












Validity and Reliability of the Turkish Version of Mahony Psychological Assessment for Bariatric Surgery

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ABSTRACT

Background: The aim of this study was to determine the validity and reliability of the Turkish version of Mahony Psychological Assessment for Bariatric Surgery which can be easily administered and used as a guide by health professionals who will be included in the treatment of patients who are potential candidates for bariatric surgery.

Methods: A total of 310 patients who were admitted to health institutions for bariatric surgery in 3 different provinces of Turkey answered these questions in the Turkish translation of Mahony Psychological Assessment for Bariatric Surgery. Eating disorder examination questionnaire was also administered to the patients in addition to Mahony Psychological Assessment for Bariatric Surgery.

Results: Early life problems due to weight scores of women were significantly higher than men ($P = .001$). Among the age groups, both the early life problems due to weight scores ($P = .008$) and dysphoric feelings about weight scores ($P < .001$) of the 18-44 age group were significantly higher than the participants who are over the age of 45. There is a weak-to-medium and positive correlation between the total Mahony Psychological Assessment for Bariatric Surgery total scores and all the subscale and total scores of the Eating Disorder Examination Questionnaire ($P < .05$ for all). These correlation results support the co-validity of Mahony Psychological Assessment for Bariatric Surgery and Eating Disorder Examination Questionnaire. Internal consistency of the Mahony Psychological Assessment for Bariatric Surgery was at a high level except for the subscale of positive treatment attitude and supportive environment. Cronbach's α values were calculated to be 0.902 for the subscale of emotional and binge eating, 0.820 for the early life problems due to weight, 0.856 for the dysphoric feelings about weight, 0.539 for the positive treatment attitude and supportive environment, and 0.919 for the whole scale.

Conclusion: The analyses have shown that the Turkish version of Mahony Psychological Assessment for Bariatric Surgery may be used in clinical interviews and psychiatric evaluation of bariatric surgery patients in Turkey.

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INTRODUCTION

Obesity is a preventable public health problem with an increasing prevalence around the globe. Obesity is defined and graded with body mass index (BMI) (weight (kg)/height² (m²)). A BMI value of 18.5-24.9 kg/m² is considered normal, 25-29.9 kg/m² overweight, and 30 kg/m² and above obese status. An individual with a BMI value that is >30-34.9 kg/m² is considered class I obese, 35-39.9 kg/m² class II obese, and >40 kg/m² and above class III or morbidly obese. Obesity may lead to significant health problems, mainly type 2 diabetes, cardiovascular

diseases, hypertension, hyperlipidemia, cerebrovascular diseases, various cancer types, obstructive sleep apnea, non-alcoholic fatty liver disease, gastroesophageal reflux, bile duct disease, polycystic ovary syndrome, infertility, osteoarthritis, and depression.^{1,2}

Several methods of treatment are available for obesity such as diet, exercise, pharmacological treatment, and surgery. High success rates in treatment and a decrease in complications have increased the interest in bariatric surgery (BS) today. The first surgical procedure that

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falls under the category of BS was a jejunoileal bypass operation performed by Varco at the University of Minnesota in 1954. A wide range of techniques has been put into practice since then. The mechanisms of action of BS procedures are gastric bypass, sleeve gastrectomy, gastric banding, duodenal switch, and biliopancreatic diversion based on malabsorption and gastric resection. Bariatric surgery indications were first identified by the United States National Institute of Health in 1991. Bariatric surgery indications were determined as follows: BMI that is $>40 \text{ kg/m}^2$ or $>35 \text{ kg/m}^2$ and an additional disease associated with obesity, failure of non-surgical treatments, absence of alcohol and substance use disorders, acceptable level of surgical risk, not having an uncontrolled psychiatric disorder, and sufficient degree of social support.³

Adequate pre- and post-operative evaluation and post-operative follow-up accompanied by a multidisciplinary approach are required to increase the success of BS and reduce the risk of potential complications. Psychiatric assessment is an important part of this process. Obesity may be associated with a number of psychiatric disorders and psychological factors such as depression, anxiety disorders, bipolar disorder, schizophrenia, eating disorders, alcohol/substance use disorders, low self-esteem, and oral stage characteristics, and these factors may affect the post-surgery progress and weight regain.⁴ After BS, patients need to make many changes in their life, including their eating habits, and various psychiatric problems may occur during this adaptation process. The following information should be obtained to perform the patient's psychiatric and cognitive evaluation in the pre-BS psychiatric interview: the reason for which the patient decides to undergo the surgery, whether they are knowledgeable about postoperative follow-up, their expectations from the surgery, their desired weight, how their life is affected by being overweight, their actions to lose weight, whether these actions have been successful or not, whether they are on a diet and do physical exercise, their eating habits, the presence of stress factors, social support, medical history, medications that are taken on an ongoing basis, the presence of any past or present psychiatric disorders,

if any, the treatments they have used, the medications they currently use, the presence of any behavior/thoughts with regards to suicide attempts and/or self-mutilation now or in the past, history of alcohol and substance use, and family history of psychiatric diseases.²

A standardized and comprehensive psychiatric interview and psychosocial assessment before a BS are definitely needed.⁵ Mahony Psychological Assessment for Bariatric Surgery (MPABS) was developed by David Mahony in 2011.⁶ Mahony Psychological Assessment for Bariatric Surgery is a 5-point Likert-type self-report questionnaire consisting of 115 items in total. The original questionnaire in English has a high level of internal consistency (Cronbach's $\alpha=0.930$; 0.940 for men and 0.927 for women). Of 11 subscales, 8 had a reliability value greater than 0.70 for both sexes. While the subscales of alcohol and substance use disorders and anger level showed a sufficient level of reliability in men (>0.70), they had low-reliability levels in women. The subscale of awareness of dietary restrictions that will be necessary after surgery has a low-reliability level in both sexes (<0.60).⁶ The present study has aimed to translate MPABS into Turkish and to examine its validity and reliability. We assumed that the questionnaire would correlate with the eating disorder questionnaires and have subscales similar to those found in the original study and that the Turkish version will be generally valid and reliable.

MATERIAL AND METHODS

Translation Process

First of all, the researcher who developed the questionnaire was contacted by e-mail, and permission was obtained for its translation and use in research. The questionnaire was then translated from English to Turkish by 2 researchers. Another researcher who had no prior knowledge about the original version of the questionnaire and an expert who taught English translated the items in the questionnaire back from Turkish to English. The final translation of the questionnaire was decided upon by comparing these 4 texts with one another. Fifteen patients who were admitted for BS were asked to fill out the translated questionnaire before it was used in the study in order to determine whether there were any items that were difficult to understand. Some items have been modified in the questionnaire at this stage. The modified questionnaire was used in the research.

Participants

The study is conducted with 310 patients who were admitted to general surgery departments of secondary and tertiary health care institutions for BS in 3 different provinces of Turkey. The participants were referred to psychiatry departments through consultation to receive a psychological assessment before surgical intervention.

MAIN POINTS

- The validity and reliability of the Turkish version of Mahony Psychological Assessment for Bariatric Surgery (MPABS) were tested.
- Cronbach's α values were calculated to be 0.902 for the subscale of emotional and binge eating, 0.820 for the early life problems due to weight, 0.856 for the dysphoric feelings about weight, 0.539 for the positive treatment attitude and supportive environment subscales, and 0.919 for the whole scale.
- The MPABS scale may be used in clinical interviews and psychiatric evaluations of individuals who are potential candidates for bariatric surgery in Turkey.

Procedure

Participants who agreed to take part in the study were informed about the details of the study in the outpatient room. After they have been informed, the demographic and clinical data forms of the participants who volunteered to participate in the study were filled out by the researchers. Other assessment tools were presented to the participants randomly and they were asked to fill them in on their own. Those who needed assistance in this process received help from their relatives or the researchers provided that there is no relative. All this process lasted 30-60 minutes on average.

Assessment Tools

Demographic and Clinical Data Collection Form: This form created by the researchers includes the participants' demographic data, anthropometric measurements, physical and mental history/family history, eating habits, and the treatment methods they resorted to for obesity before BS.

Mahony Psychological Assessment for Bariatric Surgery: It is a 115-item self-report questionnaire that questions the following characteristics of patients admitted for BS: faking good, malingering, minimization or denial of problems, surgical motivation, emotional eating habits, anger, binge eating, obesity-related depression, weight-related impairment, weight-related social impairment, knowledge of postsurgical dietary restrictions, alcohol/substance abuse, and surgical anxiety. Items in the questionnaire are scored as follows: "1=never, 2=rarely, 3=sometimes, 4=often, 5=always." The original validity-reliability study of the questionnaire revealed 6 different factors for men and women. For women, awareness of eating habits, early life problems due to weight (ELPW), dysphoric feelings about weight (DFW), weight-related impairment, surgical anxiety, and guilty feelings related to eating habits were the determined factors (total variance explained: 53.62%). In men, these factors were listed as weight-related depression, awareness of eating habits, ELPW, perceived interpersonal support and anxiety about weight and weight gain, anger, and guilty feelings related to eating habits (total variance explained: 50.11%). The results of the factor analysis conducted without taking into account the effect of sex were similar to the results obtained for women. The questionnaire had a high level of internal consistency (Cronbach's $\alpha=0.930$). The original study did not include any concurrent and discriminatory validity assessments.⁶

Eating Disorder Examination Questionnaire: It is a self-report questionnaire that is most commonly used to assess eating disorders, consisting of a total of 28 items and 5 subscales (eating concern, shape concern, weight concern, restraint, and binge eating). The total EDEQ score may also be calculated by determining the mean \pm standard deviation (mean \pm SD) of the sub-scales of EDEQ excluding binge eating. Items in the questionnaire (except for those related to binge eating) are scored between 0 (never) and 6 (every day). Self-report information is taken as the basis

for items related to binge eating. The higher the scores, the higher the relevant subscale or the more severe the level of eating disorder in general.⁷ The Turkish version of EDEQ is reported to be valid and reliable as well.⁸

Statistical Analysis

Descriptive statistics of the data were presented as frequency and percentage for categorical variables and for normally distributed variables, the results were shown as mean \pm SD. Independent samples *t*-test were used for group comparisons. Pearson correlation coefficient was utilized for the concurrent validity of the questionnaires. For discriminant validity, the study examined whether there was a statistically significant difference between these correlation coefficients after Fisher's *r-to-Z transformation* between the scales that were considered to measure different dimensions.⁹ Cronbach's α values, corrected item-total correlation coefficients (CITC), and Cronbach's α if item deleted (CAID) values were calculated for the internal consistency of the scales. *MedCalc 17.2* software was used for all the analyses except for factor analysis (*MedCalc Software, Ostend, Belgium*). *FACTOR 10.8.04* software was used for exploratory factor analysis.¹⁰ Pearson's correlation was preferred during factor analysis since univariate distributions of ordinal items were symmetrical.¹¹ Parallel analysis was used to determine the number of factors to be extracted.¹² Direct oblmin was used as the rotation method and the maximum likelihood estimation method was utilized in the extraction of the factors. Bootstrapped analyses to minimise bias with a 95% CI were preferred for all calculations by bootstrapping methods.¹³ The variances, eigenvalues, factor loadings, and common factor variances explained by the subscales were calculated. A value of $P < .01$ was considered statistically significant.

Ethics Committee Approval

A written informed consent form was obtained from all participants before conducting the study. The study was approved by the Ondokuz Mayıs University Clinical Research Ethics Board (Ethics board approval date and number: 16.03.2020/32-135).

RESULTS

Demographic and Clinical Characteristics of Participants

The demographic and clinical characteristics of the participants in the study are summarized in Table 1. More than 60% ($n=188$) of the participants were in the class III obesity category, and approximately 60% ($n=178$) had an additional physical illness. Similarly, more than 60% ($n=195$) of the participants had an obese person in their family, and almost 45% ($n=137$) stated that they had been obese since their childhood. More than 80% of the participants pointed out that they ate snacks even though they were not hungry ($n=269$) and skipped their meals

Table 1. Distribution of Demographic and Clinical Characteristics of the Participants

			Mean ± SD
Demographic data	Age (year)		41.88 ± 13.53
			n (%)
	Age group (year)	18-44	177 (57.1)
		45-64	123 (39.7)
		≥65	10 (3.2)
	Gender	Woman	203 (65.5)
		Man	107 (34.5)
	Marital status	Married	221 (71.3)
		Single	63 (20.3)
		Divorced	21 (6.8)
		Widow	5 (1.6)
	Education	Illiterate	4 (1.3)
		Literate	4 (1.3)
		Primary school	66 (21.3)
		Secondary school	39 (12.6)
		High school	100 (32.3)
Working status	No	154 (49.7)	
	Yes	156 (50.3)	
Income rate	Low	28 (9.0)	
	Lower middle	66 (21.3)	
	Upper middle	109 (35.3)	
	High	107 (34.5)	
Anthropometric measurements			Mean ± SD
Height (cm)		164.93 ± 8.69	
Body weight (kg)		113.42 ± 17.62	
BMI (kg/m ²)		41.70 ± 5.52	
BMI group			n (%)
	Class I obesity		26 (8.4)
	Class II obesity		96 (31.0)
	Class III obesity		188 (60.6)
Body weight self-assessment	As it is supposed to be		11 (3.5)
	Much		84 (27.1)
	Too much		215 (69.4)
Physical and mental history/ family history	Physical illness	No	132 (42.6)
		Yes	178 (57.4)
	Physical illness in the family	No	115 (37.1)
		Yes	195 (62.9)
	Psychiatric disorder	No	264 (85.2)
		Yes	46 (14.8)
	Family history of psychiatric disorder	No	274 (88.4)
		Yes	36 (11.6)
	Mental treatment	No	260 (83.9)
		Yes	50 (16.1)
Smoking	No	221 (71.3)	
	Yes	89 (28.7)	

(Continued)

Table 1. Distribution of Demographic and Clinical Characteristics of the Participants (*Continued*)

			Mean \pm SD
	Alcohol	No	245 (79.0)
		Yes	65 (21.0)
	Childhood obesity	No	173 (55.8)
		Yes	137 (44.2)
	Obesity in the family	No	115 (37.1)
		Yes	195 (62.9)
		Mean \pm SD	
	Obesity onset age (year)		21.94 \pm 12.11
Eating habits	Snack when not hungry		n (%)
		Yes, often	179 (57.7)
		Yes, sometimes	90 (29.0)
		No, never	41 (13.2)
	Skipping meals	Yes, often	179 (57.7)
		Yes, sometimes	92 (29.7)
		No, never	39 (12.6)
	Frequent weight gain	No	134 (43.2)
		Yes	176 (56.8)
	Binge eating periods	No	192 (61.9)
		Yes	118 (38.1)
	Overeating in the presence of negative emotions	No	111 (35.8)
Yes		199 (64.2)	
Overeating in the presence of positive emotions	No	161 (51.9)	
	Yes	149 (48.1)	
Treatment methods			Mean \pm SD
	Target body weight (kg)		71.11 \pm 12.03
			n (%)
	Dietary program	No	237 (76.5)
		Yes	73 (23.5)
	Compliance with the dietary program	Bad	36 (49.3)
		Good	37 (50.7)
	Exercise program	No	107 (34.5)
		Yes	105 (33.9)
		There used to be	98 (31.6)
	Finding diet and exercise program useful	Yes	63 (20.3)
		No	150 (48.4)
Not sure		97 (31.3)	
Scales			Mean \pm SD
	MPABS EBE		53.46 \pm 13.19
	MPABS ELPW		13.32 \pm 5.08
	MPABS DFW		43.26 \pm 10.62
	MPABS PATASE		32.68 \pm 4.85
	MPABS total		318.30 \pm 43.24
	EDEQ EC		2.18 \pm 1.29
	EDEQ SC		3.40 \pm 1.42
	EDEQ WC		2.85 \pm 1.30
	EDEQ BE		1.91 \pm 1.65
	EDEQ R		2.33 \pm 1.39
	EDEQ total		2.69 \pm 1.10

MPABS, Mahony Psychological Assessment for Bariatric Surgery; BMI, body mass index; SC, shape concern; EBE, emotional and binge eating; DFW, dysphoric feelings about weight; ELPW, early life problems due to weight; n, number; R, restraint; WC, weight concern; BE, binge eating; SD, standard deviation; PATASE, positive treatment attitude and supportive environment; EDEQ, Eating Disorder Examination Questionnaire; EC, eating concern.

with regard to eating habits (n=271). Approximately 2/3 of the participants reported binge-eating periods, and most of the participants reported emotional eating periods. The proportion of participants who regularly made use of any dietary or exercise program corresponded between 1/4 and 1/3 of all participants, and the rate of those who thought these programs were beneficial was only 1/5 of the participants. In addition, the difference of more than 40 kg between the mean ± SD target body weight (BW) of the participants and their pre-surgical mean ± SD BW measurements indicated the high level of expectations that participants had with regard to BS results.

Comparison of Mahony Psychological Assessment for Bariatric Surgery Scores Based on Demographic Characteristics

Participants were compared with each other according to their sex, age group, and obesity class on their MBPAB total and subscale scores. Due to the low number of participants in some of the age and obesity class groups, new groups were formed by including 18-44 years group and a 45+ years group for age and by including a class I-II group and a class III group for obesity classification. Women’s ELPW, DFW, and total MPABS scores were significantly higher than men’s scores ($P=.001$, $P < .001$, $P=.007$, respectively). The comparison with regards to age groups revealed significant differences in favor of the 18-44 years group on ELPW ($P=.008$) and DFW ($P < .001$) scores. There were no significant differences in MPABS total and subscale scores between groups based on obesity classes. The comparisons are presented in Table 2.

Construct Validity: Exploratory Factor Analysis

Construct validity of the MPABS was assessed by exploratory factor analysis (EFA), and the steps outlined in Field (2013) were thoroughly followed.¹⁴ Data were initially screened for sample size and correlations between the variables. Sample size was adequate (over 300) for EFA, and the Kaiser-Meyer-Olkin (KMO) sampling adequacy measure was in the acceptable range (0.665).¹⁵ We checked for multicollinearity, and the determinant of the correlation matrix (R -matrix) was >0.0001 . Hence, no multicollinearity

problems were evident. Bartlett’s test of sphericity indicated that the R -matrix differed significantly from an identity matrix ($\chi^2(6555)=18011.5$, $P < .001$). Therefore, no singularity problems were identified. Based on the R -matrix, items with multiple correlation coefficients <0.30 were excluded as suggested by Field (2013). After the removal of these items, EFA was run again and items that did not load significantly on any factor (factor loadings <0.30) or which cross-loaded on 2 or more factors (factor loadings >0.30) were removed at this stage. We also took into account the suggestions put forth in the original study and checked for items with common factor variance <0.500 and factor loadings <0.400 to remove.⁶ As a result of these procedures, a total of 55 items of the original scale were retained for further analyses during the EFA. With the remaining items, KMO was calculated at 0.831 (good). Bartlett’s test of sphericity results was significant ($\chi^2(903)=5799.1$, $P < .001$). Parallel analysis¹⁶ results suggested extracting 4 factors for the MPABS. After also reviewing the content of the items loading on these factors (face validity analysis), these factors were identified and labeled as follows: (i) EBE (17 items), (ii) ELPW (5 items), (iii) DFW (14 items), and (iv) positive treatment attitude and supportive environment (PATASE, 10 items). Factor loadings varied between 0.407 and 0.752 in EBE, 0.450 and 0.681 in ELPW, 0.408 and 0.710 in DFW, and 0.400 and 0.635 in PATASE. Therefore, no item had a loading coefficient <0.400 . In addition, 9 items did not load significantly on any of these factors. Consequently, they were not included in any subscale. Total variance explained for the whole scale was 40.3%. The factors on which the items are loaded, variances explained by the subscales, eigenvalues of the subscales, and common factor variances are presented in Table 3.

Concurrent and Discriminant Validity

Pearson correlation coefficients between the MPABS and EDEQ total and subscale scores were examined for concurrent validity assessments. Mahony Psychological Assessment for Bariatric Surgery total scores correlated significantly positively and weakly with the EDEQ total and subscale scores (r values ranged from 0.228 to 0.437).

Table 2. Group Comparisons According to Sex, Age Group, and Obesity Class

	Sex				Age Group				Obesity Class			
	Women (n=203)	Men (n=107)	t	P	18-44 years (n=177)	45+ years (n=133)	t	P	Class I-II (n=122)	Class III (n=188)	t	P
MPABS EBE	54.47 (14.41)	51.55 (10.28)	1.86	.064	54.31 (15.06)	52.34 (10.12)	1.31	.193	52.52 (11.44)	54.08 (14.21)	-1.02	.309
MPABS ELPW	14.02 (5.23)	11.97 (4.48)	3.45	.001	13.98 (5.49)	12.44 (4.32)	2.67	.008	12.72 (4.55)	13.70 (5.37)	-1.67	.097
MPABS DFW	45.14 (11.08)	39.71 (8.67)	4.41	<.001	45.18 (11.73)	40.72 (8.30)	3.73	<.001	41.38 (9.86)	44.49 (10.93)	-2.54	.011
MPABS PATASE	32.24 (4.94)	33.52 (4.59)	-2.23	.026	33.29 (5.02)	31.86 (4.52)	2.59	.010	32.61 (4.66)	32.72 (4.99)	-0.19	.848
MPABS total	323.13 (46.09)	309.14 (35.69)	2.73	.007	321.67 (48.99)	313.83 (33.78)	1.58	.114	314.40 (38.74)	320.84 (45.85)	-1.28	.201

Results are presented as mean ± SD.

MPABS, Mahony Psychological Assessment for Bariatric Surgery; EBE, emotional and binge eating; DFW, dysphoric feelings about weight; ELPW, early life problems due to weight; n, number; PATASE, positive treatment attitude and supportive environment; SD, standard deviation.

Table 3. Factor Loadings of the Items

Item	F1 (EBE)	F2 (ELPW)	F3 (DFW)	F4 (PATASE)	<i>h</i> ²
4	0.166	-0.004	0.408	-0.325	0.382
5	0.447	0.168	-0.197	-0.332	0.412
6	0.212	0.163	-0.204	-0.017	0.125
7	-0.027	0.080	0.710	-0.097	0.542
10	-0.036	0.588	-0.137	-0.038	0.326
17	0.013	0.050	0.019	0.571	0.345
18	-0.041	0.655	-0.072	0.003	0.399
21	0.019	0.151	-0.370	-0.123	0.144
22	0.036	0.117	-0.089	0.466	0.245
23	-0.225	0.093	0.496	-0.125	0.334
24	0.068	0.038	0.018	0.604	0.402
27	-0.054	-0.144	0.320	-0.367	0.467
28	0.294	0.392	-0.012	-0.060	0.338
33	0.111	0.450	0.185	0.096	0.219
34	0.015	0.138	-0.026	0.635	0.409
35	0.666	0.056	-0.014	-0.025	0.477
36	0.589	-0.216	0.178	0.018	0.321
37	0.128	0.212	0.550	-0.350	0.454
38	0.434	0.033	0.381	0.025	0.361
44	0.604	0.166	0.048	0.076	0.478
46	0.161	0.385	0.419	0.174	0.366
47	0.201	0.192	-0.079	0.345	0.219
48	-0.163	0.217	0.031	0.484	0.317
50	0.028	-0.064	0.440	0.193	0.149
51	-0.070	0.681	-0.064	0.151	0.427
54	0.749	0.004	0.047	0.073	0.570
56	0.054	0.096	0.472	-0.151	0.314
57	0.014	-0.017	0.586	-0.113	0.363
60	0.407	0.051	0.128	0.007	0.208
64	0.542	-0.026	-0.225	-0.114	0.332
65	0.508	0.112	0.272	0.075	0.406
66	0.060	0.057	0.551	0.132	0.352
67	-0.015	0.162	0.379	0.414	0.233
68	0.238	0.038	0.328	0.469	0.427
70	0.223	0.290	-0.191	0.112	0.211
73	0.715	-0.039	-0.060	-0.006	0.492
74	0.380	0.035	0.407	-0.086	0.364
76	0.073	0.287	0.591	-0.100	0.310
77	0.685	-0.066	0.246	-0.018	0.510
81	0.140	0.059	0.471	-0.101	0.210
82	0.702	0.101	-0.151	0.013	0.567
86	0.052	0.281	0.419	0.160	0.311
89	0.567	-0.023	-0.096	-0.244	0.375
90	0.536	0.011	0.186	-0.036	0.341
92	0.009	0.623	-0.052	0.188	0.399

Item	F1 (EBE)	F2 (ELPW)	F3 (DFW)	F4 (PATASE)	<i>h</i> ²
93	0.608	0.072	-0.051	0.091	0.413
95	0.147	0.138	-0.097	0.117	0.074
99	0.752	0.021	-0.171	-0.047	0.596
106	0.122	-0.120	-0.351	0.160	0.201
108	0.010	0.143	0.191	0.430	0.214
109	0.319	0.092	-0.179	0.358	0.293
110	0.591	0.014	-0.115	0.157	0.388
112	0.045	0.058	0.521	-0.374	0.494
113	0.007	0.033	-0.321	0.403	0.187
115	0.045	-0.043	-0.078	0.400	0.255
Eigenvalues	11.69	4.81	3.42	2.21	
Percentage of the variance explained by the subscales	21.3	8.8	6.2	4.0	40.3*
Internal consistency	0.902	0.820	0.856	0.539	0.919*

*It shows the results for the whole scale. Items loaded on the factors are indicated in bold.

EBE, emotional and binge eating; DFW, dysphoric feelings about weight; ELPW, early life problems due to weight; PATASE, positive treatment attitude and supportive environment.

Yet, the correlation between the MPABS total score and the EDEQ R subscale score was negligible ($r = 0.113$). Similar results were obtained for the correlations between MPABS subscale scores and EDEQ total and subscale scores. There was a significantly positive and weak correlation between the variables (r values ranged from 0.213 to 0.451). However, some of the correlations between MPABS ELPW and EDEQ WC, MPABS DFW and EDEQ BE, MPABS DFW and EDEQ R, and MPABS PATASE and EDEQ EC were negligible (r values ranged from 0.136 to 0.193). Further, the correlation between MPABS EBE and EDEQ R ($P = .823$), MPABS ELPW and EDEQ BE ($P = .488$), MPABS ELPW and EDEQ R ($P = .102$), and MPABS PATASE and EDEQ BE ($P = .773$) were non-significant. Eating concern, shape concern, and weight concern had the strongest significant positive correlations with DFW (r values ranged from 0.397 to 0.451). Additionally, binge eating had the strongest significant positive correlation with EBE ($r = 0.348$). These results support the concurrent validity of the MPABS.

The restraint subscale of the EDEQ was hypothesized to less likely correlate with the MPABS since restricting the amount of food intake would not be common in individuals with obesity unless there was an accompanying eating disorder or a strict dietary program. Therefore, for discriminant validity assessments, the difference of the correlation coefficients between the MPABS total score and EDEQ R score was compared between the MPABS total score

and EDEQ total and remaining subscale scores by Fisher's *r*-to-*Z* transformation. All correlation coefficients, except for EDEQ R and EDEQ BE) were significantly different (for MPABS total and EDEQ R-EDEQ EC $Z = 4.25, P < .001$; for MPABS total and EDEQ R-EDEQ SC $Z = 3.51, P < .001$; for MPABS total and EDEQ R-EDEQ WC $Z = 2.62, P = .004$; for MPABS total and EDEQ R-EDEQ BE $Z = 1.47, P = .071$; and for MPABS total and EDEQ R-EDEQ total $Z = 3.48, P < .001$). These results support the discriminant validity of the MPABS. Detailed results of the correlation analyses are presented in Table 4.

Reliability Assessments

The internal consistency of MPABS was good-excellent except for the PATASE subscale. Cronbach's *a* values were 0.902 for EBE, 0.820 for ELPW, 0.856 for DFW, 0.539 for PATASE, and 0.919 for the whole scale. The CITC and CAID values calculated separately for each subscale are presented in Table 5. When the CITC values were examined, the correlations varied between 0.392 and 0.698 in EBE, 0.568 and 0.677 in ELPW, 0.247 and 0.693 in DFW, and 0.135 and 0.388 in PATASE. Particularly with regards to PATASE, we observed that the items showed a weaker than 0.400 correlation with the whole scale and that the

removal of the 113th and 115th items (about psychiatric or substance-related treatment history) significantly improved the internal consistency of the subscale. The removal of the 74th item (about self-responsibility and self-blame) in the DFW subscale led to an improvement in internal consistency. The 38th item (eating quickly) in the EBE and the 50th and 74th items (guilt) in the DFW were also lower than the 0.400 CITC value. These results show that further research is needed, particularly, on the reliability of the PATASE subscale while reliability is substantially supported for the other subscales and the whole MPABS.

DISCUSSION

The present study analyzed the validity and reliability of the Turkish version of the MPABS and showed that the Turkish version of the questionnaire is valid and reliable to a great extent and may be used in studies and clinical interviews in this field.

Most of the patients participating in the study were in the class III obesity category and had a physical illness. Totally 14.8% ($n=46$) of patients had a history

Table 4. Examination of the Relationship Between MPABS and its Subscales and EDEQ and its Subscales

		MPABS EBE	MPABS ELPW	MPABS DFW	MPABS PATASE	MPABS Total	EDEQ EC	EDEQ SC	EDEQ WC	EDEQ BE	EDEQ R	EDEQ Total
MPABS EBE	<i>r</i>	1										
	<i>P</i>											
MPABS ELPW	<i>r</i>	0.299	1									
	<i>P</i>	<.001										
MPABS DFW	<i>r</i>	0.453	0.593	1								
	<i>P</i>	<.001	<.001									
MPABS PATASE	<i>r</i>	0.055	0.088	0.346	1							
	<i>P</i>	.339	.124	<.001								
MPABS TOTAL	<i>r</i>	0.736	0.592	0.813	0.316	1						
	<i>P</i>	<.001	<.001	<.001	<.001							
EDEQ EC	<i>r</i>	0.411	0.243	0.397	0.148	0.427	1					
	<i>P</i>	<.001	<.001	<.001	.009	<.001						
EDEQ SC	<i>r</i>	0.246	0.226	0.451	0.309	0.377	0.611	1				
	<i>P</i>	<.001	<.001	<.001	<.001	<.001	<.001					
EDEQ WC	<i>r</i>	0.255	0.136	0.414	0.315	0.314	0.708	0.692	1			
	<i>P</i>	<.001	.017	<.001	<.01	<.001	<.001	<.001				
EDEQ BE	<i>r</i>	0.348	0.040	0.193	-0.016	0.228	0.454	0.197	0.343	1		
	<i>P</i>	<.001	.488	.001	.773	<.001	<.001	<.001	<.001			
EDEQ R	<i>r</i>	0.013	0.093	0.192	0.213	0.113	0.446	0.435	0.461	0.142	1	
	<i>P</i>	.823	.102	.001	<.001	.046	<.001	<.001	<.001	.012		
EDEQ TOTAL	<i>r</i>	0.279	0.213	0.444	0.303	0.375	0.838	0.842	0.870	0.342	0.721	1
	<i>P</i>	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	

MPABS, Mahony Psychological Assessment for Bariatric Surgery; SC, shape concern; EBE, emotional and binge eating; DFW, dysphoric feelings about weight; ELPW, early life problems due to weight; R, restraint; WC, weight concern; BE, binge eating; PATASE, positive treatment attitude and supportive environment; EDEQ, Eating Disorder Examination Questionnaire; EC, eating concern.

Table 5. Corrected Item-Total Correlation Coefficients of Subscales and Cronbach's α Values If Item Is Deleted

Item Number	MPABS EBE		MPABS ELPW			MPABS DFW			MPABS PATASE		
	CITC	CAID	Item Number	CITC	CAID	Item Number	CITC	CAID	Item Number	CITC	CAID
5	0.485	0.899	10	0.568	0.800	4	0.524	0.845	17	0.367	0.469
35	0.662	0.894	18	0.587	0.793	7	0.653	0.838	22	0.388	0.468
36	0.471	0.900	33	0.642	0.778	23	0.591	0.841	24	0.267	0.502
38	0.392	0.902	51	0.600	0.789	37	0.631	0.840	34	0.329	0.486
44	0.636	0.895	92	0.677	0.767	46	0.449	0.850	48	0.339	0.491
54	0.696	0.892				50	0.292	0.859	67	0.260	0.510
60	0.413	0.902				56	0.549	0.844	68	0.296	0.523
64	0.492	0.899				57	0.490	0.847	108	0.251	0.508
65	0.501	0.899				66	0.539	0.845	113	0.199	0.583
73	0.636	0.894				74	0.247	0.860	115	0.135	0.559
77	0.618	0.895				76	0.693	0.835			
82	0.695	0.893				81	0.409	0.852			
89	0.520	0.898				86	0.460	0.849			
90	0.495	0.899				112	0.532	0.845			
93	0.622	0.895									
99	0.698	0.892									
110	0.538	0.898									

MPABS, Mahony Psychological Assessment for Bariatric Surgery; CITC, corrected item-total correlation coefficients; EBE, emotional and binge eating; DFW, dysphoric feelings about weight; ELPW, early life problems due to weight; CAID, Cronbach's α if item deleted; PATASE, positive treatment attitude and supportive environment.

of psychiatric disorders and 16.1% (n=50) had received psychiatric treatment. There was high comorbidity of psychiatric disorders in obesity and a complex and mutually interactive relationship between both conditions.¹⁷⁻²⁰ It is not clear whether potential candidates for BS show psychiatric characteristics in the obesity category and how post-surgery psychiatric disorders are affected. Among potential candidates for BS, depression is the most common disorder, the prevalence of psychiatric diagnosis and a history of suicide are high,^{21,22} their satisfaction with life is at a low degree, dissatisfaction with their body is high, and they meet the diagnostic conditions of at least 1 personality disorder.²³⁻²⁵ Current results suggest that these individuals are at higher risk with regards to psychiatric diagnosis prevalence, personality disorders, self-harm, and suicide. Surgery is not an option for patients who are in an active psychotic episode and who lack the capacity to make decisions. Existing psychiatric disorders may prevent surgical intervention.²⁶ It is of utmost importance to inform the general public about the relationship between obesity and mental health and to provide treatment for psychiatric disorders that may impair the quality of life before planning a surgical intervention.

The importance of making changes in lifestyle is also undeniable when treating obesity. However, it is noteworthy that the patients' participation in dietary and exercise programs is low. More importantly, the participants'

beliefs about the benefits of these programs are extremely weak. The excess body weight they want to lose in order to treat obesity seems far from reasonably achievable by making changes in lifestyle, which may be the reason for a low level of participation in such programs. Therefore, there is a need for interviews to increase motivation, in particular, in order to provide accurate information, to establish realistic expectations about losing excess weight and perhaps most importantly, to ensure regular participation.²⁷⁻³¹ For this reason, it is necessary to collaborate with clinicians focusing on obesity treatment to make changes in lifestyle and to maintain them, which is the essential requirement of treatment.

There is indisputably a relationship between disorders such as binge and emotional eating and obesity.³²⁻³⁵ Moreover, studies have reported that if binge eating is treated, the risk of obesity will decrease.³⁶ However, if BS is performed without offering treatment for the condition, the results will not be satisfactory and close follow-up will be required.³⁷ Therefore, eating disorders associated with obesity should be consulted with psychiatrists before performing BS.³⁸⁻⁴⁰

Group Comparisons Based on Demographic Characteristics

The results obtained from group comparisons suggest that sex and age should be taken into account during the psychiatric evaluation of patients admitted for BS. As a matter of fact, sex-specific statistical analyses

were performed in the original validity-reliability study of the scale and it was shown that sex had an effect on the questionnaire.⁶ It has been reported that female patients, in particular, were diagnosed with depression and anxiety disorder more often, resorted to psychiatric treatments more frequently, received more recommendations with regards to dietary treatments, and had lower BMI values.⁴¹ In future studies, sex-specific evaluations should be performed, sex-specific risk factors and associated conditions should be determined, whether sex-based differences persist after BS should be identified, and whether the responses to surgery differ by sex should be investigated.

Although the original validity-reliability study did not include an analysis on age groups, the presence of sex-related differences suggested that this might also be required.^{41,42} In addition, there are studies in the literature indicating an increase in suicide rates after BS among women under 24 years of age.^{43,44} Given that there will be different psychiatric disorders and physical illnesses among different age groups, the importance of evaluating age-related differences before surgery is warranted.

Construct Validity of the Mahony Psychological Assessment for Bariatric Surgery

The results of the exploratory factor analysis showed that the Turkish version of MPABS consisted of 4 factors after removing the items that did not have sufficient loading value. In the original validity-reliability study, factor analysis was performed based on sex. For women, awareness of eating habits, ELPW, DFW, weight-related impairment, surgical anxiety, and guilty feelings related to eating habits were the determined factors. In men, these factors were weight-related depression, awareness of eating habits, ELPW, perceived interpersonal support and anxiety about weight and weight gain, anger, and guilty feelings related to eating habits.⁶ The factors determined in the Turkish version differed from those in the original study. This may be due to the absence of a sex-specific analysis in this study and cultural differences. On the other hand, DFW and ELPW factors were common across both studies. In addition, PATASE factor also partially overlapped with the subscale of interpersonal support. Emotional and binge eating factor was more closely related to the items in the awareness about eating habits subscale in the original questionnaire. Therefore, a general analysis revealed that the Turkish version largely overlapped with the subscales in the original questionnaire. It is plausible that the scale has had a diminished capacity to screen for possible problem areas due to the removal of items. Therefore, it is expected that only 40.3% of the variance could be explained with the number of items retained in the analyses. The original study explained 53.62% of the variance for women and 50.11% for men.⁶ In future studies to be conducted with larger sample sizes, it is

necessary to examine whether sex-specific differences can be determined more clearly, and whether a greater rate of the variance can be explained through analyses that require fewer items to be removed. However, current results supported the construct validity of the scale at a satisfactory level.

The original scale consisted of 11 subscales, but these were based on only a theoretical background, and the statistical analyses failed to confirm the validity of these subscales. The original study, however, further suggested a 6-factor solution, which consisted of items that varied according to sex. These factors were, however, provisional as well, and further analyses regarding the factor structure of the scale were warranted. Currently, the www.bariatric-codex.com website provides automated scoring based on individual data. The output presents T-scores for each subscale, and these scores might be evaluated for clinical relevance, and a targeted questioning about the problems identified in the output might be discussed further during the psychological interview. Although these scores do not correspond to well-established subscales, they might inform clinicians seeking to better understand the difficulties of the patient and might highlight possible prognostic factors after BS. These suggestions are also yet only provisional, and more research is definitely needed. The automated scoring presents 7 different domains, all of which consist of multiple subdomains. These domains are as follows: (i) validity indicators, (ii) postsurgical risk factors, (iii) surgical readiness, (iv) eating habits, (v) weight-related impairment, (vi) affective scales, and (vii) postsurgical concerns. However, these domains and their subdomains have not been subject to statistical validation yet. Therefore, in the current study, a confirmatory factor analysis (CFA) was not deemed appropriate. Future studies should be conducted in large enough samples in which EFA and CFA could be performed. The factorial structure and subscales of the MPABS are yet to be conclusively identified.

Concurrent and Discriminant Validity of the Mahony Psychological Assessment for Bariatric Surgery

The correlation between the total and subscale scores of MPABS and all the subscale and total scores of EDEQ implicated the concurrent validity of the MPABS. In addition, EBE subscale of MPABS already included items related to binge eating, and the coefficient of the correlation between this subscale and EDEQ BE was moderate and positive. The original validity-reliability study did not include a concurrent validity analysis.⁶

The higher level of correlation of MPABS with other EDEQ subscales (excluding EDEQ BE) and total score of EDEQ compared to the EDEQ R sub-scale supported the discriminant validity. On the other hand, the level of correlation with the EDEQ BE subscale did not indicate a significant difference, which might serve as an additional

result supporting the discriminant validity. Mahony Psychological Assessment for Bariatric Surgery evaluates the psychologic state before BS in a much broader framework rather than just focusing on binge eating. In this respect, it was significant that MPABS correlated more with eating, shape, and weight concerns than binge eating. The original study did not contain any discriminant validity results.⁶

Reliability of the Mahony Psychological Assessment for Bariatric Surgery

The internal consistency of MPABS was good-excellent except for the PATASE subscale. The low internal consistency of PATASE subscale, due to the weak correlation of the items concentrated here with the whole scale and the increase in internal consistency achieved by removing some items, indicated that further research was required on the reliability of the PATASE subscale. The relatively low correlation of some items in DFW and EBE subscales with the whole scale suggested that reliability analyses should be repeated in future studies. However, the current results generally supported the reliability of MPABS. Cronbach's α value (0.930) obtained in the original study on the scale was consistent with the results of the present study.⁶ In addition, the original study on the scale showed that the internal consistency of the 3 subscales was below 0.700, which was compatible with the low level determined for a single subscale in the present study.⁶ The original study on the scale did not report CITC or CAID values.⁶

Potential Implications of the Results for Clinical Practice

Bariatric surgery has been administered frequently in recent years, and it is necessary to evaluate patients before the surgery with a detailed psychiatric examination and psychosocial factors associated with obesity need to be uncovered. With regards to this evaluation, standardization is required and scales that can be used commonly in each institution are needed to examine similar problems. Mahony Psychological Assessment for Bariatric Surgery might be useful in covering this unmet need, determining the psychological needs of the patients, and identifying the potential problems that they may encounter after surgery. It may also be possible to have a general idea of the prognostic aspect of the treatment and to identify individuals who are at risk for psychiatric disorders with regard to unsuccessful surgical interventions. Such results might also guide the identification and implementation of necessary methods of psychiatric intervention. The use of this scale in Turkey will enable detailed psychiatric and psychosocial assessments before surgery and decrease the psychological complications that may develop after surgery.

The present study has some limitations such as the absence of MPABS test-retest reliability assessment, the lack of

structured diagnostic interviews with the participants, the absence of sex-specific statistical analyses, and the use of only self-report questionnaires. On the other hand, the original aspects of this study and its contributions to the literature may be listed as follows: the Turkish version of MPABS is found valid and reliable to a great extent, and we introduced a multidimensional and standardized scale into Turkish that may be administered before BS and will allow comparison in future studies, the study included comprehensive clinical data on Turkish participants who are planning to undergo BS.

As a result, the Turkish version of MPABS is determined to be valid and reliable to a great extent despite some limitations. It is clear that there is a need for an objective self-report assessment tool that can be used easily even in cases where it is not always possible to make a psychiatric assessment of many psychiatric parameters mentioned above before surgery by a consultant. Future studies to be conducted with this scale in the literature may mediate the standardization of psychological assessment before BS and enable comparison between research results.

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