study used Pearson correlation to evaluate the concurrent validity between the WeSEI score, WSSQ score, BMI, and sex.

CFA was then conducted to assess factorial validity (i.e., a seven-factor model) using Robust Weighted Least Squares (RWLS) estimation. Multiple fit indices were examined, including the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Following previous evidence-based recommendations (Browne & Cudeck, 1993; Hoyle & Panter, 1995), acceptable model fit was determined using the following criteria: CFI and TLI > 0.90 together with RMSEA and SRMR < 0.08.

To establish measurement equivalence across sex and weight status groups, multi-group CFA was conducted using RWLS estimation. Three increasingly restrictive models were tested sequentially: (i) Model 1 presents a configural model establishing baseline fit; (ii) Model 2 presents a metric model constraining factor loadings to be equal across groups; and (iii) Model 3 presents a scalar model with additional constraints on item intercepts. After each invariance step, model comparison was conducted using Chen's (2007) recommended change criteria: decreases in CFI ≤ 0.01 , increases in RMSEA < 0.015, and changes in SRMR < 0.03 for loading invariance and < 0.01 for intercept invariance. However, the present study did not perform multiple comparisons among subgroup analyses; therefore, Bonferroni correction was not used. The findings of measurement invariance were primarily based on fit indices, not significant testing. Additionally, missing data were handled using listwise deletion, and participants with incomplete data were removed from analyses.

According to statistical guidelines, the minimum sample size for CFA is at least 200 participants (Kline, 2011). The present study comprised 1303 participants, which exceeded the recommended sample size for CFA.

3. Results

The present sample ($N = 1303$; mean age = 20.24 years [$SD = 1.31$]; mean BMI = 21.79 kg/m² [$SD = 4.31$]) consisted of more females ($n = 1088$; 83.5 %). In addition, 217 participants (16.7 %) had a BMI higher than 25 kg/m², indicating they were in an overweight category. Frequency analyses (Table 1) showed distinct patterns of weight stigma sources across socio-cultural influences. Within the media domain, encompassing social media platforms, traditional media outlets, and television programming, participants reported moderate frequencies of observed weight stigma, with "sometimes" and "often" responses ranging from 19 % to 39 %. The interpersonal domain, comprising relationships with parents, friends, and significant others, demonstrated predominantly lower frequencies of observed weight stigma, with respondents typically selecting "never" or "seldom". However, notable

Table 1

Frequency and percentage of response distributions for the Weight Stigma Exposure Inventory (WeSEI).

	Never	Seldom	Sometimes	Often	Almost always
Social media source ($M = 15.80$; $SD = 4.44$; skewness = -0.38 ; kurtosis = -0.17)					
Item 1	201 (15 %)	263 (20 %)	424 (33 %)	336 (25 %)	78 (6 %)
Item 2	69 (5 %)	126 (10 %)	277 (21 %)	494 (38 %)	337 (26 %)
Item 3	77 (6 %)	163 (13 %)	369 (28 %)	510 (39 %)	184 (14 %)
Item 4	148 (11 %)	289 (22 %)	416 (32 %)	352 (27 %)	98 (8 %)
Item 5	176 (14 %)	306 (23 %)	446 (34 %)	304 (23 %)	71 (5 %)
Traditional media source ($M = 14.81$; $SD = 4.84$; skewness = -0.15 ; kurtosis = -0.45)					
Item 6	163 (13 %)	326 (25 %)	438 (34 %)	282 (22 %)	94 (7 %)
Item 7	94 (7 %)	198 (15 %)	325 (25 %)	477 (37 %)	209 (16 %)
Item 8	130 (10 %)	281 (22 %)	402 (31 %)	379 (29 %)	111 (9 %)
Item 9	181 (14 %)	302 (23 %)	442 (34 %)	295 (23 %)	83 (6 %)
Item 10	227 (17 %)	337 (26 %)	441 (34 %)	233 (18 %)	65 (5 %)
TV source ($M = 15.14$; $SD = 4.82$; skewness = -0.08 ; kurtosis = -0.41)					
Item 11	171 (13 %)	359 (28 %)	449 (34 %)	252 (19 %)	72 (6 %)
Item 12	78 (6 %)	164 (13 %)	329 (25 %)	449 (34 %)	283 (22 %)
Item 13	148 (11 %)	313 (24 %)	463 (36 %)	275 (21 %)	104 (8 %)
Item 14	138 (11 %)	310 (24 %)	423 (32 %)	311 (24 %)	121 (9 %)
Item 15	134 (10 %)	309 (24 %)	448 (34 %)	302 (23 %)	110 (8 %)
Parent source ($M = 10.73$; $SD = 4.80$; skewness = 0.69; kurtosis = -0.18)					
Item 16	407 (31 %)	342 (26 %)	348 (27 %)	150 (12 %)	56 (4 %)
Item 17	85 (7 %)	244 (19 %)	361 (28 %)	291 (22 %)	322 (25 %)
Item 18	499 (38 %)	315 (24 %)	314 (24 %)	131 (10 %)	44 (3 %)
Item 19	630 (48 %)	292 (22 %)	249 (19 %)	103 (8 %)	29 (2 %)
Item 20	772 (59 %)	234 (18 %)	200 (15 %)	79 (6 %)	18 (1 %)
Friend source ($M = 10.54$; $SD = 4.36$; skewness = 0.64; kurtosis = -0.01)					
Item 21	458 (35 %)	429 (33 %)	309 (24 %)	88 (7 %)	19 (1 %)
Item 22	104 (8 %)	269 (21 %)	379 (29 %)	286 (22 %)	265 (20 %)
Item 23	509 (39 %)	397 (30 %)	291 (22 %)	81 (6 %)	25 (2 %)
Item 24	564 (43 %)	375 (29 %)	265 (20 %)	75 (6 %)	24 (2 %)
Item 25	673 (52 %)	336 (26 %)	217 (17 %)	64 (5 %)	13 (1 %)
Significant others source ($M = 8.39$; $SD = 4.38$; skewness = 1.28; kurtosis = 0.97)					
Item 26	805 (62 %)	252 (19 %)	181 (14 %)	48 (4 %)	17 (1 %)
Item 27	688 (53 %)	230 (18 %)	220 (17 %)	127 (10 %)	38 (3 %)
Item 28	744 (57 %)	252 (19 %)	208 (16 %)	72 (6 %)	27 (2 %)
Item 29	880 (68 %)	198 (15 %)	158 (12 %)	52 (4 %)	15 (1 %)
Item 30	910 (70 %)	189 (15 %)	151 (12 %)	38 (3 %)	15 (1 %)
Stranger source ($M = 13.38$; $SD = 4.96$; skewness = 0.06; kurtosis = -0.62)					
Item 31	50 (4 %)	219 (17 %)	400 (31 %)	314 (24 %)	320 (25 %)
Item 32	197 (15 %)	236 (18 %)	370 (28 %)	333 (26 %)	167 (13 %)

(continued on next page)

Table 1 (continued)

	Never	Seldom	Sometimes	Often	Almost always
Item 33	228 (17 %)	319 (24 %)	421 (32 %)	254 (19 %)	81 (6 %)
Item 34	273 (21 %)	317 (24 %)	419 (32 %)	231 (18 %)	63 (5 %)
Item 35	307 (24 %)	336 (26 %)	413 (32 %)	196 (15 %)	51 (4 %)

exceptions emerged in specific interpersonal contexts: only 7 % of participants ($n = 85$) reported never observing weight stigma from parents (Item 17), while 8 % ($n = 104$) reported never observing weight stigma from friends (Item 23). These findings suggest that although weight stigma observations were generally less frequent in interpersonal relationships, the vast majority of participants had observed some degree of weight stigma from both parents and friends. Additionally, weight stigma observations from strangers, although categorized within the interpersonal domain, exhibited a uniform distribution across frequency categories, indicating variable exposure in public encounters.

Descriptive statistical analyses of subscale scores showed heterogeneous patterns of observed weight stigma across various sources. Media-related sources demonstrated comparable mean scores: social media ($M = 15.80$, $SD = 4.44$), traditional media ($M = 14.81$, $SD = 4.84$), and television ($M = 15.14$, $SD = 4.82$). In contrast, interpersonal sources exhibited generally lower mean scores: parents ($M = 10.73$, $SD = 4.80$), friends ($M = 10.54$, $SD = 4.36$), significant others ($M = 8.39$, $SD = 4.38$), and strangers ($M = 13.38$, $SD = 4.96$). Distribution characteristics further differentiated these domains, with media-related sources displaying slight negative skewness (ranging from -0.38 to -0.08) and interpersonal sources showing positive skewness (ranging from 0.06 to 1.28). Kurtosis values for media-related sources ranged from -0.45 to -0.16 , while interpersonal sources had values between -0.62 and 0.97 . However, given that all skewness and kurtosis ranges were within -2 to 2 , this indicated that these subscale scores could be considered as normal distributions.

Table 2 presents the Pearson correlations among WeSEI subscales. Results indicated positive intercorrelations among all WeSEI subscales (r -values ranging from 0.22 to 0.77 ; $p < 0.001$), suggesting discriminant validity without excessive overlap. Moreover, all WeSEI subscales demonstrated significantly positive correlations with WSSQ factors (r -values ranging from 0.15 to 0.35 ; $p < 0.001$). Higher BMI was positively associated with all WeSEI subscales (r -values ranging from 0.10 to 0.22 ; $p < 0.001$).

Table 3 presents the satisfactory fit indices for the WeSEI's oblique seven-factor structure. All items demonstrated robust factor loadings,

predominantly exceeding 0.70 (range: 0.68 – 0.89). Under this factor structure, the omega coefficients demonstrated strong internal consistency across all dimensions: social media ($\omega = 0.86$), traditional media ($\omega = 0.92$), television ($\omega = 0.92$), parents ($\omega = 0.91$), friends ($\omega = 0.89$), significant others ($\omega = 0.93$), and strangers ($\omega = 0.91$).

The model fit for each subgroup demonstrated acceptable model fit indices (Table 3). Table 4 presents the results of a multiple-group CFA, which further supports measurement invariance across both sex and weight status groups. Both metric invariance (equal factor loadings) and scalar invariance (equal item intercepts) were established, as evidenced by changes in fit indices (ΔCFI , $\Delta RMSEA$, and $\Delta SRMR$) falling within acceptable ranges.

4. Discussion

The present study is the first to assess the psychometric properties of the WeSEI among an Indonesian young adult sample. The WeSEI assesses observed sources of weight stigma, including interpersonal sources (i.e., parents, strangers, significant others, and friends) and non-interpersonal sources (i.e., television, traditional media, and social media sources). The aim of the present study was to use CFA to validate the factorial structure of the WeSEI. Results indicated that the WeSEI was valid and reliable among Indonesian young adults. The three hypotheses were supported, with the findings showing that the WeSEI had a seven-factor structure, strong internal consistency, and significant correlations with external criteria, including the WSSQ score and BMI. Additionally, the WeSEI was measurement invariant in assessing observed weight stigma across sex (male vs. female) and weight status (non-overweight vs. overweight) subgroups. However, some may argue that the very good fit indices in the CFA results are a consequence of overfitting. However, Preacher (2006) has noted that the problem of overfitting exists when “a model [shows] good fit by capturing error (noise) as well as regularity” (p. 232). Moreover, drawing on the work of both Forster and Sober (1994) and Roberts and Pashler (2000), Preacher added that a “model with relatively high FP [fitting propensity] may fit a given data set very well but may not generalize to other samples easily” (p. 232).

Given that the fit indices found in the present study ($CFI = 0.984$ to 0.999 ; $TLI = 0.982$ to 0.999) were similar to those reported in prior studies ($CFI = 0.968$, $TLI = 0.957$ in the Turkish WeSEI [Çarkıt et al., 2025]; $CFI = 0.997$ to 1.000 , $TLI = 0.997$ to 1.000 in the Chinese WeSEI [Ruckwongpatr et al., 2025]; $CFI = 0.981$ to 0.999 , $TLI = 0.980$ to 0.999 in the Malay WeSEI [Gan et al., 2025]), the present authors are of the view that the problem of overfitting is not serious. Therefore, the results showed that the WeSEI had good psychometric properties, which accurately evaluated observed sources of weight stigma, supporting the

Table 2
Pearson correlations between Weight Stigma Exposure Inventory (WeSEI), Weight Self-Stigma Questionnaire (WSSQ), body mass index (BMI), and sex.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. WeSEI F1	–												
2. WeSEI F2	0.77	–											
3. WeSEI F3	0.67	0.67	–										
4. WeSEI F4	0.44	0.47	0.44	–									
5. WeSEI F5	0.43	0.44	0.44	0.67	–								
6. WeSEI F6	0.22	0.27	0.26	0.54	0.63	–							
7. WeSEI F7	0.61	0.59	0.60	0.50	0.55	0.37	–						
8. WeSEI Total	0.78	0.80	0.77	0.76	0.78	0.61	0.80	–					
9. WSSQ F1	0.28	0.24	0.25	0.33	0.19	0.15	0.27	0.32	–				
10. WSSQ F2	0.24	0.23	0.21	0.35	0.29	0.27	0.24	0.34	0.67	–			
11. WSSQ Total	0.29	0.26	0.25	0.37	0.26	0.22	0.28	0.36	0.92	0.90	–		
12. BMI	0.14	0.13	0.14	0.22	0.13	0.10	0.16	0.19	0.51	0.29	0.44	–	
13. Gender	0.14	0.11	0.13	0.01*	−0.10‡	−0.08‡	0.04*	0.05*	0.03*	0.07‡	0.05‡	−0.11	–

WeSEI F1 = Social media source; WeSEI F2 = Traditional media source; WeSEI F3 = TV source; WeSEI F4 = Parent source; WeSEI F5 = Friend source; WeSEI F6 = Significant others source; WeSEI F7 = Stranger source; WeSEI Total = total score of WeSEI; WSSQ F1 = self-devaluation; WSSQ F2 = fear of enacted stigma; WSSQ Total = total score of WSSQ;
All correlations were significant at $p < 0.001$ except those marked with * (>0.05), † (between 0.01 and 0.05), and ‡ (between 0.01 and 0.001).

Table 3
Model fit indices of the Weight Stigma Exposure Inventory across different sample groups.

	χ^2 (df)	p-value of χ^2	CFI	TLI	RMSEA (90 % CI)	SRMR
Total sample	2288.73 (539)	<0.001	0.984	0.982	0.050 (0.048, 0.052)	0.058
Male subgroup	457.31 (539)	0.995	0.999	0.999	0.000 (0.000, 1.000)	0.067
Female subgroup	1865.63 (539)	<0.001	0.985	0.984	0.048 (0.045, 0.050)	0.057
Normal weight subgroup (BMI < 25)	2012.04 (539)	<0.001	0.983	0.982	0.050 (0.048, 0.053)	0.060
Overweight subgroup (BMI ≥ 25)	523.23 (539)	0.679	0.999	0.999	0.000 (0.000, 0.019)	0.066

Note: CFI = Comparative fit index, TLI = Tucker-Lewis index, RMSEA = Root mean square error of approximation, and SRMR = standardized root mean square residual.

Table 4
Fit indexes of the Weight Stigma Exposure Inventory in measurement invariance across different groups.

	Configural model	Loadings constrained as equal	Loadings and thresholds constrained as equal
Male and female			
χ^2 (df) or Δ	2322.94	110.08 (28)	51.37 (28)
$\chi^2(\Delta df)$	(1078)		
CFI or ΔCFI	0.989	−0.001	0
RMSEA or $\Delta RMSEA$	0.042	0.001	0
SRMR or $\Delta SRMR$	0.059	0.001	0
Normal weight (BMI < 25) and overweight (BMI ≥ 25)			
χ^2 (df) or Δ	2535.27	197.44 (28)	22.31 (28)
$\chi^2(\Delta df)$	(1078)		
CFI or ΔCFI	0.987	−0.002	0
RMSEA or $\Delta RMSEA$	0.046	0.002	−0.001
SRMR or $\Delta SRMR$	0.061	0.002	0

Notes: CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

use of this scale across Indonesian healthcare and research settings.

Consistent with previous evidence of the WeSEI (Ruckwongpatr et al., 2025), the CFA findings showed that the seven-factor structure was supported for the WeSEI. In addition, the CFA supported the seven-factor structure as having excellent model fit across different sample subgroups (i.e., sex, weight status). These findings indicated that the WeSEI’s seven-factor structure is equally good in assessing observed weight stigma among various subgroups. More specifically, the results suggest that various sources of observed weight stigma in the WeSEI are similarly interpreted by males and females. However, previous research suggested that coping mechanisms for experiences of weight stigma can differ by sex, potentially leading to disparate health consequences (Puhl & Brownell, 2006). Therefore, it is important to identify the source of weight discrimination that both genders experience. Similar to previous findings (Ruckwongpatr et al., 2025), the Indonesian version of WeSEI found equivalent constructs across different subgroups (i.e., sex differences and weight status). This finding implies that Indonesian young adults interpret their observed weight stigma similarly irrespective of their weight status. Therefore, the present results supported the consistency and effectiveness of the WeSEI in assessing sources of exposure to weight stigma across different population groups.

Additionally, the reliability analysis of the Indonesian WeSEI showed high levels of internal consistency across all seven factors ($\omega = 0.86\text{--}0.93$), which supports earlier findings ($\omega = 0.89\text{--}0.94$) (Ruckwongpatr et al., 2025). Consistent with the original scale (Ruckwongpatr et al., 2025), the Indonesian WeSEI supported concurrent validity through correlation with the WSSQ scores ($r = 0.15\text{--}0.35$) across young adults. Comparatively, the Indonesian version of WeSEI had weaker correlations with WSSQ scores ($r = 0.15\text{--}0.35$), whereas the original version had stronger correlations with WSSQ score ($r = 0.52\text{--}0.60$) (Ruckwongpatr et al., 2025).

According to Bujang (2024), larger sample sizes produce greater precise correlation estimates, whereas smaller sample sizes may produce weaker correlation estimates. The present study had a smaller number of participants ($n = 1303$) than the original study, which had a much larger sample ($n = 15,991$) (Ruckwongpatr et al., 2025). The present study’s smaller sample size may have affected the degree of association between the WeSEI and WSSQ scores. Moreover, considering that WeSEI and WSSQ do not totally examine the same construct, future studies should consider including additional validation measures to test the concurrent validity of WeSEI.

All seven factors of WeSEI had positive associations among individuals with a higher BMI or who were overweight ($r = 0.10$ to 0.22). The associations between BMI and WeSEI score may be explained because those individuals who are overweight are more likely to experience weight discrimination (Papadopoulos & Brennan, 2015; Puhl & Brownell, 2001, 2006; Schvey et al., 2017). However, the present study’s findings demonstrated weaker correlations between scores on the BMI and WeSEI. These weak correlations may be due to the fact that relatively few participants in the present sample were overweight (i.e., only 16.7 % of the total sample). Therefore, the study’s sample may not have had sufficient participants reporting very high BMI levels with very high WeSEI scores that resulted in a strong correlation.

When adapting the WeSEI into Bahasa Indonesia, it was ensured that the translated version was both culturally appropriate and conceptually similar to the original. However, a few words in the items had to be adjusted so that Indonesian participants could understand without changing the meaning. Through this process, these small modifications improved the instrument so that it was both accurate and suitable for Indonesians. For example, the word ‘mengusik’ was used instead of ‘mengejek’ as the translation for ‘tease’ because it covers all forms of teasing, not just verbal teasing. In Indonesia, ‘mengejek’ is more commonly used when teasing is in the form of verbal harassment. The word ‘meme’ was also retained because it is more popular among young Indonesians, specifically in relation to jokes on the internet.

The present findings further provided evidence that the social media factor (first factor) of the WeSEI had the highest mean score ($M = 15.88$) for non-interpersonal sources of exposure to weight stigma. Social media is a platform for individuals to observe different opinions (Ménard et al., 2025), including body image (Knight & Preston, 2025). Recent evidence has found that body image dissatisfaction may impact psychological health among Indonesians, especially young girls (Garbett et al., 2023; Saifah et al., 2024). Additionally, social media has the most significant effect among non-interpersonal sources of observed weight stigma among Indonesian young people (i.e., those aged between 15 and 24 years) (Muthia et al., 2022). Moreover, strong evidence shows that social media is the most common non-interpersonal source of fat-shaming and weight discrimination and is a significant contributor to poorer health consequences (Muthia et al., 2022). Therefore, social media may have the biggest impact on experienced weight stigma among Indonesian young adults. Moreover, the strangers’ factor (seventh factor) of the WeSEI had the highest mean score ($M = 13.38$) for interpersonal sources of observed weight stigma among Indonesian young adults. Previous studies suggest that individuals may commonly receive unfair treatment about their weight from strangers (Ruckwongpatr et al., 2025).

Accordingly, strangers may be a common interpersonal source of exposure to weight stigma among Indonesian young adults. However, the present study suggests further examination is needed in future studies.

The use of self-reported data may have introduced well-known methodological biases, such as memory recall and/or social desirability. A prior systematic review found that individuals may not provide accurate answers to sensitive questions (e.g., such as weight and height) and provide answers influenced by social desirability (Connor Gorber et al., 2007). The same review also found that participants tended to underreport their weight and over-report their height, resulting in inaccurate BMI values (Connor Gorber et al., 2007). Therefore, the present study's results may be influenced by inaccurate reporting, reducing the strength of the study's conclusions. Where possible, future research should use more objective measures to improve the validity of the study results (e.g., actually measure height and weight rather than rely upon self-report).

The present study had several other limitations. First, Indonesian young adults were recruited using the convenience sampling method. Therefore, the present sample was not fully representative and may affect the generalizability of the study's findings. Second, weight stigma is not a clinical condition. Therefore, the WeSEI does not have direct clinical relevance. Third, the use of self-report data may produce potential response biases (e.g., recall biases and the aforementioned social desirability biases). The use of self-report data also meant that BMI was not objectively measured. Fourth, the use of cross-sectional data means that causal relationships between sources of exposure to weight stigma and the development of weight stigmatisation could not be determined. Fifth, there was a large sex imbalance between males ($n = 215$) and females ($n = 1088$) in the present study, which might have impacted the results. Although the findings indicated measurement invariance across sex, the sample's sex imbalance may mean that the findings are not necessarily generalizable and should be interpreted with caution. Future studies involving more sex-balanced samples are warranted. Sixth, because the present study used an online survey, individuals without internet access could not participate, which may have introduced selection bias. This may have also restricted the generalizability of the findings. Seventh, neither CVI nor inter-rater reliability was performed in the present study, which may limit the statistical evidence for content validity. Finally, the study did not use multiple comparisons, which may increase the risk of Type I error. However, the results of measurement invariance were based on fit indices for subgroups, not p -values.

5. Conclusion

The present study validated the Indonesian version of the WeSEI to assess various sources of observed weight stigma among young adults. The findings confirmed that the WeSEI has a seven-factor structure, including both interpersonal sources (i.e., parent, stranger, significant other, and friends) and non-interpersonal sources (i.e., television, traditional media, and social media) for exposure to weight stigma. The WSEI score was also significantly correlated with the WSSQ score and higher BMI. Moreover, the WeSEI was supported by measurement invariance across different subgroups (i.e., sex and weight status). The findings provide preliminary evidence of good psychometric properties of the WeSEI in assessing observed weight stigma among Indonesian young adults. This scale may be useful for early detection, intervention, and clinical research in Indonesia. Additionally, the findings provide some directions for future research in Indonesia, which can empirically enhance the understanding of sources and development of weight stigmatization and its related psychological consequences.

CRedit authorship contribution statement

Kamolthip Ruckwongpatr: Writing – original draft, Visualization, Software, Formal analysis, Conceptualization. **Jian-An Su:** Writing –

review & editing, Conceptualization. **I-Hua Chen:** Writing – review & editing, Conceptualization. **Nadia Bevan:** Writing – review & editing, Validation, Methodology. **Ira Nurmala:** Writing – review & editing, Supervision, Resources, Project administration, Investigation, Funding acquisition, Data curation, Conceptualization. **Muthmainnah Muthmainnah:** Writing – review & editing, Resources, Project administration, Methodology, Investigation, Funding acquisition, Data curation. **Lutfi Agus Salim:** Writing – review & editing, Validation, Methodology, Data curation. **Asma Nadia:** Writing – review & editing, Validation, Methodology, Data curation. **Musheer A. Aljaberi:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization. **Mark D. Griffiths:** Writing – review & editing, Validation, Methodology. **Chung-Ying Lin:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Software, Resources, Project administration, Funding acquisition, Formal analysis, Conceptualization.

Consent for publication

Not applicable.

Ethics approval and consent to participate

The present study's procedures were approved by the Health Research Ethics Committee in the Faculty of Nursing, Universitas Airlangga (Number: 3016-KEPK and 188/EA/KEPK/2024). All participants gave their consent before participating in the study.

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Declaration of competing interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this paper.

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Data availability

The original datasets are available from the corresponding author upon reasonable request.

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