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ORIGINAL ARTICLE

Validation of the Polish version of the Multidimensional Body-Self Relations Questionnaire among women

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Abstract In Poland, appropriate means to assess body image are relatively limited. The aim of the study was to evaluate the psychometric properties of the Polish version of the Multidimensional Body-Self Relations Questionnaire (MBSRQ). To do so, a sample of 341 females ranging in age from 18 to 35 years (M = 23.09; SD = 3.14) participated in the present study. Owing to the fact that the confirmatory factor analysis of the original nine-factor model was not well fitted to the data (RMSEA = 0.06; CFI = 0.75) the exploratory approach was employed. Based on parallel analysis and minimum average partial an eight-factor structure of the Polish version of the MBSRQ was distinguished. Exploratory factor analysis revealed a factorial structure similar to the original version. The proposed model was tested using an exploratory structural equation modelling approach which resulted in good fit (RMSEA = 0.04; CFI = 0.91). In the present study, the internal reliability assessed by McDonald's ω coefficient amounts from 0.66 to 0.91. In conclusion, the Polish version of the MBSRQ is a useful measure for the attitudinal component of body image assessment.

Keywords Body image · MBSRQ · Polish validation

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Introduction

Body image is a multidimensional construction composed of evaluative thoughts, beliefs, feelings and behaviours related to one's own physical appearance [1]. Therefore, it encompasses cognitive, emotional and behavioural elements [2]. Body image is widely divided into two components—attitudinal (i.e. satisfaction/dissatisfaction with body attributes or overall appearance) and perceptual (i.e. size or shape estimation). According to Thompson and van den Berg [3], the measurement of attitudinal body image is relatively straightforward in contrast to the assessment of the perceptual dimensions of body image, which is an area rife with methodological perplexity.

Numerous studies have focused on instruments measuring attitudinal aspects of body image. Of these instruments, most extensively used are: the Figure Rating Scale [4] for assessing global subjective satisfaction and the Body Dissatisfaction subscale of the Eating Disorder Inventory [5] for assessing dissatisfaction with one's appearance. Benninghoven [6] provides examples of other instruments, such as the Situational Inventory for Body-Image Dysphoria for assessing affective distress regarding appearance, the Appearance Schemas Inventory for assessing the cognitive dimension of body image and the Body Checking Questionnaire for assessing the behavioural dimension.

One of the widely used attitudinal measures for body image assessment is the Multidimensional Body-Self Relations Questionnaire (MBSRQ) [7–9] and its shorter version the 34-item MBSRQ-Appearance Scales (MBSRQ-AS) [10–12]. The MBSRQ assesses two dispositional dimensions: evaluation and cognitive-behavioural orientation in comparison with three somatic domains—physical appearance, fitness, and health/illness. The evaluation

subscales reflect how good or bad one feels about appearance, fitness, and health/illness, while the orientation scales measure how important the various aspects of body image are, personally, how much attention is given to each aspect and how actively a person maintains or improves their body's appearance, fitness and health [7, 8].

The MBSRQ is intended for use with adults and adolescents and is inappropriate for children [8].

Until now, measures designed for body image assessment have been very limited in Poland. Polish studies have not focused on methods concerning attitudinal body image assessment. Therefore, the purpose of this study was to evaluate the psychometric properties of the Polish version of the MBRSQ.

Methodology

Participants

Participating in the study was a group of 341 women. The mean age of the sample was 23.09 (SD = 3.14) years old. The mean weight of women was 59.32 kg (SD = 10.10) and height was 1.66 m (SD = 0.06). The average body mass index (BMI) was 21.38 kg/m^2 (SD = 3.30). Among all participants, 16.42 % were underweight (<18.5 kg/m^2), 74.20 % had a normal weight (from 18.5 to 24.99 kg/m^2), 6.45 % were overweight (from 25.0 to 29.99 kg/m^2) and 2.93 % were obese (≥30.0 kg/m^2).

Material

The Multidimensional Body-Self Relations Questionnaire (MBSRQ) [7, 8] was used in the study. In accordance to the original conceptual scoring, this questionnaire consists of ten scales measuring different aspects related to body image: the Appearance Evaluation scale (feelings of physical attractiveness/unattractiveness and satisfaction/dissatisfaction with one's looks), the Appearance Orientation scale (the extent of investment in one's appearance), the Fitness Evaluation scale (feelings of being physically fit/unfit), the Fitness Orientation scale (the extent of investment in being physically fit or athletically competent), the Health Evaluation scale (feelings of physical health and/or the freedom from physical illness), the Health Orientation scale (extent of investment in a physically healthy lifestyle), the Illness Orientation scale (extent of investment in a physically healthy lifestyle), the Body Areas Satisfaction scale (satisfaction with discrete aspects of one's appearance), the Overweight Preoccupation scale (a construct reflecting fat anxiety, weight vigilance, dieting, and eating restraint) and the Self-Classified Weight scale (self-appraisals of weight).

The questionnaire comprises 69 items with five possible answers ranging from 1 to 5. However, there were four types of possible answers throughout the questionnaire: from "definitely disagree" to "definitely agree" (items 1–57), from "never" to "very often" (item 58), from "very underweight" to "very overweight" (items 59 and 60) and from "very dissatisfied" to "very satisfied" (items 61–69).

The Polish version of the MBSRQ was translated from English to Polish using a standard forward–backward translation procedure by Schier [13], however, she did not assess the psychometric properties of the measure. In the present study, we used the Polish version of the MBRSQ translated by Schier [13].

Body mass index (BMI) was evaluated by the participants' self-reported height and weight.

Procedure

Participants were selected among university students and university's administrative and teaching staff ($N = 461$). Certain criteria for determining participants eligible to take part in our study have been defined: participants' age from 18 to 35 years and the absence of eating disorders, according to the American Psychiatric Association's Diagnostic Classification DSM IV-TR [14]. Of all participants, 51 female participants with possible eating disorders (as defined by DSM-IV-TR and the answers concerned negative eating attitudes or behaviours), and 10 participants aged 35 and over were excluded. Our final sample comprised 400 Polish adults age ranging from 18 to 35 ($M_{age} = 23.23$ and $SD_{age} = 3.27$); 341 females ($M_{age} = 23.09$; $SD_{age} = 3.14$) and 59 males ($M_{age} = 24.02$; $SD_{age} = 3.88$).

Body image issues vary between males and females, therefore, these two sets of results are not invariance [15]. Owing to the underrepresentation of men in the current study, the decision to exclude the results obtained from male participants from further analysis was made.

All participants provided oral consent to take part in the study. The research was approved by the local Research Ethics Committee (no. 12/02/2013).

Statistical analyses

The data were analysed using R system for statistical computing [16], and Mplus version 7.2 [17]. To assess the model fit proposed by Cash [8], we employed confirmatory factor analysis (CFA). Since the CFA was found to be unsatisfactory, we decided to switch to an exploratory approach. Parallel analysis (PA) [18] and minimum average partial (MAP) [19] were used to address the number of factors. To examine the factor structure, we performed exploratory factor analysis (EFA). The measurement model was assessed using the exploratory structural equation

modelling (ESEM) approach [20]. Internal reliability of the scale was assessed using the McDonald's ω coefficient [21].

Results

Confirmatory factor analysis

Firstly, we assessed whether the factor model proposed by Cash [8] suited our data. However, the results were unsatisfactory (root mean square error of approximation [RMSEA] = 0.06, comparative fit index [CFI] = 0.75) and this led us to switch to an exploratory approach.

Exploratory factor analysis

Conway and Huffcutt [22] proposed a three-step exploratory factor analysis (EFA) procedure to minimise methodological mistakes. The first step involves selecting the extraction method, the second step determines the number of factors and the final step involves the rotation choice. At each of these steps, researchers need to make decisions which can greatly affect the EFA results [23–25].

The main problem in introducing the extraction method is the choice between principal component analysis (PCA) and exploratory factor analysis, such as maximum likelihood (ML). The aim of PCA is only to reduce observed data, while ML discovers relationships between observed and latent variables [26]; therefore, we chose ML [23] for the purpose of our analysis.

To discover the number of factors, parallel analysis (PA) [18] was applied as recommended by Fabrigar et al. [23] as well as the minimum average partial (MAP) [19]. Despite the excellent properties of PA and MAP, they are not frequently used in determining the number of factors, and are not included in popular statistical software, e.g. SPSS [27]. The most common procedure used to determine the number of factors is the Kaiser rule [23, 28]. However, its accuracy has been questioned by a simulation study [29] which found that the Kaiser rule correctly identifies the number of factors only in 8.77 % of cases. In the same study, the PA method correctly identified the number of factors in 76.42 % of cases, and MAP correctly identified 59.60 % of cases. The PA was performed on 1,000 random samples and on the 95 % percentile, as proposed by Weng and Cheng [30], to reduce the tendency of PA to overextract. The MAP was calculated for average squared off-diagonal correlation despite the revision to the fourth power [25], since simulation studies support the earlier solution [31]. Parallel analysis and Velicer's MAP revealed an eight-factor structure. In the case of introducing Kaiser criterion, we would have to extract 15 factors.

In the third step, we chose the oblique simplimax rotation [32], which is a modification of promax rotation, overcoming its theoretical issues. In the promax rotation, the simple target matrix and the target rotation were found in a two-step procedure while simplimax did it simultaneously by finding among all simple target matrices that have a specified number of zero elements. Due to this fact, choosing the best simple target with specified number of zeros was objective. In brief, the main aim of the simplimax rotation is to maximise the simplicity of the rotated pattern [32]. Fabrigar et al. [23] argued that using oblique rotation is the best practice since, in the case when factors are uncorrelated, they load similarly as orthogonal rotations. On the other hand, if we used an orthogonal rotation on correlated factors, the results would not reflect the reality. The sorted pattern matrix is presented in Table 1.

The eight-factor structure explained 52.57 % of variance, after extraction. Factor 1 corresponds to either Appearance Evaluation or Body Areas Satisfaction scale, therefore, it can be suggested that they measure the same construct. Apart from this fact, almost the entire factor structure of the Multidimensional Body-Self Relations Questionnaire [8] has been successfully replicated.

Exploratory structural equation modelling

As Marsh et al. [33] noted, a good confirmatory factor analysis (CFA) fit is unlikely for a multifactor inventory. Moreover, Browne [34] posted one of the most precise accusations to the CFA and emphasized the fact that CFA procedures were often used for exploratory purposes by including a sequence of modifications of a model to improve the fit. Therefore, in this kind of situations, applying exploratory approach with rotation of the factor matrix appears preferable. For the purpose of our studies, we decided to employ the exploratory factor analysis modelling (ESEM) approach [20] which allows for guided examination of loading fit, without imposing cross-loadings to zero. In ESEM, an EFA measurement model with rotations can be used in a structural equation model that can be used in addition or instead of CFA [20]. Owing to structural equation modelling (SEM) framework, ESEM gives access to all the common SEM parameters which allow to assess the model structure and its fit. Moreover, ESEM gives an opportunity to test measurement invariance across groups as well as in longitudinal studies [33]. The ESEM approach is preferred in more complex measurement structures or in cases when the researcher's measurement knowledge is limited CFA has been found to be more appropriate, e.g. in multi-trait multi-method modelling [20]. To perform ESEM, we have followed the procedure proposed by Asparouhov and Muthen [20]. Results of the ESEM are presented in Table 2.

Table 1 Sorted pattern matrix of the Polish version of the MBSRQ

	F1	F2	F3	F4	F5	F6	F7	F8
MBRSQ_69	0.84	0.00	0.03	0.02	0.02	−0.11	0.02	0.07
MBRSQ_5	0.81	0.06	0.12	0.01	−0.02	−0.10	−0.00	0.02
MBRSQ_30	0.77	0.06	−0.11	−0.07	−0.01	−0.16	0.12	0.02
MBRSQ_65	0.75	0.02	−0.01	−0.13	−0.10	0.19	0.05	−0.01
MBRSQ_48	0.75	−0.03	−0.06	0.04	0.09	−0.09	0.05	−0.19
MBRSQ_11	0.63	−0.02	−0.14	0.01	0.01	−0.31	0.07	−0.05
MBRSQ_42	0.62	0.15	−0.13	0.04	0.09	−0.12	0.05	−0.15
MBRSQ_39	0.56	−0.00	−0.01	0.05	−0.00	−0.33	0.17	0.02
MBRSQ_21	0.55	0.17	0.25	0.07	0.02	−0.23	0.02	0.16
MBRSQ_64	0.51	−0.02	−0.05	0.05	0.12	−0.34	0.06	0.02
MBRSQ_61	0.49	−0.07	−0.07	0.11	0.14	0.31	0.05	−0.02
MBRSQ_63	0.47	0.02	−0.10	0.03	0.04	−0.31	0.06	0.02
MBRSQ_66	0.46	0.03	−0.09	0.07	0.21	−0.13	−0.08	0.12
MBRSQ_62	0.29	−0.10	0.02	0.14	0.14	0.18	0.01	−0.04
MBRSQ_68	0.28	−0.00	0.02	0.02	0.02	−0.02	−0.05	−0.02
MBRSQ_16	0.12	0.82	0.13	0.02	0.05	0.00	−0.01	0.03
MBRSQ_35	0.08	0.82	−0.04	0.03	0.02	0.08	0.07	0.09
MBRSQ_44	0.07	0.81	0.05	0.05	0.15	−0.04	−0.02	0.00
MBRSQ_6	0.06	0.80	0.07	−0.01	0.01	0.01	−0.13	0.18
MBRSQ_53	0.06	0.70	−0.07	0.09	0.27	0.02	−0.02	0.11
MBRSQ_26	0.01	0.67	−0.05	0.01	0.24	0.09	0.11	0.20
MBRSQ_43	−0.05	0.57	0.02	−0.07	0.23	−0.03	0.12	−0.20
MBRSQ_25	−0.08	0.57	−0.04	−0.01	0.11	−0.02	0.08	−0.12
MBRSQ_34	−0.07	0.51	−0.01	−0.06	0.16	0.11	0.07	−0.23
MBRSQ_15	−0.06	0.50	0.02	−0.08	0.10	−0.04	0.09	−0.10
MBRSQ_9	0.04	0.44	−0.04	0.20	0.03	0.02	0.44	0.04
MBRSQ_1	0.04	−0.01	0.79	0.05	0.05	−0.03	−0.05	−0.17
MBRSQ_22	0.03	0.09	0.76	−0.06	0.09	−0.04	−0.01	0.12
MBRSQ_50	0.00	0.12	0.69	−0.04	0.00	−0.05	−0.01	0.07
MBRSQ_13	−0.08	−0.11	0.66	−0.03	0.02	−0.00	0.09	0.09
MBRSQ_2	−0.00	0.12	0.65	−0.04	−0.05	0.05	−0.11	−0.12
MBRSQ_12	−0.10	−0.01	0.63	−0.10	0.07	−0.04	0.11	0.15
MBRSQ_31	−0.08	0.01	0.56	−0.08	−0.01	−0.05	0.02	0.00
MBRSQ_49	0.07	0.13	0.52	0.03	−0.08	0.21	−0.05	−0.39
MBRSQ_32	−0.05	−0.04	0.51	0.17	0.07	−0.01	0.02	−0.50
MBRSQ_40	−0.25	0.23	0.41	−0.09	−0.19	0.11	0.00	−0.05
MBRSQ_23	0.06	−0.10	0.33	0.16	−0.13	0.07	0.11	−0.09
MBRSQ_41	0.09	−0.09	0.31	0.02	0.13	−0.03	0.04	0.07
MBRSQ_45	−0.02	0.02	−0.03	0.89	−0.05	−0.09	−0.15	−0.02
MBRSQ_27	−0.12	−0.06	−0.04	0.82	−0.00	−0.07	0.01	0.06
MBRSQ_17	0.05	0.30	−0.10	0.56	−0.05	−0.02	−0.02	−0.28
MBRSQ_28	−0.00	0.09	−0.03	−0.55	−0.16	−0.06	0.00	−0.12
MBRSQ_36	0.19	0.03	−0.11	0.45	0.04	0.04	−0.00	−0.29
MBRSQ_54	0.32	0.22	0.06	0.37	0.17	−0.05	−0.06	0.14
MBRSQ_24	−0.07	0.01	−0.04	−0.06	0.90	−0.00	0.06	−0.09
MBRSQ_33	−0.00	0.13	0.04	−0.05	0.76	−0.01	−0.07	−0.22
MBRSQ_3	0.05	0.18	0.10	0.04	0.72	−0.03	−0.12	−0.02
MBRSQ_14	0.11	0.21	0.03	0.12	0.63	−0.01	−0.07	0.05

Table 1 continued

	F1	F2	F3	F4	F5	F6	F7	F8
MBRSQ_51	0.09	−0.02	0.03	0.16	0.60	0.03	0.04	0.09
MBRSQ_52	−0.06	0.27	−0.01	0.08	0.54	−0.01	0.17	0.06
MBRSQ_4	−0.00	0.23	0.04	−0.09	0.47	0.08	0.09	0.14
MBRSQ_59	−0.04	−0.02	−0.11	−0.04	−0.00	0.87	−0.06	−0.06
MBRSQ_60	−0.09	0.08	−0.17	−0.01	−0.04	0.83	−0.05	−0.09
MBRSQ_67	0.49	−0.01	−0.08	0.02	−0.04	−0.56	0.04	0.00
MBRSQ_10	−0.35	0.07	0.29	−0.15	0.09	0.52	−0.06	0.14
MBRSQ_58	−0.08	0.01	0.22	−0.15	0.05	0.50	−0.04	0.28
MBRSQ_57	−0.13	0.20	0.20	0.03	−0.06	0.48	0.23	0.30
MBRSQ_46	0.01	0.02	0.09	−0.23	0.01	−0.02	0.64	0.04
MBRSQ_55	0.07	0.01	0.13	0.03	0.02	0.04	0.63	0.03
MBRSQ_56	0.09	−0.06	−0.01	−0.19	0.00	0.02	0.54	0.04
MBRSQ_29	−0.12	0.22	0.05	0.13	−0.05	0.04	0.54	0.15
MBRSQ_37	0.07	−0.04	0.07	−0.02	0.01	−0.03	0.52	−0.36
MBRSQ_47	0.03	−0.08	−0.04	−0.15	0.03	−0.07	0.41	−0.32
MBRSQ_38	−0.05	−0.36	−0.03	−0.18	0.09	−0.19	−0.40	0.15
MBRSQ_20	−0.25	−0.01	0.35	0.05	0.10	0.14	0.37	0.29
MBRSQ_18	−0.01	0.16	0.02	0.18	0.04	−0.11	0.33	−0.05
MBRSQ_7	0.13	0.23	−0.01	0.28	0.05	−0.03	0.32	−0.05
MBRSQ_8	−0.01	0.24	0.05	0.18	0.07	−0.06	0.31	0.01
MBRSQ_19	0.02	0.02	−0.09	0.07	0.04	−0.07	0.30	0.02

Extraction method: maximum likelihood. Rotation: simplimax

The overall model fit was good (RMSEA = 0.04, CFI = 0.91). For comparison, we conducted the CFA on items distinguished by the EFA, however, the overall model fit was unsatisfactory (RMSEA = 0.06; CFI = 0.79).

Reliability

There has been a strong discussion whether Cronbach's α can be used in psychological science as an appropriate measure of reliability [35–41]. The main accusation to Cronbach's α is its assumption of tau equivalency, which restricts true scores from differing from item to item by only a constant [39]. This assumption has been found difficult to meet in practice, therefore, researchers using Cronbach's α are relatively likely to violate this assumption. The violation of this tau equivalency results in a negatively biased estimate of reliability [35]. Sijtsma [35] argues whether Cronbach's α is a measure of internal consistency since its value depends only on the sum of the inter-item covariances, and therefore, Cronbach's α is only able to reveal the average degree of interrelatedness which also highly depends on the number of items in the particular questionnaire. To overcome those difficulties, Revelle and Zinbard [38] performed a comparison of 13 estimates of reliability. They concluded that McDonald's ω is superior to other estimates of reliability and therefore we decided to apply this approach it in our study. Results of reliability assessment with bootstrapped (number of simulations = 1,000) 95 % confidence intervals of the Polish version of the MBSRQ are presented in Table 3.

Discussion

Although body image is a multidimensional construct, research has focused on the assessment of body image evaluation and perception [42]. Among the various measures for body image assessment, the Multidimensional Body-Self Relations Questionnaire (MBSRQ) may be considered to be an excellent attitudinal body image instrument [43]. The objective of the present study was to assess the psychometric properties of the Polish version of the MBSRQ among women aged between 18 and 35 years. In the Polish population, there is a lack of questionnaires assessing body image, thus we have decided to improve the current situation. The MBSRQ was already translated into Polish [13] but the psychometric properties of the measure among the Polish population have not been evaluated.

The internal consistency of the Polish version of MBSRQ was satisfactory. These results are in agreement

Table 2 Exploratory structural equation modelling results for the Polish version of the MBSRQ

	F1	F2	F3	F4	F5	F6	F7	F8
MBSRQ_1	0.01	−0.02	0.60	0.00	0.10	−0.02	−0.02	0.14
MBSRQ_2	0.05	0.07	0.44	−0.02	0.05	0.02	−0.06	0.07
MBSRQ_3	0.78	0.18	0.10	0.05	0.06	−0.01	−0.11	0.07
MBSRQ_4	0.47	0.30	0.03	−0.02	−0.18	0.00	0.06	−0.01
MBSRQ_5	0.04	0.03	0.13	0.91	0.00	0.01	−0.03	−0.02
MBSRQ_6	0.04	1.06	0.08	0.08	−0.02	0.05	−0.18	−0.12
MBSRQ_7	0.06	0.19	0.01	0.08	0.29	−0.05	0.31	−0.01
MBSRQ_8	0.04	0.23	−0.01	0.04	0.12	0.00	0.32	−0.03
MBSRQ_9	0.02	0.52	−0.08	0.08	0.21	0.06	0.47	−0.04
MBSRQ_10	0.13	0.03	0.22	−0.44	−0.20	0.84	−0.02	−0.10
MBSRQ_11	0.00	−0.01	−0.07	0.73	−0.01	−0.44	0.01	0.04
MBSRQ_12	0.09	−0.02	0.68	−0.05	−0.15	0.05	0.13	−0.14
MBSRQ_13	0.02	−0.11	0.68	−0.04	−0.06	0.07	0.09	−0.09
MBSRQ_14	0.70	0.23	0.02	0.12	0.11	0.01	−0.07	−0.03
MBSRQ_15	0.02	0.63	0.00	−0.05	−0.10	0.01	0.09	0.23
MBSRQ_16	0.00	0.99	0.15	0.15	0.06	0.07	−0.02	0.03
MBSRQ_17	0.08	0.33	−0.01	−0.01	0.82	−0.04	0.01	0.23
MBSRQ_18	0.03	0.21	0.05	0.02	0.12	−0.13	0.26	0.06
MBSRQ_19	0.06	0.03	−0.04	−0.03	0.09	-0.19	0.28	−0.04
MBSRQ_20	0.14	0.02	0.27	−0.18	−0.08	0.35	0.53	−0.24
MBSRQ_21	0.01	0.15	0.20	0.60	−0.02	−0.07	0.01	−0.12
MBSRQ_22	0.07	0.06	0.63	0.04	−0.04	0.03	0.01	−0.06
MBSRQ_23	−0.15	−0.08	0.37	0.02	0.21	0.01	0.16	0.08
MBSRQ_24	1.00	0.04	−0.07	−0.05	−0.10	0.00	0.06	0.23
MBSRQ_25	0.04	0.70	−0.04	−0.08	0.00	−0.02	0.02	0.22
MBSRQ_26	0.24	0.71	−0.06	−0.03	−0.04	0.05	0.11	−0.11
MBSRQ_27	0.09	−0.03	−0.01	−0.05	0.64	−0.03	0.05	−0.09
MBSRQ_29	−0.03	0.29	0.01	−0.07	0.08	0.10	0.60	−0.14
MBSRQ_30	−0.02	0.08	−0.08	0.91	−0.10	−0.23	0.08	−0.03
MBSRQ_31	0.00	−0.02	0.54	−0.06	−0.06	0.00	0.03	0.02
MBSRQ_32	0.02	−0.06	0.47	−0.05	0.25	0.00	0.04	0.38
MBSRQ_33	0.80	0.18	0.05	0.07	−0.08	0.04	−0.11	0.39
MBSRQ_34	0.06	0.62	−0.01	−0.06	−0.09	0.08	0.01	0.39
MBSRQ_35	−0.03	0.99	−0.02	0.03	0.01	−0.01	0.05	−0.02
MBSRQ_36	0.02	0.00	−0.07	0.21	0.61	0.10	0.02	0.24
MBSRQ_37	−0.03	−0.02	0.08	0.12	0.03	−0.02	0.49	0.38
MBSRQ_39	0.01	−0.01	0.05	0.66	0.03	−0.39	0.15	−0.02
MBSRQ_40	−0.21	0.22	0.42	−0.23	−0.05	0.15	0.01	0.02
MBSRQ_41	0.17	−0.10	0.32	0.07	−0.04	−0.07	0.06	−0.02
MBSRQ_42	0.04	0.19	−0.11	0.79	0.04	−0.06	−0.01	0.20
MBSRQ_43	0.13	0.74	0.04	−0.07	−0.09	−0.08	0.07	0.32
MBSRQ_44	0.11	0.88	0.06	0.07	0.09	−0.02	−0.01	0.04
MBSRQ_45	0.03	0.02	0.00	0.03	0.76	−0.05	−0.09	−0.03
MBSRQ_46	−0.02	0.06	0.06	0.00	−0.30	−0.11	0.68	0.06
MBSRQ_47	−0.05	−0.06	−0.04	0.02	−0.09	−0.09	0.44	0.38
MBSRQ_48	0.04	−0.04	−0.03	1.00	0.03	0.03	−0.03	0.20
MBSRQ_49	−0.10	0.05	0.33	0.07	0.09	0.16	−0.02	0.23
MBSRQ_50	0.00	0.11	0.65	0.00	−0.05	−0.03	0.01	−0.04

Table 2 continued

	F1	F2	F3	F4	F5	F6	F7	F8
MBSRQ_51	0.71	−0.08	0.02	0.10	0.15	0.06	0.10	−0.06
MBSRQ_52	0.57	0.31	−0.03	−0.10	0.07	−0.04	0.23	0.03
MBSRQ_53	0.32	0.78	−0.07	0.00	0.18	−0.01	0.00	−0.09
MBSRQ_54	0.20	0.19	0.07	0.32	0.36	−0.02	−0.01	−0.15
MBSRQ_55	0.00	0.04	0.07	0.08	−0.01	0.02	0.62	0.04
MBSRQ_56	−0.03	−0.04	−0.04	0.10	−0.23	0.03	0.58	0.10
MBSRQ_57	−0.09	0.15	0.08	−0.06	0.02	0.78	0.33	−0.33
MBSRQ_58	0.06	−0.03	0.07	−0.01	−0.21	0.69	0.02	−0.25
MBSRQ_59	0.30	0.29	−0.63	0.71	−0.68	0.74	−0.05	−0.23
MBSRQ_60	−0.02	0.04	−0.12	−0.13	0.05	0.35	-0.02	0.03
MBSRQ_61	0.13	−0.11	−0.15	0.52	0.09	0.40	0.06	0.10
MBSRQ_62	0.16	−0.13	−0.02	0.29	0.09	0.18	0.02	0.04
MBSRQ_63	0.06	0.03	−0.06	0.56	−0.01	−0.39	0.05	0.01
MBSRQ_64	0.16	−0.03	0.03	0.65	0.07	−0.42	0.05	−0.05
MBSRQ_65	−0.15	0.00	−0.02	0.83	−0.13	0.22	0.00	0.09
MBSRQ_66	0.26	0.02	−0.04	0.40	0.06	−0.21	−0.08	−0.13
MBSRQ_67	−0.02	−0.01	0.02	0.56	0.01	−0.71	0.02	−0.05
MBSRQ_68	0.05	−0.04	0.02	0.27	0.00	−0.02	−0.04	0.02
MBSRQ_69	0.01	−0.01	0.04	0.70	−0.01	−0.06	−0.01	−0.04

with other studies [9–12] in other languages (Spanish, French, Greek, German). In the present study, the internal reliability measured using McDonald's ω coefficient ranges from 0.66 to 0.91. The internal consistency for the subscales of the original version of the MBSRQ measured by Cronbach's α ranged from 0.73 to 0.90 for females [8].

Based on our results, we are proposing an eight-factor solution of MBSRQ in the Polish population. The eight-factor solution was confirmed either by the exploratory factor analysis or exploratory structural equation modelling approach. In opposition to most adaptations of the MBSRQ [9, 10], we have provided model fit indicators. The Polish version of the MBSRQ was composed of 67 items consisting of the following subscales: (1) the Appearance Evaluation scale and the Body Areas Satisfaction scale (16 items), (2) the Appearance Orientation scale (12 items), (3) the Fitness Evaluation scale (7 items), (4) the Fitness Orientation scale (10 items), (5) the Health Evaluation scale (6 items), (6) the Health Orientation scale (10 items), (7) the Self-Classified Weight scale (3 items), and (8) Overweight Preoccupation scale (3 items). However, the original version of the MBSRQ consists of 69 items regrouped into the following seven-factor subscales: the Appearance Evaluation scale (7 items), the Appearance Orientation scale (12 items), the Fitness Evaluation scale (3 items), the Fitness Orientation scale (13 items), the Health Evaluation scale (6 items), the Health Orientation scale (8 items), the Illness Orientation scale (5 items) and three additional subscales: the Body Areas Satisfaction scale (9 items), the Overweight Preoccupation scale (4 items) and the Self-Classified Weight scale (2 items). The Polish version of the MBSRQ demonstrates good psychometric properties. Our model is well fitted to the data. The reliability of the Polish version is similar to the original MBSRQ. Factor structure closely resembles the original structure proposed by Cash [7, 8] and most items load each scale, respectively.

Table 3 Reliability of the Polish version of the MBSRQ

	McDonald's ω	95 % confidence interval	
		Lower	Upper
F1	0.91	0.90	0.93
F2	0.91	0.90	0.92
F3	0.82	0.79	0.84
F4	0.78	0.74	0.82
F5	0.88	0.86	0.90
F6	0.66	0.59	0.72
F7	0.75	0.71	0.79
F8	0.71	0.64	0.76

In our study, eight factors explained 52.57 % of the total variance, after extraction. By contrast, in the Spanish version of the MBSRQ [9] four factors explained 43.46 % of the total variance. Moreover, the number of items was reduced to 45 [9].

There are some noteworthy limitations of the present study. First, in our study we examined mostly students in

psychology and dietetics. In Poland, both disciplines are mostly chosen by female students. Further research with a larger sample size of the male population should be carried out. Second, similar to a French study [10], body mass index (BMI) was calculated on self-reported height and weight. This could result in a tendency to underestimate weight values (women, overweight and obese individuals) and overestimate height values (men) [44]. Third, our study was based on university students as well as administrative and teaching personnel and in the analysis we have only included women due to an underrepresentation of men. We did not include a clinical sample. In a future study carrying out body image assessments in Poland, researchers should also explore a clinical sample (particularly with body image disturbance). Fourth, the limitation of our study is the lack of information about the stability of the results in time. Further, Polish studies should determine the test–retest reliability of the MBSRQ among female and male populations. Finally, it should be noted that the convergent and discriminant validity have not been assessed, therefore, a multi-trait-multi-method analysis is recommended for future studies.

To conclude, the psychometric properties of the Polish version of the MBSRQ are suitable for assessing the attitudinal aspect of body image in females. The factorial structure of the test is acceptable, and it shows cross-validity. The Polish version of the MBSRQ could be used as an appropriate measure for the attitudinal component of body image assessment.

Conflict of interest There is no actual or potential conflict of interest in relation to this article.

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