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Dimensional Structure, Psychometric Properties, and Sex Invariance of a Bahasa Malaysia (Malay) Translation of the Multidimensional Body-Self Relations Questionnaire–Appearance Scales (MBSRQ–AS) in Malaysian Malay Adults

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**Abstract**

The 34-item Multidimensional Body-Self Relations Questionnaire–Appearance Scales (MBSRQ–AS) is a widely-used measure of multidimensional body image. Here, we examined the psychometric properties of a Bahasa Malaysia (Malay) translation of the MBSRQ–AS. A sample of 629 Malaysian Malays (women *n* = 315) completed the MBSRQ–AS, as well as measures of body appreciation, psychological well-being, perceptions of appearance ideals, and internalisation of appearance ideals. Exploratory factor analysis indicated that the MBSRQ–AS items reduced to four dimensions, although one factor had less-than-adequate internal consistency. Omitting this factor resulted in a 23-item 3-factor solution, which we tested for fit using confirmatory factor analysis (CFA) alongside the parent 5-factor model. CFA indicated that both models had good fit on some indices, but less-than-ideal fit on other indices, with the 3-factor model showing comparatively better fit. Multi-group CFA indicated that it was not possible to achieve scalar invariance across sex, but internal consistency coefficients were adequate. Evidence of construct validity, as assessed through correlations between MBSRQ–AS scores and additional measures, was mixed. We discuss reasons that complicate interpretation of the dimensionality of MBSRQ–AS scores in this and previous studies, and call for further research on this issue.

**Keywords:** Multidimensional body image; MBSRQ; MBSRQ–AS; Malaysia; Test adaptation

**1. Introduction**

 Although notions of multidimensional body image were originally proposed in the 1960s (e.g., Shontz, 1969), it was the publication of Cash and Pruzinsky’s (1990) seminal volume that cemented body image as a multifaceted psychological experience of embodiment. Indeed, Cash and Pruzinsky (1990, p. xi) used the term “body images” to highlight the fact that there was not a single entity, but was rather a complex and multidimensional construct that encompasses body-related self-perceptions and self-attitudes, including one’s thoughts, beliefs, feelings, and behaviours (see also Cash, 2004; Cash & Pruzinsky, 2002; Cash & Smolak, 2011). Despite this view, scholars have often focused on singular aspects of body image in their measurements, possibly because a lack of psychometrically sound instruments that capture the multidimensionality of the body image construct (Fiske, Fallon, Blismmer, & Redding, 2014; Thompson & van den Berg, 2002). One exception is the Multidimensional Body-Self Relations Questionnaire (MBSRQ), a comprehensive self-report inventory of self-attitudinal aspects of body image (Brown, Cash, & Mikulka, 1990; Cash, 2000).

 An initial version of the instrument, developed in 1983, was called the Body-Self Relations Questionnaire (BSRQ) and contained 294 items (see Cash, 2000, 2015). The number of items in a subsequent version of the instrument was reduced to 54 items based on conceptual clarifications (Cash, Winstead, & Janda, 1985, 1986); that is, body image attitudes were conceptualised as reflecting two psychological dimensions – evaluation and cognitive-behavioural orientation – in three somatic domains, namely appearance, health, and fitness. A principal-components analysis with data from 2,052 respondents from the United States (U.S.) supported this conceptual framework (Brown et al., 1990), with BSRQ scores reducing to seven subscales (Appearance Evaluation, Appearance Orientation, Fitness Evaluation, Fitness Orientation, Health Evaluation, Health Orientation, and Illness Orientation). Cash (2000) later added three appearance-related subscales (the Body Areas Satisfaction Scale, the Overweight Preoccupation Scale, and the Self-Classified Weight Scale) and, together, the 10-subscale 69-item instrument was named the MBSRQ (Cash, 2000, 2015).

 A shorter, 34-item version of the instrument, consisting only of the five appearance-related subscales (Appearance Evaluation, Appearance Orientation, Overweight Preoccupation, Self-Classified Weight, and the Body Areas Satisfaction Scale), is also available and is known as the MBSRQ–Appearance Scales (MBSRQ–AS). Cash (2000) recommended using this version when researchers are only or primarily interested in appearance-focused body image. Both the MBSRQ and MBSRQ–AS have been widely-used in English-speaking samples, mainly due to their uniqueness in assessing multidimensional body image (Thompson, 2004; Thompson & van den Berg, 2002). A further benefit of the MBSRQ and MBSRQ–AS is the wealth of evidence demonstrating the convergent, divergent, and discriminant validity of their scores in U.S. participants (see Cash, 2000, 2015). Cash (2000) also reported adequate internal consistency coefficients across all MBSRQ subscale scores (Cronbach’s α women ≥ .74, men ≥ .70) and adequate 1-month test-retest reliabilities. However, a more recent study of young adults from the United Kingdom suggested that several MBSRQ items, including all items on the Appearance Evaluation subscale, demonstrated high levels of test-retest *instability* after only two weeks (Nevill, Lane, & Duncan, 2015).

 There are a number of other limiting issues concerning use of the MBSRQ. For example, although Brown and colleagues (1990) indicated that the 7-factor structure of BSRQ scores was stable in women and men, a more recent study using multigroup confirmatory factor analysis (CFA) indicated that only a handful of MBSRQ subscales achieved configural, metric, and scalar invariance across sex and age, respectively, in U.S. adults (Rusticus & Hubley, 2006). Other work has suggested a lack of invariance across certain subpopulations in the U.S. (e.g., women with and without breast cancer; Sabiston et al., 2010). Perhaps most problematic is the finding that the proposed MBSRQ–AS factor structure does not fit all U.S. population segments. Thus, a CFA of MBSRQ–AS scores in a sample of African American women indicated that the 5-factor model had poor fit to the data (Kashubeck-West et al., 2013). Instead, exploratory factor analysis (EFA) resulted in the extraction of a 3-factor model consisting of items related to Appearance Focus (Cronbach’s α = .90), Weight Concerns (α = .79), and Non-Weight Body Satisfaction (α = .57).

 Other studies have examined the dimensionality of MBSRQ scores in different linguistic and cultural groups. In one early study, the factor structure of a Spanish translation of the MBSRQ was assessed in a sample of Spanish college students (*N* = 214; Raich, Torras, & Figueras, 1996). Using EFA, the authors extracted six factors that demonstrated only partial overlap with the parent dimensionality. A more recent EFA study using the Spanish version of the MBSRQ with Spanish students and patients undergoing cosmetic surgery (*N* = 261) resulted in the extraction of four factors, with 24 items being eliminated (Botella, Ribas, & Ruiz, 2009). Other studies using the Spanish MBSRQ have been conducted with Chilean adolescents and young adults (*N* = 451; Cruzat-Mandich et al., 2018) and Mexican college students (Blanco Ornelas, Ramírez, Aguirre Chávez, Zueck Enríquez, & Benavides Pando, 2017), with EFA results suggesting the existence of seven and two dimensions, respectively, that showed little overlap with the parent dimensions. Finally, Brytek-Matera and Rogoza (2015) translated the MBSRQ into Polish and examined its factor structure in a mixed staff-and-student female sample (*N* = 341). CFA of a hypothesised 10-dimensional factor structure showed poor fit to the data. Conversely, both EFA and exploratory structural equation modelling (ESEM) suggested that eight factors should be extracted, although a subsequent CFA of the hypothesised 8-factor model also showed poor fit to the data (it should be noted, however, that these authors conducted all analysis on the same sample, which is problematic; see Fokkema & Greiff, 2017).

 Other studies have examined the factor structure of scores on the MBSRQ–AS. In one study, a French translation of the MBSRQ–AS was completed by a mixed sample of French university staff and students, as well as obese individuals from the community (*N* = 772; Untas, Koleck, Rascle, & Borteyrou, 2009). In an EFA with the items from the Appearance Evaluation (7 items) and Appearance Orientation (12 items) subscales, these authors consistently extracted two factors with data from women, men, participants categorised as normal weight, and participants categorised as obese. Likewise, Argyrides and Kkeli (2013) translated the MBSRQ–AS into Greek and administered it to a sample of Cypriot adolescents and young adults (*N* = 1,312). An EFA with the 19 items of the Appearance Evaluation and Appearance Orientation subscales indicated a 2-factor structure that was stable in girls and boys. Vossbeck-Elsebusch and colleagues (2014) translated the MBSRQ–AS into German and administered it to a sample of female patients with disordered eating and non-patients (*N* = 523). Omitting the Self-Classified Weight subscale (due to high inter-item correlations on this subscale), the authors reported using CFA that the four remaining MBSRQ-AS subscales presented adequate fit to the data. Between-group differences as a function of disordered eating diagnosis were also examined, although it should be noted that the authors neglected to examine whether subscale scores were invariant across groups – a precondition for examining group differences (Chen, 2008; Davidov, Dülmer, Schlüter, Schmidt, & Meuleman, 2012).

 Roncero, Perpiñá, Marco, and Sánchez-Reales (2015) made several adjustments to the Spanish version of the MBSRQ–AS items and administered it to a community sample of Spanish adolescents and adults (*N* = 1,041). A CFA of the hypothesised 5-factor model showed adequate fit, although there was a strong correlation between scores on the Appearance Evaluation and Body Areas Satisfaction Scale. A second CFA testing a 4-factor model with these subscales collapsed also indicated adequate fit, but the 5-factor model showed comparatively better fit. Roncero and colleagues (2015) also examined between-group differences in subscale scores across age and sex, but neglected to first establish invariance across these levels. Another CFA study with Spanish adolescents (*N* = 355) also indicated adequate fit of the 5-factor model (Marco, Perpiñá, Roncero, & Botella, 2017). These authors, too, examined between-group differences as a function of sex without first establishing that MBSRQ–AS scores were sex invariant.

In addition, Jankauskinė and Miežienė (2011) prepared a Lithuanian translation of the MBSRQ–AS, which was administered to 217 Lithuanian participants recruited from fitness clubs. An EFA pointed to the existence of six factors, of which only three demonstrated adequate internal consistency coefficients. Unfortunately, it is not clear how these authors determined how many factors to extract and is likely that factor over-retention was a limiting issue. Finally, Naqvi and Kamal (2017) prepared an Urdu translation of the MBSRQ–AS, which they administered to a sample of Pakistani university students (*N* = 350). An EFA supported the extraction of 27 of the 34 MBSRQ-AS items, which loaded onto four factors (Appearance Evaluation, Appearance Orientation, Body Areas Satisfaction, and Overweight Preoccupation). In a subsequent study with Pakistani university students (*N* = 500), Naqvi and Kamal (2017) concluded that a CFA provided evidence of adequate fit for the 4-factor model, but examination of fit indices reported in the study in fact showed substandard fit on several indices.

 While the MBSRQ and MBSRQ–AS have been widely used in different cultural contexts, translational studies to date appear to have introduced elements of test adaptation error (for a discussion, see Swami & Barron, 2018). This includes examination of the dimensionality of only portions of the instrument rather than the full measure (Argyrides & Kkeli, 2013; Untas et al., 2009; see also Lyu & Gill, 2012), factor over-retention in EFAs (Jankauskinė & Miežienė, 2011), the use of CFA in the absence of an initial EFA (Brytek-Matera & Rogoza, 2015; Roncero et al., 2015; Vossbeck-Elsebusch et al., 2014), multiple analyses using the same dataset (Brytek-Matera & Rogoza, 2015), erroneous interpretation of fit indices (Naqvi & Kamal, 2017), and assessments of between-group differences in the absence of tests of invariance (Marco et al., 2017; Roncero et al., 2015; Vossbeck-Elsebusch et al., 2014). Each of these problematic elements will have likely introduced a degree of measurement bias into the aforementioned studies (Swami & Barron, 2018). Furthermore, other studies appear to have used translations of the MBSRQ or MBSRQ subscales in China (Lin & Lin, 2000), India (Deshmukh & Kulkarni, 2017), Iran (Barahmand, 2009), Jordan (King et al., 2013), the Netherlands (Alleva, Martijn, Veldhuis, & Tylka, 2016), Norway (Loland, 1998), South Africa (Peltzer & Pengpid, 2012), and Sweden (Kling, Rodgers, & Frisén, 2016) without first examining factorial validity in these cultural contexts. This is problematic because making assumptions about the factor structure of scores on a measure in the absence of empirical tests will almost certainly result in artefactual results (Swami & Barron, 2018).

* 1. **The Present Study**

As a contribution of the available literature, the present study examined the factor structure and psychometric properties of a Bahasa Malaysia (Malay) translation of the MBSRQ–AS. The MBSRQ appears to have been administered to Malaysian samples, but studies have neglected to report whether the measure was translated or to report on the dimensionality of instrument scores (e.g., Abu Samah & Ahmadian, 2014), or have inappropriately combined MBSRQ items with items from other measures for analyses (Chin, Mohd. Taib, Mohd. Shariff, & Khor, 2008). Given these issues, we prepared a novel translation of the MBSRQ–AS and examined its psychometric properties in a sample of Malaysian Malays. Malaysia is a useful cultural context to examine the dimensionality and psychometric properties of the MBSRQ–AS for reasons that have been discussed elsewhere (e.g., Swami, 2006, 2015; Swami & Barron, 2016; Swami, Tovée, & Harris, 2013). These include the focus on a national context undergoing a nutritional and lifestyle transition as a result of rapid industrialisation and urbanisation, evolving gendered relations, and – perhaps most importantly – the dearth of psychometrically valid and reliable tools for the assessment of multidimensional body image (Swami & Barron, 2017).

 To examine the factor structure of Malay MBSRQ–AS scores, we followed best-practice guidelines for the test adaptation of body image instruments (Swami & Barron, 2018). Specifically, we began our investigation of the MBSRQ–AS factor structure using EFA, which allowed for an exploration of dimensionality without any *a priori* constraints in terms of modelling. Next, we examined the fit of the EFA-derived model alongside Cash’s (2000) 5-factor model using CFA in a distinct sample. Given the analytic problems discussed above, we elected not to test the fit of alternative hypothesised models (e.g., the 4-factor model proposed by Naqvi & Kamal [2017]). As a preliminary hypothesis, we predicted that Malay MBSRQ–AS would reduce to five factors as per Cash’s (2000) model. In addition, we followed Rusticus and Hubley (2006) in examining the invariance of MBSRQ–AS scores across sex, with an initial expectation that we would be able to demonstrate full measurement invariance (i.e., at the configural, metric, and scalar levels). For all derived models, we also examined internal consistency coefficients, with the expectation that scores would internally reliable.

 Finally, we conducted a preliminary examination of the construct validity of MBSRQ–AS scores in our sample using measures that been validated for use in Malay-speaking populations. Specifically, we aimed to examine associations between MBSRQ–AS scores and body appreciation, life satisfaction, subjective happiness, and perceptions and internalisation of societal ideals of appearance. These constructs were selected based upon the availability of measures that have been validated for use in Malay-speaking populations and because of expectations scores on these measures (i.e., measures of body image, psychological well-being, and internalisation of appearance ideals) would be significantly associated with MBSRQ–AS scores. More specifically, evidence of construct validity would be demonstrated through significant correlations between MBSRQ–AS scores and scores on all additional measures, with relatively stronger correlations expected for body appreciation (i.e., a measure of body image) compared to all other measures. We also assessed the convergent validity of MBSRQ–AS scores through associations with self-reported body mass index (BMI), with the expectation that significant correlations would emerge in both women and men.

**2. Method**

**2.1. Participants**

 The participants consisted of an online panel of Malaysian citizens who self-reported as being of Malay ancestry (women *n* = 315, men *n* = 314). Malays represent the majority ethnic group in Malaysia (Department of Statistics Malaysia, 2017) and must be Muslim, as defined by Article 160 of the Constitution of Malaysia (Mohamed Adil, 2007). The sample ranged in age from 18 to 64 years (*M* = 32.81, *SD* = 8.65) and in self-reported BMI from 14.02 to 45.45 kg/m2 (*M* = 24.74, *SD* = 5.15). In terms of marital status, 37.5% were single, 59.8% were married, and 2.7% were divorced. Of the total sample, 1.0% had completed primary education, 28.0% had completed secondary education, 46.1% had an undergraduate degree, 13.0% had a postgraduate degree, and 11.9% had some other qualification.

**2.2. Measures**

 **2.2.1. Multidimensional Body-Self Relations Questionnaire–Appearance Scales**. Participants completed a Bahasa Malaysia (Malay) translation of the MBSRQ–AS (Cash, 2000). This is a 34-item measure with items rated of 5-point scales, with anchors varying depending on the subscale. Based on data from U.S. samples, Cash (2000) recommended computing scores for five subscales, namely Appearance Evaluation (7 items), Appearance Orientation (12 items), Overweight Preoccupation (4 items), Self-Classified Weight (2 items), and the Body Areas Satisfaction Scale (9 items). The translational procedure used to develop a Malay version of the MBSRQ–AS is described below and the items in English and Malay are provided in Table 1.

 **2.2.2. Body appreciation**. The Body Appreciation Scale (Avalos, Tylka, & Wood-Barcalow, 2005) is a 15-item measure of a facet of positive body image, which has been shown to have a one-dimensional factor structure in U.S. samples (for a review, see Swami, 2018). Among Malaysian Malays, however, the BAS reduces to two dimensions tapping general body appreciation (8 items) and body image investment (3 items) (Swami & Chamorro-Premuzic, 2008). As such, participants in the present study only completed items on the former subscale, which were responded to on a 5-point scale (1 = *never*, 5 = always). Although an updated version of the BAS is available (i.e., the BAS-2; Tylka & Wood-Barcalow, 2015), including a Malay variant (Swami et al., 2018), the latter was not available when we began this project. A general body appreciation score was computed as the mean of all eight items, with higher scores reflecting more positive body image. Scores on the Malay BAS have been shown to have adequate internal reliability and convergent validity (Swami & Chamorro-Premuzic, 2008). In the present work, omega for scores on this scale was .91 (95% CI = .90-.92).

 **2.2.3. Life satisfaction.** Participants were asked to complete the Satisfaction with Life Scale (SLS; Diener, Emmons, Larsen, & Griffin, 1985; Malay translation: Swami & Chamorro-Premuzic, 2009). This is a 5-item scale that taps individuals’ assessments of the quality of their lives on the basis of their own unique criteria. All items were rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*) and an overall score was computed as the mean of all items (higher scores reflect greater life satisfaction). Scores on the Malay version of the SLS have been shown to have adequate internal consistency and good construct validity (Swami & Chamorro-Premuzic, 2009). In the present work, omega for scores on this scale was .86 (95% CI = .84-.87).

**2.2.4. Subjective happiness.** Participants were also asked to complete the Subjective Happiness Scale (SHS; Lyubomirsky & Lepper, 1999; Malay translation: Swami, 2008), a 4-item molar measure of the extent to which individuals believe they are happy or unhappy people. Two SHS items ask respondents to characterise themselves based on absolute ratings and ratings relative to peers and two further items present brief descriptions of happy and unhappy individuals, and ask respondents to rate the extent to which the descriptions are accurate of themselves. All items were rated on 7-point scales and an overall score was computed as the mean of all items, with higher scores reflecting greater subjective happiness. Scores on the Malay version of the scale have adequate internal consistency, good patterns of construct validity, and good test-retest reliability over a 1-month period (Swami, 2008). In the present study, omega for SHS scores was .87 (95% CI = .82-.93).

 **2.2.5. Appearance ideals.** The survey package in the present study included the Sociocultural Attitudes Toward Appearance Questionnaire-3 (SATAQ-3; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004; Malay translation: Swami, 2009). This is a 30-item scale measuring the multi-dimensional impact of sociocultural influences on body image, with items rated on a 5-point scale (1 = *definitely disagree*, 5 = *definitely agree*). Although scores on the English version of the scale reduce to four dimensions, Swami (2009) reported that scores on the Malay version consist of three dimensions tapping perceived pressure and general internalisation of appearance ideals (14 items), the extent to which different sources of information are considered important in terms of appearance ideals (9 items), and internalisation of an athletic ideal (5 items). Here, participants were only asked to complete the former two subscales of the Malay SATAQ-3 and subscale scores were computed as the mean of all relevant items. Scores on the Malay version of the SATAQ-3 have been shown to have adequate internal consistency coefficients and adequate convergent validity (Swami, 2009). Although a newer version of the SATAQ is available (i.e., SATAQ-4; Schaefer et al., 2014), this measure has not been translated and validated for use in Malay-speaking populations. In the present study, omega was .91 (95% CI = .90-.92) for Pressure and Internalisation-General and .71 (95% CI = .68-.75) for Information.

 **2.2.6. Demographics**: Participants were asked to provide their demographic details consisting of sex, age, highest educational attainment, height, and weight. The latter two items were used to compute participants’ self-reported BMI as kg/m2. In Malaysian samples, self-reported height and weight have been shown to be highly correlated with actual measurements (Kee et al., 2017).

**2.3. Test Adaptation**

The MBSRQ–AS was translated into Malay following best-practice guidelines for the test adaptation of body image instruments (Swami & Barron, 2018). This involved a 5-stage procedure (Beaton, Bombardier, Guillemin, & Ferraz, 2000), the first step of which was the forward translation of the MBSRQ–AS items from English to Malay by independent informed and uninformed translators. Next, the two translations were examined by a third independent and blind translator, who resolved discrepancies between the translations and produced a synthesised translation. Third, two new independent and blind translators back-translated the synthesised translation into English (Brislin, 1970). Fourth, the forward- and back-translations were examined by a bilingual committee comprising all the aforementioned translators, a methodologist, and four of the authors of the present paper. Minor word-choice issues were settled at this stage through consensus, resulting in a pre-final version of the Malay BAS-2. In a final step, the pre-final version was pre-tested in a sample of 36 individuals (women = 52.8%) who were fluent in Malay. These participants were asked to rate each item for understanding on a 5-point scale (1 = *do not understand at all*, 5 = *understanding completely*). The mean responses per item were then assessed (overall *M* = 3.83, *SD* = 0.48, range = 3.06-4.11) and 3 items with relatively lower ratings of understanding (*M*s < 3.50) were returned to the committee for further consideration. Following committee discussion, minor grammatical adjustments were made to Items 12, 19, and 20 to improve grammatical clarity while maintaining semantic and item equivalence. The Malay items of the final translation used in the present study are reported in Table 1.

**2.4. Procedures**

Ethics approval was obtained from the departmental ethics committee at the first author’s institution (approval code: EHS17-020). Data were collected in September 2018 via a QualtricsTM (www.qualtrics.com) research panel, which is an online survey platform available to researchers to facilitate participant recruitment and online data collection. To be eligible to complete our survey, participants had to be Malaysian citizens of Malay ethnicity, of the age of majority (≥ 18 years), and fluent in Malay. The project was advertised as a study on “attitudes toward the body” and included an estimated duration (15-20 minutes). After providing digital informed consent, participants were directed to the measures described above, which were presented in an anonymous form. The order of presentation of each of the scales above was counter-balanced for each participant and demographic items were always presented last. In exchange for completing the survey, participants were paid AUD 2.00. All participants received debriefing information at the end of the survey.

**2.5. Analytic Strategy**

There were no missing data in the present study. However, we replaced improbable BMI values (< 12 or > 50 kg/m2; *n* = 18) using the multiple imputation technique. To examine the factor structure of Malay MBSRQ–AS scores, we adopted Swami and Barron’s (2018) recommendation of using a two-step, EFA-to-CFA analytic strategy for the test adaptation of body image instruments. To ensure adequate sample sizes for both steps, the total sample was split using a computer-generated semi-random seed, resulting in one split-half for EFA (women *n* = 160, men *n* = 154) and a second split-half for CFA (women *n* = 155, men *n* = 160).

Data from the first split-half were subjected to EFA with principal-axis factoring, the most commonly-used fitting procedure to estimate factor loadings and unique variances of a model (Fabrigar, Wegener, MacCallum, & Strahan, 1999), in IBM SPSS Statistics v. 24, which we conducted separately for women and men. Sample size adequacy was based on Worthington and Whittaker’s (2006) recommendation that, if item communalities are ≥ .50 or there are 10:1 items per factor with factor loadings of about .40, then a sample size of 150-200 may be adequate; if communalities are ≥ .60 or there is a minimum of 4:1 items per factor with factor loadings above .60, then smaller samples are adequate. All item communalities for women and men in the first split-half were ≥ .54, suggesting that our subsample sizes were adequate for EFA. The female and male subsamples also met assumptions for EFA based on item distributions, average item correlations, and item-total correlations (Clark & Watson, 1995).

To determine whether our data were factorable, we computed the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (which should ideally be ≥ .80; Kaiser, 1974) and Bartlett’s test of sphericity (which should be significant). For the EFAs, we followed Brown and colleagues (1990) in applying a varimax rotation, an orthogonal rotation method that assumes factors will be uncorrelated. Factor extraction was based on the results of parallel analysis (Hayton, Allen, & Scarpello, 2004), which reduces the likelihood of factor over-retention compared to other commonly-used extraction methods (Velicer, Eaton, & Fava, 2000). Parallel analysis works by creating a random dataset with the same number of cases and variables as the actual dataset. Factors in the actual data are only retained if their eigenvalues are greater than the eigenvalues from the random data (Hayton et al., 2004). Item retention was based on Comrey and Lee’s (1992) recommendation that items with “fair” loadings (i.e., ≥ .33) should be retained. Finally, the degree of factor similarity across women and men was assessed using Tucker’s (1951) congruence coefficient, with values between .85 and .94 corresponding to fair similarity across groups and values ≥ .95 suggesting that factor structures can be considered equal across groups (Lorenzo-Seva & ten Berge, 2006).

Data from the second split-half were subjected to CFA using the lavaan (Rosseel, 2012), semTools (Jorgensen, Pornprasertmanit, Schoerman, & Rosseel, 2018), and MVN packages (Korkmaz, Goksuluk, & Zararsiz, 2014) with *R* (*R* Development Core Team, 2014). Proactive Monte Carlo simulations (Marcoulides & Chin, 2013) indicated that a sample size of 260 would be sufficient for this analysis, which was surpassed in our study. We planned to examine the fit of the EFA-derived factor structure of MBSRQ–AS scores and, if different, Cash’s (2000) 5-factor model. Assessment of the present data for normality indicated that they were neither univariate (Sharipo-Wilks *p* < .001) nor multivariate normal (Mardia’s skewness = 14900.23, *p* < .001, Mardia’s kurtosis = 44.55, *p* < .001), so parameter estimates were obtained using the robust maximum likelihood method with the Satorra-Bentler correction (Satorra & Bentler, 2001). To assess goodness-of-fit, we used the normed model chi-square (χ²/df; values < 3.0 considered indicative of good fit; Hu & Bentler, 1999), the Steiger-Lind root mean square error of approximation (RMSEA) and its 90% CI (values close to .06 considered to be indicative of good fit and up to .08 indicative of adequate fit; Steiger, 2007), the standardised root mean square residual (SRMR; values < .09 indicative of good fit; Hu & Bentler, 1999), the comparative fit index (CFI; values close to or > .95 indicative of adequate fit; Hu & Bentler, 1999), the Tucker-Lewis index (TLI; values close to or > .95 indicative of good fit; Hu & Bentler, 1999), and Bollen’s Incremental Fit Index (BL89; values close to or > .95 indicative of good fit; Hu & Bentler, 1999). To compare relative fit across models, we use the Akaike information criterion (AIC), with the lowest values being preferred (Hooper, Couglan, & Mullen, 2008).

In the second split-half, we also used multi-group CFA (Chen, 2007) to assess measurement invariance at the configural, metric, and scalar levels between women and men. Configural invariance implies that the latent MBSRQ–AS variables and the pattern of loadings of the latent variables on indicators are similar across groups (i.e., the unconstrained latent model should fit the data well in all groups). Metric invariance implies that the magnitude of the loadings is similar across groups and is tested by comparing two nested models consisting of a baseline model and an invariance model. Because the Δ*χ*² statistic is overly stringent criterion invariance (Meade, Johnson, & Braddy, 2008), we used ΔCFI < .01 as an indicator of metric invariance (Cheung & Rensvold, 2002). Finally, scalar invariance implies that both the item loadings and item intercepts are similar across groups and is examined using the same nested-model comparison strategy as with metric invariance (Chen, 2007). For scalar invariance, Chen (2007) suggested that invariance is supported when ΔCFI < .01 *and* ΔRMSEA < .015 *or* ΔSRMR < .030, although other scholars suggest that ΔCFI < .01 is sufficient (Cheung & Rensvold, 2002).

Internal consistency was assessed using omega and its associated 95% CI, with values greater than .70 reflecting adequate internal reliability (Dunn, Baguley, & Brunsden, 2014). In the CFA portion of the dataset, evidence of convergent validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981), with average variance extracted (AVE) values of ≥ .50 considered adequate (Malhotra & Dash, 2011). Sex differences in MBSRQ–AS scores were only investigated should scalar or partial scalar invariance be established (Davidov et al., 2012). Finally, to assess convergent validity, we used the total sample and examined bivariate correlations between MBSRQ–AS scores and measures of well-being (life satisfaction and subjective happiness), body appreciation, perceived media influence and internalisation of appearance ideals, and self-reported BMI.

**3. Results**

**3.1. Exploratory Factor Analysis**

 **3.1.1. Female subsample.** We conducted an EFA with the female subsample from the first split-half (*n* = 160). Bartlett’s test of sphericity, χ2(561) = 2653.76, *p* < .001, and the KMO measure of sampling adequacy, KMO = .84, indicated that the MBSRQ–AS items had adequate common variance for factor analysis. The results of the EFA pointed to the existence of 8 factors with λ > 1.0 and inspection of the scree plot indicated there were four primary factors before a steep cut-off to a fifth factor. The results of parallel analysis suggested that four factors should be extracted: only the first four factors from the actual data had λ greater than the criterion λ generated from the random data (i.e., λ1 = 5.67 > 4.78. λ2 = 3.63 > 3.28, λ3 = 3.21 > 2.89, and λ4 = 2.58 > 2.34). The fifth factor derived from the actual data had an λ that was lower than the corresponding criterion λ generated from the random data (i.e., λ5 = 1.98 < 2.17). Based on the results of the parallel analysis, we retained four factors for this subsample, which explained 44.4% of the common variance. Factor loadings are reported in Table 1.

 **3.1.2. Male subsample.** In the male sample (*n* = 154), Bartlett’s test of sphericity, χ2(561) = 2435.65, *p* < .001, and the KMO measure of sampling adequacy, KMO = .80, indicated that the MBSRQ–AS items had adequate common variance for factor analysis. The EFA results indicated there were 9 factors with λ > 1.0. Inspection of the scree plot suggested three primary factors, two secondary factors, and a gradual slope to the sixth factor. As with the female subsample, parallel analysis indicated that four factors should be extracted, as only the first four factors from the actual data had λ greater than the criterion λ generated from the random data (i.e., λ1 = 5.11 > 3.76, λ2 = 3.01 > 2.76, λ3 = 2.71 > 2.54, and λ4 = 2.21 > 1.97). The fifth factor derived from the actual data had an λ that was lower than the corresponding criterion λ generated from the random data (i.e., λ2 = 1.76 < 1.86). The four extracted factors explained 38.4% of the common variance and factor loadings are reported in Table 1.

 **3.1.3. Factor interpretation and further analyses**. The factor loadings reported in Table 1 for the female and male subsamples suggest a degree of similarity across factor structures. Tucker’s congruence coefficient was .86, suggestive of similar but not equal factor structures. In both women and men, items that loaded on the first factor included all nine BASS items plus Items 5 and 9, which referred to satisfaction with one’s looks and a perception that one is good-looking. For this reason, we considered that these 11 items referred to Body Areas and Appearance Satisfaction. Omega for scores on this factor was .90 in women (95% CI = .87-.92) and .89 in men (95% CI = .87-.92). Across sexes, the second factor included six items of the Appearance Orientation items from Brown and colleagues (1990), as well as an additional weight-related item (Item 8), which we considered to be consistent with appearance orientation. We, therefore, called this 7-item factor Appearance Orientation and omega was adequate in women (.77, 95% CI = .71-.82) and men (.77, 95% CI = .71-.82).

The third factor in women and men included both Self-Classified Weight items along with three Overweight Preoccupation items. Together, we considered these items to reflect Weight Perceptions and Concerns. Omega was adequate in women (.81, 95% CI = .76-.85) and men (.73, 95% CI = .66-.80). The fourth factor consisted of three items that mainly reflected clothing-related attitudes, which we thus called Clothing Perceptions. However, omega was less-than-adequate in women (.62, 95% CI = .50-.71) and men (.62, 95% CI = .49-.71). For this reason, we discarded the final factor and concluded that scores on the Malay MBSRQ–AS reduce to three internally-consistent factors with a total of 23 items. The remaining items either showed cross-loadings (Items 19 and 20 in men) or did not load onto any of the four aforementioned factors (8 items in women, 6 in men) and so were discarded from analyses (see Table 1).

**3.2. Confirmatory Factor Analysis and Sex Invariance**

 In the second split-half subsample (*n* = 320), we first examined the fit of Brown and colleague’s (1990) 5-factor model. Indices were suggestive of poor fit to the data: SBχ²(517) = 1436.218, SBχ²normed = 2.78, robust RMSEA = .085 (90% CI = .080-.091), SRMR = .101, robust CFI = .731, robust TLI = .708, BL89 = .716, AIC = 26044.59. Suggested modification indices were consulted to improve model fit, with modifications being based on correlations among like items from the same factor (Schumacker & Lomax, 2004). Despite freeing up to three error covariances per subscale, in accordance with the results from likelihood ratio tests (see Supplementary Materials), the fit indices remained below acceptable levels on some indices: SBχ²(505) = 994.337, SBχ²normed = 1.97, robust RMSEA = .062 (90% CI = .056 - .068), SRMR = .098, robust CFI = .861, robust TLI = .846, BL89 = .844, AIC = 25458.73 (see Figure 1).

Next, we examined the fit of the EFA-derived 3-factor model. Fit indices were: SBχ²(227) = 637.932, SBχ²normed = 2.81, robust RMSEA = .087 (90% CI = .079-.095), SRMR = .128, robust CFI = .811, robust TLI = .789, BL89 = .795, AIC = 17376.21. As indices were less than ideal, suggested modification indices were considered to improve model fit based on correlations among like items from the same factor (Schumacker & Lomax, 2004). Specifically, modification indices were consulted to free error covariances at a rate of up to three error covariances per subscale, in accordance with the results from likelihood ratio tests (see Supplementary Materials). Fit remained less-than-adequate based on some indices: SBχ²(218) = 496.348, SBχ²normed = 2.28, robust RMSEA = .072 (90% CI = .064-.080), SRMR = .123, robust CFI = .876, robust TLI = .856, BL89 = .861, AIC = 17189.10 (see Figure 2).

The CFA analyses indicated that both models had acceptable fit on some indices, but less-than-adequate fit on other indices. However, comparison of AIC values indicated that the 3-factor model provided comparatively better fit than the 5-factor model. We, therefore, used the 3-factor model in all further analyses. Convergent validity for this model was less-than-adequate, as AVE was less than .50 (Body Areas and Appearance Satisfaction, AVE = .40; Appearance Orientation, AVE = .41; Weight Perception and Concerns, AVE = .32). Omega for scores on the Body Areas and Appearance Satisfaction subscale was .84 (95% CI = .80-.88) in women and .87 (95% CI = .84-.90) in men. Omega for Appearance Orientation scores was .85 (95% CI = .81-.88) in women and .83 (95% CI = .78-.86) in men. Finally, omega for Weight Perception and Concerns subscale scores was .77 (95% CI = .71-.82) in women and .71 (95% CI = .63-.77) in men.

Next, we tested for measurement invariance across sex for the second split-half subsample (see Table 2 for full metrics) based on the EFA-derived, 3-factor model. Indices for ΔSRMR (.002) indicated that scalar invariance was found. However, given that SRMR was inflated in the baseline model, we also utilised additional criteria. Indices for ΔCFI and ΔRMSEA indicted that configural and metric invariance was found, but ΔCFI was above acceptable levels for scalar invariance. We, therefore, ran the Lagrange multiplier test to assess whether relaxing constraints within the model would result in partial scalar invariance. However, the multivariate score indicated that this would not be achievable, χ2(20) = 29.71, *p* = .075. These results suggest that (partial or full) sex invariance was not achieved on the three-dimensional model of MBSRQ–AS scores, so between group analyses were not conducted.

**3.3. Construct Validity**

 We examined the construct validity of the three-dimensional MBSRQ–AS scores by computing bivariate correlation with scores on all additional measures included in the present study, separately for women and men, and using the total sample (see Table 3). In women, scores on the three MBSRQ–AS subscales were significantly but weakly inter-correlated, whereas in men the association between Body Areas and Appearance Satisfaction and Weight Perception and Control scores did not reach significance. In women, associations between MBSRQ–AS scores and scores on measures of body appreciation, psychological well-being, and internalisation of appearance ideals were generally consistent with our hypotheses, with the exceptions of lack of significant associations between Body Areas and Appearance Satisfaction scores and the SATAQ-3 variables, and between Weight Perception and Control scores and life satisfaction and subjective happiness, respectively. In men, associations between Body Areas and Appearance Satisfaction scores and the SATAQ-3 subscale of Pressure and Internalisation did not reach significance. In addition, Weight Perception and Control scores were only significantly correlated with Pressure and Internalisation scores and BMI.

**4. Discussion**

 The present study examined the psychometric properties of MBSRQ–AS scores in a sample of Malaysian adults. In terms of dimensionality, the results of our EFA indicated that MBSRQ–AS reduced to four dimensions that included 26 items. However, a 3-item fourth factor had less-than-adequate internal consistency. Omitting this factor resulted in a 23-item, 3-factor solution of Malay MBSRQ–AS. This 3-factor structure showed only partial overlap with the parent dimensionality proposed by Brown and colleagues (1990). Specifically, a primary factor consisted of 11 items tapping body areas and appearance satisfaction (similar to the Body Areas Satisfaction Scale in the parent study, but including two appearance-related items). A secondary factor included six appearance orientation items (five of which loaded on the Appearance Orientation subscale in the parent study), and a tertiary factor appeared to tap five items related to both self-classified weight and overweight preoccupation. Of the original items, almost a third (eight items) either cross-loaded or did not load onto any of the extracted factors, which is suggestive of item redundancy.

 Our CFA results were also indicative of some problems with the dimensionality of Malay MBSRQ–AS scores. Specifically, we failed to achieve adequate fit on all fit criteria for both the parent, 5-factor model and the EFA-derived 3-factor model. While it is important that fit indices are not used rigidly to judge model fit (Heene, Hilbert, Draxler, Ziegler, & Bühner, 2011; Hu & Bentler, 1999; Perry, Nicholls, Clough, & Crust, 2015), it was apparent the neither model achieved adequate fit based on CFI, TLI, BL89, and SRMR. It is possible that adequate fit was achieved based on some indices but not others because some indices (particularly non-centrality parameters) are more sensitive to different types of model misspecification. A more likely possibility is that, rather than indicating model misspecification, the contradictory indices were a function of evaluating fit function value from diferent perspectives (a “wearing-two-watches” problem) and sample-specific issues that make it more difficult to interpret fit criteria (see Lai & Green, 2016). Thus, we preliminarily suggest that both the 5-factor and 3-factor models demonstrated adequate (and indeed good) fit on some but not all indices. Of the two models, it was the 3-factor model that we selected as being superior based on the AIC criterion.

 How does our final model compare with other translational models of MBSRQ–AS scores? CFA studies with Spanish adolescents and adults (Marco et al., 2017; Roncero et al., 2015) have suggested adequate fit of the parent 5-factor model, but neglected to test whether the fit of alternative, EFA-derived factor structures (see also Vossbeck-Elsebusch et al., 2014). Other studies have conducted analyses on only a subset of MBSRQ–AS items (Argyrides & Kkeli, 2013; Untas et al., 2009) or have derived alternative EFA-based models that subsequently do not demonstrate adequate fit in CFA (Naqvi & Kamal, 2017). Analytic problems (particularly the lack of implementation of an EFA-to-CFA strategy) make it difficult to determine whether alternative factor structures may be more suitable in these cultural contexts (cf. Worthington & Whittaker, 2006). Indeed, it is worth noting that, where EFAs have been conducted on the full set of MBSRQ (Botella et al., 2009; Blanco Ornelas et al., 2017; Cruzat-Mandich et al., 2018; Raich et al., 1996) or MBSRQ–AS items (Jankauskinė &, Miežienė, 2011; Naqvi & Kamal, 2017), they have failed to replicate the parent factor structures proposed by Brown and colleagues (1990).

 In this context, it might be concluded that the parent 5-factor model of MBSRQ–AS scores do not generalise well to non-English-speaking samples or possibly even to non-majority-White samples (Kashubeck-West et al., 2013). Our results certainly highlight this as a real possibility. There may be cultural or subcultural issues that result in differential item functioning (particularly item redundancy) in some populations, although studies of invariance across cultural populations would be required to investigate this further. A related issue worth highlighting is that, in the parent study, Brown and colleagues (1990) used principal components analysis (PCA) to determine the factor structure of the MBSRQ. However, PCA is used to reduce the number of observed variables to a smaller number of principal components that account for most of the variance of observed variables, unlike EFA which identifies the latent constructs and the underlying factor structure. Thus, it might be suggested that the parent study by Brown and colleagues (1990) may have resulted in a factor structure that proves difficult to replicate in EFA studies (e.g., because PCA overestimates factor loadings relative to EFA; Snook & Gorsuch, 1989). One way of dealing with this issue would be to revisit the factor structure of MBSRQ–AS scores in English-speaking samples using an EFA-to-CFA approach. This may be useful in and of itself given that the factor structures of the MBSRQ and MBSRQ–AS have only been infrequently examined in English-speaking samples beyond the parent study.

 Our results also suggest that sex invariance of the 3-factor model was not achieved for the Malay MBSRQ–AS. This is consistent with at least one previous study of U.S. adults, which reported that MBSRQ subscales generally did not achieve full invariance across sex (Rusticus & Hubley, 2006). This has important implications for scholars wishing to examine, or who have examined (Marco et al., 2017; Roncero et al., 2015), sex differences in MBSRQ or MBSRQ–AS subscale scores. To our knowledge, no existing study has adequately demonstrated sex invariance for scores on the MBSRQ or its invariants (but see Alvy, 2013), which is a precondition for analyses of between-group differences in latent scores (Chen, 2008; Davidov et al., 2012). Thus, we suggest that scholars should avoid drawing conclusions about sex differences in MBSRQ or MBSRQ–AS scores. In a similar vein, we suggest that scholars should avoid conducting analyses of latent group differences on any demographic or population dimension (e.g., Vossbeck-Elsebusch et al., 2014) in the absence of invariance. This is particularly the case given that research suggests that invariance of MBSRQ scores is rarely achieved across population segments (Rusticus & Hubley, 2006; Sabiston et al.., 2010).

 Other findings from the present study suggest that scores on the three dimensions of MBSRQ–AS scores had adequate internal consistency in both women and men. However, more problematically, we failed to demonstrate evidence of convergent validity as assessed using the Fornell-Larcker criterion. In addition, examination of associations between MBSRQ–AS scores and additional measures included in the present study provided mixed support of construct validity. While correlations between scores on the Body Areas and Appearance Satisfaction subscale and additional measures were generally indicative of good construct validity, similar correlations with the additional MBSRQ–AS were less-than-ideal. This was particularly the case with the Weight Perception and Control subscale in both women and men, where associations with additional measures (particularly indices of psychological well-being) did not reach significance. One preliminary conclusion that might be drawn on the basis of these results is that evidence of convergent and construct validity for Malay MBSRQ–AS scores is inconclusive, particularly for the tertiary factor that emerged in our analyses. Scholars wishing to use this subscale in particular should do so with caution.

 There are a number of limitations of the present study that should be considered. First, we relied on a relatively small, online sample of Malaysian citizens, which may limit generalisability, particularly as a quarter of Malaysians are not online (Malaysian Communications and Multimedia Commission, 2017). Recruiting a larger sample would also allow for replication of work with greater certainty in the stability of correlations among variables, as well as the replicability of our EFA results (cf. Worthington & Whittaker, 2006). In addition, the present study was limited to Malaysians of Malay ancestry. Although Malays are the majority ethnic group in Malaysia (Department of Statistics Malaysia, 2017), it is important to note that the nation is ethnically heterogeneous and it will be important to replicate the present study with other ethnic segments. Third, to establish construct validity, we relied on suitable measures that had been validated for use in Malay-speaking populations, which provided a relatively small pool of measures to choose from. Finally, the present study did not examine test-retest reliability, which will be important to consider given evidence of test-retest instability on many MBSRQ items in other cultural contexts (Nevill et al., 2015).

 These limitations notwithstanding, the present study makes an important contribution to the available literature on the psychometric properties of the MBSRQ–AS. In particular, our findings have important implications for scholars wishing to use the MBSRQ–AS in Malay-speaking populations. Our recommendation is that scholars include all 34 MBSRQ–AS items when designing studies for Malay-speaking populations and examine (and report) the factor structure of scores in their datasets. Ideally, this should be done using both EFA and CFA but, where this is not possible, we recommend testing the fit of the 3- and 5-factor models using CFA before conducting further analyses using the MBSRQ–AS. Indeed, this is important advice for scholars in any cultural context seeking to use the MBSRQ or its variants: we repeat the advice of Swami and Barron (2018) for scholars to desist from assuming latent dimensionality of scores on a scale in the absence of tests of factorial validity. More broadly, although the MBSRQ–AS is one of the most widely-used measures in body image research, we suggest that it is important that scholars reassess the dimensionality of its scores any time the measure is used.

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Table 1. *Multidimensional Body Self Relations Questionnaire–Appearance Scales (MBSRQ–AS) Items in English and (in Italics) in Bahasa Malaysia (Malay) and Associated Item-Factor Loadings for Female and Male Participants from the First Split-Half Subsample. Exploratory Factor Analysis Subsamples.*

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Dimension in Brown et al. (1990) | Women (*n* = 160) | Men (*n* = 154) |
| F1 | F2 | F3 | F4 | F1 | F2 | F3 | F4 |
| 1. Before going out in public, I always notice how I look / *Sebelum keluar ke tempat awam, saya selalu peka terhadap rupa paras saya*. | AO | .03 | .21 | .01 | **.73** | .04 | .20 | .05 | **.34** |
| 2. I am careful to buy clothes that will make me look my best / *Saya berhati-hati membeli pakaian yang akan membuatkan saya kelihatan terbaik*. | AO | .02 | .26 | .02 | **.71** | .01 | .23 | .11 | **.36** |
| 3. My body is sexually appealing / *Tubuh badan saya menarik secara seksual.* | AE | .25 | .23 | .05 | .28 | .31 | .08 | -.03 | -.16 |
| 4. I constantly worrying worry about being or becoming fat / *Saya sentiasa risau sekiranya saya nampak gemuk atau menjadi gemuk.* | OP | .04 | .19 | **.45** | .27 | .08 | .19 | **.34** | -.09 |
| 5. I like my looks just the way they are / Saya suka rupa paras saya seadanya. | AE | **.35** | .26 | -.09 | .21 | **.49** | .07 | -.12 | -.13 |
| 6. I check my appearance in a mirror whenever I can / *Saya sering memeriksa penampilan saya di cermin setiap kali ada peluang.* | AO | .08 | **.71** | .01 | .31 | .07 | **.41** | .02 | -.17 |
| 7. Before going out, I usually spend a lot of time getting ready / *Sebelum keluar, saya kebiasaannya akan meluangkan banyak masa untuk bersiap sedia.* | AO | .08 | .14 | .03 | .08 | .10 | .18 | -.02 | -.01 |
| 8. I am very conscious of even small changes in my weight / *Saya sangat peka akan perubahan berat badan saya, walaupun perubahan kecil.* | OP | .09 | **.68** | .16 | .21 | .08 | **.33** | .18 | .16 |
| 9. Most people would consider me good-looking / *Kebanyakan orang menganggap saya berpenampilan menarik.* | AE | **.33** | .28 | -.01 | .23 | **.55** | .17 | .04 | -.17 |
| 10. It is important that I always look good / *Ianya penting untuk saya sentiasa kelihatan menarik.* | AO | .13 | **.53** | .08 | .24 | .09 | **.69** | .01 | -.05 |
| 11. I use few grooming products / *Saya hanya menggunakan beberapa produk kecantikan.* | AO | -.13 | **.38** | .02 | .07 | .07 | **.43** | .07 | .32 |
| 12. I like the way I look without clothes on / *Saya suka rupa saya tanpa berpakaian.* | AE | .19 | .02 | -.01 | .14 | .05 | -.02 | -.03 | -.11 |
| 13. I am self-conscious if my grooming isn’t right / *Saya sangat peka sekiranya penampilan saya tidak betul.* | AO | .04 | **.37** | -.01 | -.11 | .05 | **.69** | -.10 | -.10 |
| 14. I usually whatever is handy without caring how it looks / *Saya biasanya pakai apa yang mudah tanpa peduli bagaimana ia kelihatan.* | AO | .12 | -.25 | -.01 | .04 | .14 | -.02 | .11 | .16 |
| 15. I like the way my clothes fit me / *Saya suka bagaimana pakaian saya sesuai dengan saya.* | AE | .10 | .27 | -.05 | **.63** | .04 | .28 | .02 | **.34** |
| 16. I don’t care what people think about my appearance / *Saya tidak peduli apa yang orang lain fikir tentang penampilan saya.* | AO | .12 | .01 | -.02 | -.01 | .13 | .10 | .02 | .14 |
| 17. I take special care with my hair grooming / *Saya menjaga rapi dandanan rambut saya.* | AO | .16 | **.63** | -.01 | .26 | .27 | **.53** | .09 | .04 |
| 18. I dislike my physique / *Saya tidak suka rupa fizikal saya.* | AE | -.24 | .03 | .11 | -.01 | -.28 | .01 | .03 | .02 |
| 19. I am physically unattractive / *Saya tidak menarik daripada segi fizikal.* | AE | -.25 | .02 | .11 | -.02 | **-.34** | .07 | .12 | **.75** |
| 20. I never think about my appearance / *Saya tidak memikirkan tentang penampilan saya.* | AO | .15 | -.19 | .07 | -.27 | .04 | **-.35** | .06 | **.60** |
| 21. I am always trying to improve my physical appearance / *Saya sentiasa berusaha untuk menambahbaik penampilan fizikal saya.* | AO | .06 | **.52** | .06 | .21 | .09 | **.61** | .03 | .03 |
| 22. I am on a weight-loss diet / *Saya sedang diet untuk menurunkan berat badan saya.* | OP | .03 | .32 | **.70** | .02 | .11 | .27 | **.66** | .29 |
| 23. Face (facial features, complexion) / *Muka (ciri-ciri muka, kulit muka)* | BASS | **.61** | .24 | .07 | -.03 | **.44** | .04 | .10 | -.08 |
| 24. Hair (colour, thickness, texture) / *Rambut (warna, ketebalan, tekstur)* | BASS | **.63** | .30 | .09 | .01 | **.38** | .20 | .08 | .12 |
| 25. Lower torso (buttocks, hips, thighs, legs) / *Bahagian bawah badan (punggung, pinggul, paha, kaki)* | BASS | **.78** | .01 | -.14 | .03 | **.67** | .06 | .08 | -.23 |
| 26. Mid torso (waist, stomach) / *Bahagian tengah badan (pinggang, perut)* | BASS | **.75** | .11 | -.31 | -.04 | **.82** | .01 | -.23 | .03 |
| 27. Upper torso (chest or breasts, shoulders, arms) / *Bahagian atas badan (dada atau payudara, bahu, lengan)* | BASS | **.80** | -.04 | .01 | .11 | **.76** | .06 | .04 | -.07 |
| 28. Muscle tone / *Otot* | BASS | **.74** | .05 | .05 | .04 | **.82** | .08 | .15 | -.01 |
| 29. Weight / *Berat badan* | BASS | **.66** | -.02 | -.32 | .01 | **.75** | -.02 | -.28 | -.09 |
| 30. Height / *Ketinggian* | BASS | **.51** | .03 | -.07 | .17 | **.33** | -.01 | .02 | -.14 |
| 31. Overall appearance / *Penampilan keseluruhan* | BASS | **.77** | .03 | -.11 | .02 | **.81** | .17 | -.04 | -.07 |
| 32. I have tried to lose weight by fasting or going on crash diets / *Saya pernah cuba menurunkan berat badan dengan berpuasa atau dengan melalui diet mendadak.* | OP | -.10 | .23 | **.65** | -.07 | .04 | .08 | **.63** | .30 |
| 33. I think I am… [very underweight – very overweight]/ *Saya fikir saya seseorang … [sangat kurang berat badan – sangat berlebihan berat badan].*  | SCW | -.18 | -.10 | **.86** | .04 | -.11 | -.10 | **.86** | -.09 |
| 34. From looking at me, most people would think I am [very underweight – very overweight] / *Berdasarkan penampilan saya, kebanyakkan orang akan fikir saya adalah… [sangat kurang berat badan – sangat berlebihan berat badan].* | SCW | -.14 | -.15 | **.82** | .01 | -.10 | -.11 | **.86** | -.07 |

*Note.* Items in bold indicate items associated with each factor. AO = Appearance Orientation, AE = Appearance Evaluation, OP = Overweight Preoccupation, BASS = Body Areas Satisfaction Scale, SCW = Self-Classified Weight, F = Factor.

Table 2. *Measurement Invariance Across Sex in the Second Split-Half Subsample.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | SBχ² | df | Robust CFI | Robust RMSEA | Robust SRMR | Model Comparison | ΔSBχ² | ΔRobust CFI | ΔRobust RMSEA | ΔSRMR | Δdf | *p* | PGFI |
| Configural | 737.338 | 436 | .867 | .074 | .127 |  |  |  |  |  |  |  | .717 |
| Metric | 762.302 | 456 | .865 | .073 | .132 | Configural vs metric | 24.964 | .002 | .001 | .005 | 20 | .208 | .748 |
| Scalar | 831.370 | 476 | .847 | .076 | .134 | Metric vs scalar | 69.068 | .018 | .003 | .002 | 20 | <.001 | .780 |

Table 3. *Bivariate Correlations between Three-Dimensional Multidimensional Body Self Relations Questionnaire–Appearance Scales (MBSRQ–AS) and Other Variables Included in the Study for the Total Sample (Women in the Bottom Diagonal).*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| (1) Body areas and appearance satisfaction |  | .28\*\* | -.07 | .55\*\* | .50\*\* | .25\*\* | .04 | .13\* | -.23\*\* |
| (2) Appearance orientation | .35\*\* |  | .23\*\* | .16\* | .14\* | .16\* | .33\*\* | .38\*\* | -.07 |
| (3) Weight perceptions and control | -.22\*\* | .27\*\* |  | -.02 | .05 | .01 | .32\*\* | .08 | .48\*\* |
| (4) Body appreciation | .58\*\* | .33\*\* | -.12\* |  | .40\*\* | .32\*\* | -.13\* | .10 | -.05 |
| (5) Life satisfaction | .48\*\* | .32\*\* | .07 | .47\*\* |  | .36\*\* | .17\* | .10 | -.10 |
| (6) Subjective happiness | .32\*\* | .16\* | .01 | .43\*\* | .48\*\* |  | -.06 | .08 | .01 |
| (7) Pressure and internalisation | -.11 | .20\*\* | .40\*\* | -.22\*\* | .08 | -.11 |  | .37\*\* | .01 |
| (8) Information | .09 | .33\*\* | .24\*\* | .12\* | .20\*\* | .05 | .39\*\* |  | -.03 |
| (9) Body mass index | -.27\*\* | -.12\* | .53\*\* | -.13\* | -.11 | .03 | .07 | .06 |  |
| Women  | *M* | 3.40 | 3.91 | 3.32 | 4.21 | 3.62 | 5.01 | 2.79 | 3.28 | 24.37 |
|  | *SD* | 0.67 | 0.60 | 0.75 | 0.66 | 0.85 | 1.10 | 0.79 | 0.56 | 5.28 |
| Men | *M* | 3.68 | 3.84 | 3.17 | 4.27 | 3.69 | 5.04 | 2.83 | 3.26 | 25.11 |
|  | *SD* | 0.61 | 0.59 | 0.68 | 0.63 | 0.73 | 0.97 | 0.76 | 0.58 | 5.03 |



*Figure 1.* Path diagram and estimates for the five-factor, parent model of the Multidimensional Body-Self Relations Questionnaire–Appearance Scales scores. The large ovals are the latent constructs, with the rectangles representing measured variables. The path factor loadings are standardised, with significance levels determined by critical ratios (all *p* < .001, except those with one asterisk which are *p* <.02, and those with two asterisks which are *p* < .250). Covariances ranged from -.13-.76 (see Supplementary Materials). Note: AO = Appearance Orientation, AE = Appearance Evaluation, OP = Overweight Preoccupation, BASS = Body Areas Satisfaction Scale, SCW = Self-Classified Weight.



*Figure 2.* Path diagram and estimates for the three-factor, EFA-derived model of the Multidimensional Body-Self Relations Questionnaire-Appearance Scales scores. The large ovals are the latent constructs, with the rectangles representing measured variables. The path factor loadings are standardised, with significance levels determined by critical ratios (all *p* < .001). Covariances ranged from -.46-.45 (see Supplementary Materials). Note: BAAS = Body Areas and Appearance Satisfaction, AO = Appearance Orientation; WPC = Weight Perception and Concerns.

**Supplementary Materials**

*Modification Indices and Likelihood Ratio Test Results for Model Adjustments.*

|  |  |
| --- | --- |
| Parent Model | EFA-derived model |
| Modification Index | Likelihood ratio | Modification Index | Likelihood ratio |
| 18 + 19, MI = 181.208 | $x^{2}$(1) = 264.12, *p* <.001 | 22 + 32, MI = 63.663 | $x^{2}$(1) = 69.415, *p* <.001 |
| 14 + 16, MI = 78.024 | $x^{2}$(1) = 89.687, *p* <.001 | 4 + 22, MI = 27.654 | $x^{2}$(1) = 30.347, *p* <.001 |
| 22 + 32, MI = 63.910 | $x^{2}$(1) = 71.76, *p* <.001 | 5 + 9, MI = 22.760 | $x^{2}$(1) = 23.5, *p* <.001 |
| 1 + 2, MI = 40.756 | $x^{2}$(1) = 41.625, *p* <.001 | 23 + 24, MI = 20.670 | $x^{2}$(1) = 21, *p* <.001 |
| 14+ 20, MI = 39.607 | $x^{2}$(1) = 47.046, *p* <.001 | 27 + 28, MI = 17.404 | $x^{2}$(1) = 17.191, *p* <.001 |
| 23 + 24, MI = 22.260 | $x^{2}$(1) = 22.659, *p* <.001 | 4 + 32, MI = 15.785 | $x^{2}$(1) = 16.117, *p* <.001 |
| 27 + 28, MI = 16.598 | $x^{2}$(1) = 16.412, *p* <.001 | 17 + 21, MI = 15.491 | $x^{2}$(1) = 15.082, *p* <.001 |
| 3 + 12, MI = 15.125 | $x^{2}$(1) = 15.316, *p* <.001 | 6 + 8, MI = 8.216 | $x^{2}$(1) = 7.685, *p* = .006 |
| 3 + 9, MI = 17.474 | $x^{2}$(1) = 17.033, *p* <.001 | 11 + 17, MI = 4.796 | $x^{2}$(1) = 4.771, *p* = .029 |
| 4 + 22, MI = 10.270 | $x^{2}$(1) = 10.65, *p* =.001 |  |  |
| 23 + 25, MI = 9.139 | $x^{2}$(1) = 9.11, *p* = .003 |  |  |
| 8 + 32, MI = 4.113 | $x^{2}$(1) = 4.45, *p* = .035 |  |  |

*Note*. EFA = Exploratory factor analysis.