

The Multidimensional Assessment of Interoceptive Awareness-2 Scale: A Turkish Validity and Reliability Study in Patients Admitted to the Dermatology Outpatient Clinic

Çok Boyutlu Bedensel Farkındalık Değerlendirmesi-2 Ölçeği: Dermatoloji Polikliniğine Başvuran Hastalarda Türkçe Geçerlilik ve Güvenilirlik Çalışması

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ABSTRACT Objective: The aim of this study is to evaluate the Turkish validity and reliability study of the Multidimensional Assessment of Interoceptive Awareness-2 (MAIA-2) Scale for dermatology patients. **Material and Methods:** The MAIA-2 Scale is a 37-item developed originally in English. A total of 390 patients, 244 (62.5%) females and 146 (37.5%) males diagnosed with the various dermatological disease, admitted to the dermatology clinic between May 2021 and October 2021 were included in the study. The MAIA-2 has been translated into Turkish. In addition, we conducted exploratory factor analysis and confirmatory factor analysis to analyze the MAIA-2. For reliability analyses, internal structure consistency and test-retest reliability were measured. Cronbach's alpha coefficient was calculated as an estimation of internal consistency. For test-retest reliability, the scale was administered to 30 patients twice, at the beginning and 2 weeks later. Test-retest reliability was statistically evaluated with the Pearson correlation test. **Results:** The mean age of the patients was found to be 33.50±15.04 (18-60) years in the study. The internal consistency of the scale (Cronbach's alpha coefficient) was found to be 0.944. The correlation coefficient was calculated as r=0.884 in the test-retest reliability. The total MAIA-2 score was 105.34±30.05 (mean±standard deviation). **Conclusion:** The Turkish version of the MAIA-2 Scale was valid and reliable for Turkish dermatology patients.

ÖZET Amaç: Bu çalışmanın amacı, Çok Boyutlu Bedensel Farkındalık Değerlendirmesi-2 [Multidimensional Assessment of Interoceptive Awareness-2 (MAIA-2)] Ölçeğinin dermatoloji hastalarında Türkçe geçerlik ve güvenilirlik çalışmasını değerlendirmektir. **Gereç ve Yöntemler:** MAIA-2 Ölçeği, orijinali İngilizce olarak geliştirilmiş 37 maddelik bir ölçektir. Çalışmaya Mayıs 2021-Ekim 2021 tarihleri arasında dermatoloji kliniğine başvuran ve çeşitli dermatolojik hastalığı olan 244'ü (%62,5) kadın ve 146'sı (%37,5) erkek olmak üzere toplam 390 hasta alınmıştır. MAIA-2 Ölçeği Türkçeye çevrilmiştir. MAIA-2 Ölçeğini analiz etmek için açıklayıcı faktör analizi ve doğrulayıcı faktör analizi yapılmıştır. Güvenilirlik analizleri için içyapı tutarlılığı ve test-tekrar test güvenilirliği ölçülmüştür. İç tutarlılığın tahmini olarak Cronbach alfa katsayısı hesaplanmıştır. Test-tekrar test güvenilirliği için ölçek 30 hastada başlangıçta ve 2 hafta sonra olmak üzere ikişer kez uygulanmıştır. Test-tekrar test güvenilirliği, pearson korelasyon testi ile istatistiksel olarak değerlendirilmiştir. **Bulgular:** Çalışmamızda hastaların yaş ortalaması 33,50±15,04 (18-60) yıl olarak bulunmuştur. Ölçeğin iç tutarlılığı (Cronbach alfa katsayısı) ise 0,944 olarak bulunmuştur. Test-tekrar test güvenilirliğinde korelasyon katsayısı r=0,884 olarak hesaplanmıştır. Toplam MAIA-2 puanı 105,34±30,05 (ortalama±standart sapma) olarak bulunmuştur. **Sonuç:** MAIA-2'nin Türkçe versiyonu dermatoloji hastaları için geçerli ve güvenilir olarak bulunmuştur.

Keywords: Awareness; dermatology; factor analysis

Anahtar Kelimeler: Farkındalık; dermatoloji; faktör analizi

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Interoception is a feeling about how we feel and perceive our body.^{1,2} Although there are several reports on interoceptive awareness and perception assessment, they address the limited aspects of interoceptive awareness and cannot evaluate its complex structure.³ The Multidimensional Assessment of Interoceptive Awareness-2 (MAIA-2) Scale is a scale designed for the assessment of interoception.⁴ The MAIA Scale was revised by Mehling et al. in 2018 and named the MAIA-2 Scale.⁵

Most skin diseases, especially such as psoriasis, atopic dermatitis, and alopecia areata, have been found to be associated with psychosocial problems (such as stress and anxiety).⁶ Emotions are an important part of individuals' lives, and emotions are attempted to be controlled by denying them or experiencing them intensely due to social situations or personal attitudes. Cognitive strategies can be developed to successfully control emotional reactions, which can be achieved by understanding body perception (interoception).⁷ Since emotional reactions are intense in skin diseases, interoception can be assessed in the patient, the disease can be kept under control, and treatment can be planned accordingly.

The present study aimed to perform the Turkish validity and reliability study of the MAIA-2 Scale, which measures interoception in dermatology patients and uses the scale in the management of dermatology diseases.

MATERIAL AND METHODS

ETHICS

Ethics committee approval was obtained from the Sivas Cumhuriyet University Non-interventional Clinical Research Ethics Committee with the decision number of 2021-05/34 (date: May 25, 2021). The purpose and content of the study were explained to patients, and informed consent was obtained from those who volunteered to participate in the study. The study was conducted in line with the World Medical Association Declaration of Helsinki, patient rights regulation, and ethical rules.

SUBJECTS

The present study was conducted on 390 patients with a dermatological disease who applied to the Dermatology Outpatient Clinic of Sivas Cumhuriyet University Hospital between May 2021 and October 2021.

Patients who were illiterate had a history of psychological illness or conditions that might affect their ability to understand the study conditions, and patients under the age of 18 were excluded from the study.

MAIA-2 SCALE

The MAIA-2 is a self-administered instrument developed by Mehling et al. to measure 8 dimensions of interoceptive body awareness. It has 37 items tested on a Likert scale, with 6 levels of ordinal response coded from 0 (never) to 5 (always). The number of items varies among the subscales: Noticing (4 items), Not-distracting (6 items), Not-worrying (5 items), Attention regulation (7 items), Emotional awareness (5 items), Self-regulation (4 items), Body listening (3 items) and Trusting (3 items).⁵

TRANSLATION PROCESS

■ Firstly, permission to translate the MAIA-2 was obtained from the original author of the instrument, Dr. Wolf Mehling.

■ The scale was translated into Turkish by 3 experts, 2 from the field of dermatology and one from linguistics. Then, a joint text was created from the 3 texts obtained by 2 different dermatology doctors.

■ Afterward, the scale's language validity was approved by reviewing the text by the committee consisting of linguists, clinicians, and academicians. With this scale, whose language validity was ensured, a pilot test was applied to 20 people, the scale was evaluated in terms of intelligibility, and its final version was created.

FIELD TESTING

The final Turkish version of the MAIA-2 Scale was applied to 390 patients with various dermatologic diseases treated at the Dermatology Clinic of Sivas Cumhuriyet University Hospital. Dermatology life

quality index (DLQI) generic tool was also applied consequently to the same patients for the purpose of demonstrating convergent validity. The DLQI scale was developed by Finlay and Khan in 1994. Its Turkish reliability and validity studies were carried out by Oztürkcan et al. It is a practical questionnaire consisting of 10 short, easy-to-understand questions including emotions, symptoms, daily activities, evaluation of leisure time, school and work life, personal relationships, and treatment parameters, prepared to understand the impacts of existing dermatological disorders on an individual's life. With a Likert-type scale, the answers consist of the options of not relevant/no at all, a little, a lot, and very much. In the evaluation, 0, 1, 2, and 3 points are given to these answers, respectively, and the obtained points are summed up. Therefore, while the minimum value is 0, the maximum value is 30.^{8,9}

STATISTICAL ANALYSIS

The statistical evaluation of the data was performed in the computer environment using SPSS 22.0 (IBM, Chicago, USA) and AMOS 22.0 (IBM, Chicago, USA) package programs. Descriptive statistical measures [mean, median, standard deviation (SD), minimum-maximum values, and percentages] were used to evaluate the research findings. When evaluating the items in the scale, firstly, reliability analyses were performed, and then exploratory factor analysis (EFA) was conducted by employing the "Varimax" rotation method. After determining the subscales, the validity of the scale structure was analyzed by confirmatory factor analysis. Socio-demographic groups were compared in terms of the scale mean score. Since the parametric test assumptions were fulfilled in the comparison evaluation, the independent sample t-test was used to determine the difference between the means of 2 independent groups, the analysis of variance was used for more than 2 independent groups (Scheffe's test was used if homogeneity was provided to determine which group mean was different from the others, while Tamhane's T2 test was used if homogeneity was not provided), Cronbach's alpha value, item-total correlations, and test-retest were used to determine the level of the scales' internal consistency. The significance level was taken as 0.05 when interpreting the results.

For test-retest reliability, the scale was applied to 30 patients twice, at the beginning and 2 weeks later. Test-retest reliability was evaluated statistically by Pearson's correlation test.

Validity analysis was carried out using convergent and construct validity. The DLQI, a well-documented and widely used generic health-related quality of life scale, was used in parallel to the MAIA-2 in order to test convergent validity.

For data analysis, we implemented EFA and confirmatory factor analysis (CFA) to analyze the scale adoption process of the MAIA-2 Scale items. We split the data into 2 parts (70:30 ratio) for exploring and validating the dimensions of the scale. In the first phase, we carried out EFA and reliability analysis based on the sub-dimensions. Then, we validated the factors using CFA.

RESULTS

Three hundred ninety patients who applied to the Dermatology Outpatient Clinic of Sivas Cumhuriyet University Hospital participated in the study. This patient group comprises 124 acne vulgaris, 57 psoriasis vulgaris, 50 dermatitis, 32 telogen effluvium, 22 pruritus, 20 urticaria, 12 tineas, 9 lichen planus, 8 nevus, 7 rosacea, 7 verruca patients, and 42 patients diagnosed with other diseases.

Regarding the age distribution of the study group, the mean age was 33.50 ± 15.04 (18-60), 62.5% of the study group were female, and 37.5% were male.

Concerning the patients' educational status, it was found that 99 (26.3%) were primary school graduates, 112 (29.7%) were high school graduates, and 179 (44.0%) were university graduates or had a higher degree.

RELIABILITY ANALYSIS RESULTS FOR THE MAIA-2 SCALE

Test-retest and Cronbach's alpha coefficients were used to measure the internal consistency of the MAIA-2 Scale. As a result of the test-retest, the scale's reliability was found to be at a very high level of 0.884. Upon examining the item analysis results of the MAIA-2 Scale, items 11, 12, and 15 were re-

moved from the MAIA-2 Scale since the relationship of an item with the other items should not be less than 0.25. When the results of the reliability analysis conducted with the remaining 34 items were examined, it was concluded that there was no need to remove items from the scale. When the general reliability levels of the 34-item scale were investigated, it was determined that the scale's reliability was very high (Cronbach's alpha=0.944).

To determine from which distribution the data of the MAIA and DLQI Scales come from; the arithmetic mean, mode, median, skewness and kurtosis coefficients were examined and it was determined that the data came from a normal distribution since the arithmetic mean and median were equal or close, and the skewness and kurtosis coefficients were within the limits of ± 2.0 (Table 1).

EFA RESULTS FOR THE MAIA-2 SCALE

Since the factor loads of all the variables that make up the scale and the factors are above the lower limit (0.30), it is observed that internal consistency and reliability are provided. After items 11, 12, and 15 were removed from the scale as a result of the reliability analysis, the factor loads of the statements ranged from 0.496 to 0.845, according to the results of the exploratory factor analysis, including all questions. Furthermore, the fact that the Kaiser-Meyer-Olkin (KMO) value is 0.920 and Barlett's test gives a significant result demonstrates that the data collected for each subscale can be gathered under factors in ac-

cordance with the scale used in the study and supports the research topic. Of the 7 subscales in the research model, Attention Regulation explains 14.735% of the total variance, Non-distracting explains 10.830% of the total variance, Emotional Awareness explains 10.265% of the total variance, Noticing explains 9.165% of the total variance, Self-regulation explains 8.249% of the total variance, Trusting explains 7.225%, and Body Listening explains 6.964% of the total variance. All of the items explain 67.434% of the total variance (Table 2).

CFA RESULTS FOR THE MAIA-2 SCALE

As a result of the CFA analysis, it was revealed that the items confirmed the relevant factors at a 95% confidence level without any modifications ($p < 0.05$ $p = 0.000$), and χ^2/df showed perfect fit, and other fit criteria were within the acceptable fit intervals (Table 3) (Figure 1).¹⁰

Considering the regression coefficients of the MAIA-2 Scale, factor loadings are important since the "p" values of all items are less than 0.05. Significant factor loadings mean that items are loaded correctly on the factors. In the Attention Regulation subscale, one of the MAIA-2 subscales, the most effective variable is S22 with a coefficient of 0.812, and the item with the lowest factor loading is S14 with a coefficient of 0.454. In the Non-distracting subscale, the most effective variable is S9 with a coefficient of 0.795, and the item with the lowest factor loading is S7 with a coefficient of 0.456. In the Emotional

TABLE 1: Descriptive statistics of MAIA-2 and DLQI.

	n	Minimum	Maximum	Mean	Standard deviation	Skewness	Kurtosis
Attention regulation	390	0.00	45.00	25.62	10.13	-0.26	-0.31
Non-distracting	390	0.00	30.00	15.11	7.50	-0.01	-0.55
Emotional awareness	390	0.00	25.00	18.03	6.28	-0.82	0.00
Noticing	390	0.00	20.00	15.33	4.66	-1.21	1.09
Self-regulation	390	0.00	20.00	11.67	5.05	-0.12	-0.60
Trusting	390	0.00	15.00	10.14	4.23	-0.73	-0.28
Body listening	390	0.00	15.00	8.40	4.14	-0.09	-0.85
MAIA-2	390	7.13	170.00	104.31	30.97	-0.60	0.26
DLQI	390	0.00	29.00	7.36	6.89	1.09	0.54

MAIA-2: Multidimensional Assessment of Interoceptive Awareness-2; DLQI: Dermatology life quality index.

TABLE 2: Exploratory factor analysis results for the Multidimensional Assessment of Interoceptive Awareness-2 Scale.

Items	Exploratory factor %	Eigenvalue	Reliability	Factor loadings
Factor 1 (Attention regulation)	14.735	12.282	0.887	
13				0.496
14				0.571
16				0.704
17				0.702
18				0.559
19				0.686
20				0.681
21				0.753
22				0.698
Factor 2 (Non-distracting)	10.830	2.954	0.866	
5				0.726
6				0.599
7				0.545
8				0.839
9				0.809
10				0.762
Factor 3 (Emotional awareness)	10.265	2.181	0.883	
23				0.626
24				0.810
25				0.743
26				0.712
27				0.599
Factor 4 (Noticing)	9.165	1.973	0.864	
1				0.795
2				0.821
3				0.812
4				0.740
Factor 5 (Self-regulation)	8.249	1.365	0.807	
28				0.590
29				0.620
30				0.652
31				0.689
Factor 6 (Trusting)	7.225	1.101	0.888	
35				0.570
36				0.845
37				0.760
Factor 7 (Body listening)	6.964	1.071	0.831	
32				0.768
33				0.754
34				0.641

Kaiser-Meyer-Olkin=0.920; Bartlett's=5680.521; Degree of freedom=561; Significance <0.001; Explained variance (%); (Total=67.434%); Scale total reliability=0.944.

Awareness subscale, the most effective variable is S25 with a coefficient of 0.886, and the item with the lowest factor loading is S27 with a coefficient of 0.718. In the Noticing subscale, the most effective variable is S2 with a coefficient of 0.888, and the item

with the lowest factor loading is S1 with a coefficient of 0.657. In the Self-regulation subscale, the most effective variable is S31 with a coefficient of 0.906, and the item with the lowest factor loading is S28 with a coefficient of 0.640. In the Trusting subscale, the

TABLE 3: Confirmatory factor analysis results for the Multidimensional Assessment of Interoceptive Awareness-2 Scale.				
Measurement name	Perfect fit	Acceptable fit	Result of the model	Model success level
χ^2/df	$0 < \chi^2/df < 3$	$0 < \chi^2/df < 5$	1.722	□
RMSEA	RMSEA ≤ 0.05	RMSEA ≤ 0.10	0.08	□
IFI	IFI	IFI ≥ 0.80	0.844	□
CFI	CFI ≥ 0.95	CFI ≥ 0.80	0.840	□

df: Degree of freedom; RMSEA: Root mean square error of approximation; IFI: Incremental Fit Index; CFI: Comparative Fit Index.

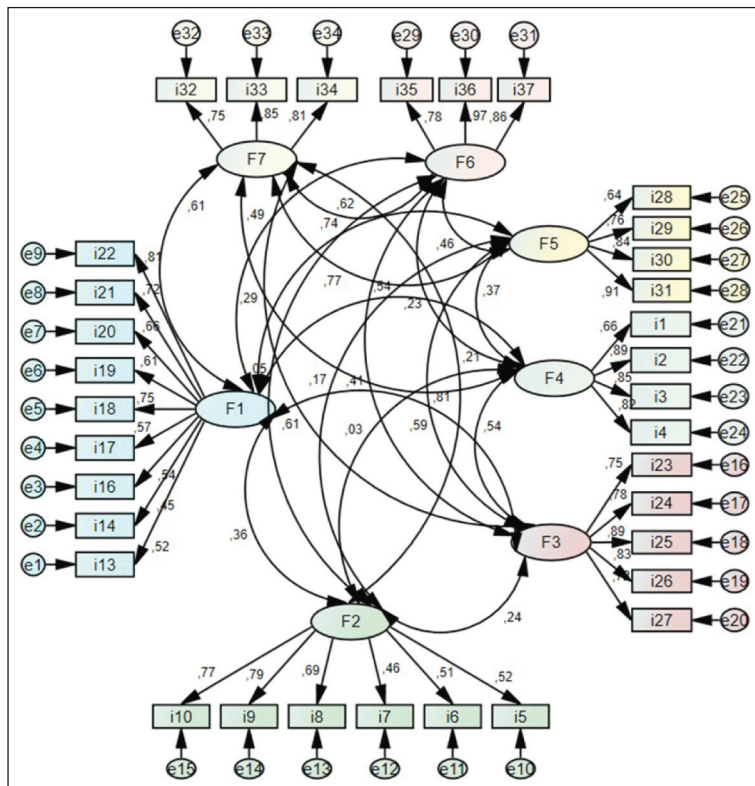


FIGURE 1: Confirmatory factor analysis results of Multidimensional Assessment of Interoceptive Awareness-2 Scale.

most effective variable is S36 with a coefficient of 0.967, and the item with the lowest factor loading is S35 with a coefficient of 0.776. In the Body Listening subscale, the most effective variable is S33 with a coefficient of 0.848, and the item with the lowest factor loading is S32 with a coefficient of 0.752.

To measure the impact of the MAIA-2 subscales on the DLQI scale, a structural equation model was used, which was suitable for the purpose and model of the study and which tested the indirect impacts between implicit variables and variables, using the maximum likelihood calculation method since the data were normally distributed. As a result, it was deter-

mined that $\chi^2/df < 3$ showed perfect fit, and other fit indices were at an acceptable level without any modifications of the variables in the model (Table 4).¹¹

After the measurement models were validated, the research hypotheses were tested on the implicit variable structural model. The analysis results are presented in Figure 2 and Table 5. According to the data in Table 5, it is observed that the relationships between factor loadings and latent variables are significant since the “p” values of the MAIA-2 → DLQI, F1 → DLQI, F5 → DLQI, F6 → DLQI relationships are less than 0.05. In light of the data in Figure 2, Table 4, the MAIA-2 Scale affects the DLQI Scale

Measurement name	Perfect fit	Acceptable fit	Result of the model	Model success level
χ^2/df	$0 < \chi^2/df < 3$	$0 < \chi^2/df < 5$	2.252	□
RMSEA	$RMSEA \leq 0.05$	$RMSEA \leq 0.09$	0.058	□
NFI	$0.95 \leq NFI < 1.0$	$0.80 \leq NFI < 1.0$	0.807	□
NNFI (TLI)	$TLI \geq 0.95$	$TLI \geq 0.80$	0.874	□
CFI	$CFI \geq 0.95$	$CFI \geq 0.80$	0.882	□

df: Degree of freedom; RMSEA: Root mean square error of approximation; NFI: Normed Fit Index; NNFI: Non-normed Fit Index; TLI: Tucker-Lewis Index; CFI: Comparative Fit Index.

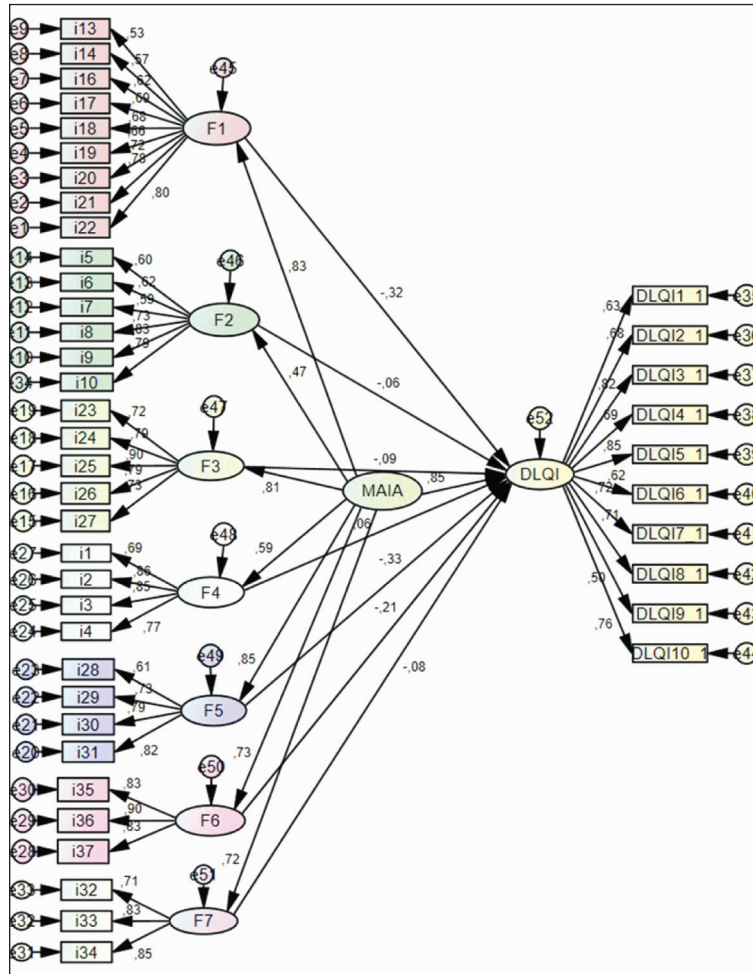


FIGURE 2: Structural equation modeling standardized path diagram.

($\beta=0.853$; $p<0.05$) positively, F1 (Attention Regulation) subscale affects it negatively ($\beta=-0.324$; $p<0.05$), F5 (Self-regulation) subscale affects it negatively ($\beta=-0.328$; $p<0.05$), and F6 (Trusting) subscale affects it negatively ($\beta=-0.206$; $p<0.05$).

The correlation coefficients between the overall scale and the subscales varied between 0.20 and 0.63.

There was a high correlation between the overall scale and the subscales ($p<0.05$).

The total MAIA-2 score was a mean±SD of 105.34 ± 30.05 points. The values for individual subscales were (mean±SD) 25.80 ± 10.08 for the Attention Regulation subscale, 12.58 ± 6.31 for the Non-distracting subscale, 18.05 ± 6.25 for the Emo-

TABLE 5: Structural model standardized path coefficients and analysis results of the research model.

Path Tested (Hypotheses)	B	Standardized regression weights (S.β)	t	p	Conclusion	
MAIA-2 → DLQI		0.600	0.853	-	Acceptance	
F1 (Attention Regulation) → DLQI		-0.189	-0.324	-0.064	0.002	Acceptance
F2 (Non-Distracting) → DLQI		-0.034	-0.063	-0.962	0.336	Rejection
F3 (Emotional Awareness) → DLQI		-0.056	-0.089	-0.909	0.364	Rejection
F4 (Noticing) → DLQI		0.040	0.058	0.809	0.418	Rejection
F5 (Self-Regulation) → DLQI		-0.180	-0.328	-2.839	0.005	Acceptance
F6 (Trusting) → DLQI		-0.115	-0.206	-2.414	0.016	Acceptance
F7 (Body Listening) → DLQI		-0.040	-0.078	-0.904	0.366	Rejection

DLQI: Dermatology life quality index.

tional Awareness subscale, 15.35 ± 4.78 for the Noticing subscale, 11.63 ± 5.13 for the Self-regulation subscale, 10.12 ± 4.28 for the Trusting subscale and 8.37 ± 4.17 for the Body Listening subscale. The total DLQI score was a mean \pm SD of 7.34 ± 7.12 points (Table 6).

The differences between the MAIA-2 and DLQI Scale levels according to the diagnosis of disease were analyzed by the ANOVA test, and it was revealed that the MAIA-2 and DLQI Scales exhibited statistically significant differences according to the diagnosis of disease ($p < 0.05$). The MAIA-2 levels were found to be higher in patients diagnosed with acne vulgaris and rosacea than in other disease groups. The DLQI levels of patients diagnosed with psoriasis vulgaris, pruritus, tinea, verruca, and urticaria were detected to be higher than the other disease groups (Table 6).

DISCUSSION

Interoception is defined as the gradually increasing development during the learning process, which consists of an individual's past experiences and during which he/she usually experiences his/her body in many situations and realizes the reactions of other individuals to his/her body. Dermatological diseases such as acne also cause many social and psychological problems. Body dysmorphia and decreased self-esteem are 2 of them. Skin plays an important role in the socialization process from infancy to adulthood with openly expressing emotions such as anger, fear, embarrassment, and fury, responding to emotional stimuli, providing self-image and self-confidence.

TABLE 6: Differentiation analysis of MAIA-2 and DLQI Scales by disease diagnosis groups.

Disease diagnosis	MAIA-2 ($\bar{x} \pm SD$)	DLQI ($\bar{x} \pm SD$)
Acne vulgaris	3.20 \pm 0.84	5.61 \pm 4.93
Psoriasis vulgaris	2.94 \pm 0.76	9.57 \pm 7.60
Pruritus	2.47 \pm 1.23	10.85 \pm 7.84
Tinea	3.08 \pm 1.27	9.72 \pm 10.87
Rosacea	3.57 \pm 0.81	7.28 \pm 5.28
Dermatitis	3.18 \pm 0.89	7.37 \pm 6.78
Telogen effluvium	3.44 \pm 0.62	3.77 \pm 4.26
Nevus	2.58 \pm 1.09	4.62 \pm 6.41
Verru	2.57 \pm 1.06	10.85 \pm 9.52
Urticaria	2.89 \pm 1.00	9.71 \pm 6.44
Lichen planus	2.89 \pm 0.93	8.97 \pm 9.06
Others	2.87 \pm 0.90	8.78 \pm 8.33
F/p	2.48/0.004*	3.27/0.000*

* $p < 0.05$.

MAIA-2: Multidimensional Assessment of Interoceptive Awareness-2;

DLQI: Dermatology life quality index; SD: Standard deviation.

Hence, it is important to evaluate bodily perception in dermatological diseases.¹²

In our study, the Turkish validity and reliability studies of the MAIA-2 Scale, which measures interoception, were conducted in dermatology patients, and it was aimed to use the scale in the follow-up and treatment of dermatology patients. The Turkish validity and reliability studies of the MAIA-2 Scale were previously conducted on healthcare workers in Türkiye.² In the present study, the Turkish validity and reliability studies of the MAIA-2 Scale were performed on individuals with dermatological diseases. The MAIA-2 Scale has been previously used in

studies in many countries worldwide, and its validity and reliability have been ensured in different languages.¹³⁻¹⁵

This study was the first adaptation and validation of a self-report interoception assessment tool for dermatological diseases in the Türkiye population.

The results obtained by applying internal consistency and test-retest methods to measure the scale's reliability indicate that the reliability of our scale in Turkish was provided.

EFA and CFA were used for the validity study of the scale. Its construct validity with the external tests method was examined using structural equation model analysis with the DLQI Scale, frequently used in dermatological diseases. The findings obtained in CFA demonstrated that the construct validity of the model was provided.

The EFA favored a model with a factorial structure of 8 subscales with low factorial loading for items 11, 12, and 15 were removed because they did not contribute to the factors they theoretically belong to. A new rotated factorial matrix was established for the 34-item scale. This matrix showed a factorial structure of 7 subscales. While the original scale includes 8 subscales, we found 7 subscales with proper factor loadings and high communalities. Also, we observed that all the subscales are rather reliable due to the satisfactory Cronbach's alpha values. In terms of the validity of the Turkish version of the MAIA-2 Scale, we obtained great fit indices and significant items on the subscales with CFA results. Consequently, a Turkish version of the MAIA-2 Scale can be considered psychometrically valid. Unlike the original scale, different items created different scales in our study. According to the analysis results in the study, it was determined that the items numbered 1-4 were included in the scale of "noticing." Items 5-10 are located under the "Non-distracting", items 13, 14, 16-22 are in "Attention Regulation", items 23-27 are in "Emotional Awareness", items 28-31 are in "Self-regulation", items 32, 33 and 34 are "Body Listening" and items 35, 36 and 37 are "Trusting". While item number 13 was in the "Noticing" subscale in the original scale, it was in the "Attention Regulation" subscale in our study. While item number 14 was in

the "Not-worrying" subscale in the original scale, it was in the "Attention Regulation" subscale in our study. In our study, there was not the "Not-worrying" subscale. The other subscales were included in the same way as the original scale.

The reason for the minor changes with regard to the MAIA-2 Scale in our study can be explained by conceptual and cultural differences between societies.^{16,17}

It was revealed that the MAIA-2 and DLQI Scales differed statistically significantly according to the diagnosis of disease. The MAIA-2 levels of patients diagnosed with acne vulgaris and rosacea were found to be higher compared to other patients. The higher MAIA-2 level in acne vulgaris and rosacea in comparison with other diseases can be explained by the fact that such diseases occur in a more visible face area. Similar to previous studies, the DLQI levels of patients diagnosed with psoriasis vulgaris, pruritus, tinea, verruca, and urticaria were also found to be high in our study.⁹

In this study, we attempted to adopt the MAIA-2 Scale for patients with dermatological disorders in the Turkish population. Turkish version of the MAIA-2 Scale provides a different structure from the original one. While the original version of the scale has 8 subscales, we obtained 7 subscales. These subscales were validated with CFA results with excellent model fit for 7 subscales, namely "Attention Regulation," "Not-distracting," "Emotional Awareness," "Noticing", "Self-regulation", "Trusting" and "Body Listening."

CONCLUSION

The results of this validation study have clearly demonstrated that the Turkish version of the MAIA-2 is an appropriate, clinically sound, and valid instrument with strong psychometric properties to be used with Turkish-speaking patients who have dermatological diseases.

In future studies, we recommend applying the scale to dermatology patients and investigating how beneficial it is in the evaluation of treatment response and patient follow-up.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Melih Akyol, Saliha Özpinar; **Design:** Mustafa Tosun, Ecem Demir Yurtseven; **Control/Supervision:** Rukiye Yasak Güner, Melih Akyol; **Data Collection and/or Processing:** Mustafa Tosun, Rukiye Yasak Güner; **Analysis and/or Interpretation:** Ecem Demir Yurtseven, Melih Akyol; **Literature Review:** Mustafa Tosun, Rukiye Yasak Güner; **Writing the Article:** Mustafa Tosun, Melih Akyol; **Critical Review:** Melih Akyol, Saliha Özpinar; **References and Fundings:** Melih Akyol; **Materials:** Mustafa Tosun.

REFERENCES

- Ceunen E, Vlaeyen JW, Van Diest I. On the origin of interoception. *Front Psychol.* 2016;7:743. [Crossref] [PubMed] [PMC]
- Özpinar S, Dunder E, Demir Y, Akyol M. Multidimensional Assessment of Interoceptive Awareness (MAIA 2): psychometric properties of the Turkish version. *Journal of Health Sciences and Medicine.* 2021;4(2):132-6. [Crossref]
- Mehling WE, Gopisetty V, Daubenmier J, Price CJ, Hecht FM, Stewart A. Body awareness: construct and self-report measures. *PLoS One.* 2009;4(5):e5614. [Crossref] [PubMed] [PMC]
- Mehling WE, Price C, Daubenmier JJ, Acree M, Bartmess E, Stewart A. The Multidimensional Assessment of Interoceptive Awareness (MAIA). *PLoS One.* 2012;7(11):e48230. [Crossref] [PubMed] [PMC]
- Mehling WE, Acree M, Stewart A, Silas J, Jones A. The Multidimensional Assessment of Interoceptive Awareness, Version 2 (MAIA-2). *PLoS One.* 2018;13(12):e0208034. [Crossref] [PubMed] [PMC]
- Orion E, Wolf R. Psychological factors in skin diseases: stress and skin: facts and controversies. *Clin Dermatol.* 2013;31(6):707-11. [Crossref] [PubMed]
- Füstös J, Gramann K, Herbert BM, Pollatos O. On the embodiment of emotion regulation: interoceptive awareness facilitates reappraisal. *Soc Cogn Affect Neurosci.* 2013;8(8):911-7. [Crossref] [PubMed] [PMC]
- Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI)--a simple practical measure for routine clinical use. *Clin Exp Dermatol.* 1994;19(3):210-6. [Crossref] [PubMed]
- Oztürkcan S, Ermertcan AT, Eser E, Sahin MT. Cross validation of the Turkish version of Dermatology Life Quality Index. *Int J Dermatol.* 2006;45(11):1300-7. [Crossref] [PubMed]
- Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online.* 2003;8(2):23-74. [Link]
- Schreiber JB, Nora A, Stage FK, Barlow EA, King J. Reporting structural equation modeling and confirmatory factor analysis results: a review. *The Journal of Educational Research.* 2006;99(6):323-38. [Crossref]
- Mercan FS, Altunay KI. Psikiyatri ve dermatolojinin ortak çalışma alanı: psikodermatoloji [Psychodermatology: a collaboration between psychiatry and dermatology]. *Türk Psikiyatri Dergisi.* 2006;17(4):305-13. [Link]
- Eggart M, Todd J, Valdés-Stauber J. Validation of the Multidimensional Assessment of Interoceptive Awareness (MAIA-2) questionnaire in hospitalized patients with major depressive disorder. *PLoS One.* 2021;16(6):e0253913. [Crossref] [PubMed] [PMC]
- Smith AR, Forrest LN, Perkins NM, Kinkel-Ram S, Bernstein MJ, Witte TK. Reconnecting to internal sensation and experiences: a pilot feasibility study of an online intervention to improve interoception and reduce suicidal ideation. *Behav Ther.* 2021;52(5):1145-57. [Crossref] [PubMed]
- Payne-Allen KJ, Pfeifer G. The role of exteroceptive and interoceptive awareness in executing socially relevant bodily actions: a naturalistic investigation of greeting behaviour in the UK and Spain. 2021. [Crossref]
- Fujino H. Further validation of the Japanese version of the Multidimensional Assessment of Interoceptive Awareness. *BMC Res Notes.* 2019;12(1):530. [Crossref] [PubMed] [PMC]
- Gim WS, Sim KL, Cho OK. Korean Multidimensional Assessment of Interoceptive Awareness (K-MAIA): development and validation. *Korean J Stress Res.* 2016;24(3):177-92. [Crossref]