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Translation and Validation of the Multidimensional Assessment of Interoceptive Awareness (Maia-2) in Urdu Among Patients with Polysubstance Use

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ABSTRACT

The study aimed to translate and validate the Multidimensional Assessment of Interoceptive Awareness (MAIA-2) in Urdu for patients with polysubstance use. The study was carried out in three phases. The first phase was the translation and tryout of the scale (*N = 10*), the second was the pilot study (*N = 50*) and the third was the main cross-sectional study (*N = 300*). Adult patients with polysubstance use (three or more substance classes) were taken from inpatient rehabilitation centres of Islamabad and Rawalpindi through convenience sampling. The scale was translated by forward translation, backward translation and expert review. The MAIA-2 has 37 items and eight subscales. Cronbach's alpha, item-total correlation, confirmatory factor analysis and correlation analysis were used. The Urdu MAIA-2 showed good reliability in the pilot study ($\alpha = .82$) and acceptable reliability in the main study ($\alpha = .77$). The first factor model did not fit well. After the justifiable error terms were allowed to covary, the model fit improved (*RMSEA = .07*). The scale was negatively related to psychological distress ($r = -.36$), suicidal ideation ($r = -.43$), alexithymia ($r = -.43$) and emotion dysregulation ($r = -.45$), and positively related to perceived social support ($r = .52$). The Urdu MAIA-2 is a reliable and valid scale for measuring interoceptive awareness in patients with polysubstance use.

Introduction

Polysubstance use means using more than one drug or type of alcohol, either at the same time or one after the other. It is a serious and complex problem, and it is hard for mental health and addiction services to treat (Leza et al., 2024). When a person uses many substances, it is not enough to ask what one drug does. We also need to ask which psychological weaknesses are common across all these substances and keep the pattern going (Meyer & Segal, 2023). One such weakness is a poor awareness of what is happening inside the body.

Interoceptive awareness is the ability to notice, understand and trust the signals that come from our body and to connect them with our emotions. For example, a person may feel a tight chest, a racing heart or a heavy stomach and may know that these signs mean fear or stress. Researchers have linked interoception with mental health in general (Khalsa et al., 2018) and with addiction in particular (Paulus & Stewart, 2014; Verdejo-García et al., 2012). It is also said that the insula, a part of the brain, has an important role in body awareness and in the feeling of craving (Naqvi & Bechara, 2010; Craig, 2009). If a patient cannot read the body's signals properly, it becomes difficult to recognise emotions and to deal with them in a healthy way. Such a person may turn to drugs again to get relief.

Interoceptive awareness is not one single skill. A person may be good at noticing sensations but may worry too much about them, or may notice them but may not trust his own body. For this reason, The Multidimensional Assessment of Interoceptive Awareness (MAIA) was developed by Mehling et al. (2012).

Rationale of the study

There are four reasons why this scale was translated and validated. First, no Urdu version of the MAIA was available, so it could not be used directly with Urdu-speaking patients in Pakistan. Second, a scale cannot be used only after translation. A translated scale may have unclear wording or items that do not fit the culture, and its factor structure may change in a new language and a new group. This is especially true for interoceptive awareness, where the wording about the body and about emotions has to be very clear (Herbert & Pollatos, 2012; Verdejo-García et al., 2012). Third, the original scale was not tested on patients with polysubstance use in Pakistan, and their experience of body signals may be different from that of the general population. Fourth, the scale was needed for our larger study, which examined the link of interoceptive awareness with alexithymia, emotion dysregulation, psychological distress and suicidal ideation in these patients. Without a reliable and valid Urdu measure, the results of that study could not be trusted. Therefore, the aim of this study was to translate the MAIA-2 into Urdu and to check its reliability, factor structure and construct validity among patients with polysubstance use.

Methods

The study used a quantitative, cross-sectional design and was carried out in three phases. The first phase was the translation and tryout of the scale (N = 10), the second was the pilot study (N = 50) and the third was the main study (N = 300).

Translation of the Scale

The original authors of the instruments were contacted via email prior to commencing the translation process to gain permission to translate and use the scale in the study. The scale was translated following a standard forward-backward translation procedure in the following steps.

Forward translation. The English to Urdu translation was done by two PhD scholars and one MPhil scholar in Psychology who were fluent in English. The original English scale was translated independently by the translators. After that, the translated versions were compared and minor differences among the versions were discussed by the research team until one Urdu version was accepted.

Backward translation. A bilingual translator who was not involved in the forward translation process translated the Urdu version back into English. The back-translated version and the original English scale were examined carefully to highlight any differences in meaning or wording. The changes were made, wherever needed, to make sure that the Urdu version did not lose the concept of the original.

Expert review. The Urdu translated version was checked by subject matter experts having experience in clinical psychology and psychological assessment. The experts assessed the concepts, familiarity with the target population and ease of understanding of the items. In addition, they looked at all items for clarity and relevance in the language. Their input was taken and the final Urdu version of the scale was prepared.

Tryout. For the tryout phase, a convenience sample of 10 adult patients was taken from a rehabilitation centre (Akbar Rehab Clinic Islamabad, Bani Gala). All participants were Urdu speaking and were diagnosed with polysubstance use disorder (three or more classes of substances). They had been in rehabilitation for over a month and were not in the withdrawal phase, so that they could comprehend the items and give well-thought-through feedback. All items were presented orally to the participants and the answers were written by the researcher. The participants were asked to give comments on the clarity, wording and relevance of the items and to point out any words or statements that were confusing or culturally inappropriate. Based on the feedback, only minor revisions in the wording of the items were made, and the final Urdu version was compiled for the pilot study.

Participants

The pilot study was conducted on 50 adult patients with polysubstance use disorder, who were recruited through convenience sampling from Akbar Rehab Clinic Islamabad (Bani Gala), Healing Door Rehab Center (Bani Gala) and Nishan Rehab, Islamabad. The main study sample consisted of 300 adult patients, selected through convenience sampling from males inpatient rehabilitation

centres of Islamabad and Rawalpindi. The sample size for the main study was determined with the G*Power statistical power analysis program.

Adults aged 18 to 60 years, having a diagnosis of polysubstance use disorder (three or more classes of substances) and who had completed at least two weeks of rehabilitation treatment, were part of the pilot and the main study. This was to make sure that they were in a stabilized stage of rehabilitation and could make meaningful responses. Informed consent was obtained from all the participants. People with a clinical diagnosis of schizophrenia or bipolar disorder, diagnosed by a psychiatrist, were excluded, as these illnesses could impact an individual's awareness and emotional regulation. Cognitive impairment, defined as a Mini-Mental State Examination (MMSE) score below 24, was also an exclusion criterion to make sure that the participants could understand and answer the items accurately.

Instruments

Multidimensional Assessment of Interoceptive Awareness (MAIA-2). The MAIA, developed by Mehling et al. (2012), was used to assess interoceptive awareness. The version used in this study has 37 items covering eight facets (subscales) of interoceptive awareness: Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-Regulation, Body Listening and Trusting. Each item is rated on a 6-point scale ranging from 0 (Never) to 5 (Always). The items of the Not-Distracting subscale (items 5 to 10) and items 11, 12 and 15 of the Not-Worrying subscale are reverse scored. In this study, the scores of the subscales and the total scale were obtained by adding the scores of the items, so the potential range of the total scale is 0 to 185. The higher the score on the MAIA-2, the better the interoceptive abilities and the higher the interoceptive awareness; by contrast, the lower the score, the more impaired the ability to perceive and interpret internal bodily and emotional states. The structure of the scale, the meaning of each subscale and the reverse-scored items are given in Table 1. In the original validation, the subscales showed acceptable to good reliability, with Cronbach's alpha values ranging from .66 to .87 (Mehling et al., 2012).

Table 1

Structure of the Multidimensional Assessment of Interoceptive Awareness (MAIA-2)

Subscale	Items	Item No.	Reverse-scored items
Noticing	4	1–4	None
Not-Distracting	6	5–10	5, 6, 7, 8, 9, 10
Not-Worrying	5	11–15	11, 12, 15
Attention Regulation	7	16–22	None
Emotional Awareness	5	23–27	None
Self-Regulation	4	28–31	None
Body Listening	3	32–34	None
Trusting	3	35–37	None

Note. Subscale descriptions are based on the original scale (Mehling et al., 2012).

Construct Validity

The following scales were also used in the main study to examine the construct validity of the Urdu MAIA-2.

The Depression Anxiety Stress Scales (DASS-21). The 21-item version of the DASS (Lovibond & Lovibond, 1995) was used to measure psychological distress. It has three subscales, depression, anxiety and stress (seven items each), rated from 0 to 3. The sum of the subscale scores is multiplied by 2, to be comparable to the full-length DASS-42. Scores higher indicate greater psychological distress.

Suicidality Scale: Suicidal Ideation, Intention and Attempts (SS-SIIA). The SS-SIIA (Bano et al., 2019) was used to measure suicidal ideation. It consists of 25 items and has been developed and tested with Pakistani population. Scores reflect an increased risk for suicidal ideation.

The Toronto Alexithymia Scale (TAS-20). The TAS-20 (Bagby et al., 1994) is a self-report questionnaire with 20 items that assesses three facets of alexithymia: (Difficulty Identifying Feelings, Difficulty Describing Feelings and Externally Oriented Thinking). Higher scores indicate more difficulty identifying and describing emotions, with a maximum score of 5 (Strongly Agree) and minimum score of 1 (Strongly Disagree).

Emotion Regulation Scale (DERS-18) difficulties. The DERS-18 (Victor & Klonsky, 2016) is an 18-item short form of the DERS (Gratz & Roemer, 2004) that was used to assess emotion dysregulation. Items are scored on a scale of 1 (Almost never) to 5 (Almost always) with higher scores indicating less ability to regulate emotions.

Multidimensional Scale of Perceived Social Support (MSPSS). MSPSS (Zimet et al., 1988) is a 12 item self-report instrument which assesses the perceived level of family, friends and significant others' support. Scores are higher for increased perceived social support.

Procedure

Permission was obtained through a formal letter from male inpatient rehabilitation centres of Islamabad and Rawalpindi, and data were collected on pre-arranged dates. The individuals who fulfilled the inclusion criteria were contacted individually and informed about the purpose of the study, the confidentiality of the data and the freedom to withdraw from the study without any repercussions. The data were collected in a private and quiet room at the rehabilitation centres. The questionnaires, including the Urdu version of the MAIA-2, were administered in paper-and-pencil mode, and the researcher was available throughout to answer any questions. It took about 30 to 40 minutes to complete the whole battery of questionnaires. For participants with low literacy, the consent information and the questionnaires were read aloud in simple and understandable language by trained research staff. After the data collection, all questionnaires were checked for incomplete answers.

Ethical Considerations

The study protocol was approved by Institutional Review Board (F.No. D-107-2(02) M.Phil/2024-Admin).The administration of rehabilitation centers was contacted and a permission was granted. All participants gave informed consent to participate in the study, explaining the purpose, procedures, risks and benefits. Patients were informed that they could withdraw from the study at any time without facing any penalties or affecting their medical care, and they were aware of this right. Confidentiality was preserved for the participants by assigning codes and storing all information in password protected files to only the research team. The study was conducted with the sensitive subjects, and a trained researcher observed for signs of distress or suicidal thoughts and immediately provided assistance to those who needed it and referred them to mental health services available at the rehabilitation centers.

Results

Pilot Study

In the pilot study (N = 50), the Cronbach's alpha of the MAIA-2 total scale was .82. The alpha values of the subscales ranged from .62 (Not-Worrying) to .90 (Body Listening). The descriptive statistics and alpha reliability coefficients are given in Table 2. The item-total correlations of all 37 items ranged from .25 to .70 (Table 3), all of them above the commonly used value of .20, and therefore all items were retained for the main study.

Table 2

Descriptive Statistics and Alpha Reliability Coefficients of the MAIA-2 and its Subscales in the Pilot Study (N = 50)

Scale	Items (K)	*M*	*SD*	*α*	Potential	Actual	*Skew.*	*Kurt.*
MAIA-2 total scale	37	97.78	18.2	.82	0–185	60–127	−.36	−.84
Noticing	4	12.22	4.06	.89	0–20	3–20	−.45	−.11
Not-Distracting	6	11.26	5.93	.88	0–30	1–24	.49	−.63
Not-Worrying	5	12.62	4.80	.62	0–25	1–24	−.24	.66

Attention Regulation	7	19.32	6.39	.72	0–35	3–30	−.51	−.28
Emotional Awareness	5	13.80	4.28	.67	0–25	5–22	−.41	−.82
Self-Regulation	4	11.46	4.14	.67	0–20	2–19	−.53	−.76
Body Listening	3	8.38	3.56	.90	0–15	3–14	.26	−1.03
Trusting	3	8.72	2.84	.83	0–15	3–15	−.37	.07

Note. MAIA-2 = Multidimensional Assessment of Interoceptive Awareness; *M* = Mean; *SD* = Standard Deviation; α = Cronbach's alpha; Skew. = Skewness; Kurt. = Kurtosis.

Table 3

Item-total Correlation of Multidimensional Assessment of Interoceptive Awareness for Patients with Polysubstance Use in the Pilot Study (N = 50)

Items	***r***	**Items**	***r***
1	0.36	20	0.39
2	0.43	21	0.40
3	0.43	22	0.59
4	0.49	23	0.30
5	0.35	24	0.70
6	0.37	25	0.38
7	0.35	26	0.48
8	0.30	27	0.58
9	0.31	28	0.45
10	0.32	29	0.34
11	0.32	30	0.46
12	0.53	31	0.58
13	0.31	32	0.58
14	0.28	33	0.64
15	0.30	34	0.46
16	0.39	35	0.51
17	0.34	36	0.32
18	0.51	37	0.56
19	0.44		

Main Study

Data were analysed for the main study sample of 300 patients. The Cronbach's alpha of the MAIA-2 total scale was .77. The alpha values of the subscales were .71 for Noticing, .73 for Not-Distracting, .57 for Not-Worrying, .75 for Attention Regulation, .62 for

Emotional Awareness, .56 for Self-Regulation, .67 for Body Listening and .55 for Trusting (Table 4). The values of skewness ranged from −.59 to .72 and the values of kurtosis ranged from −.43 to .81, which shows that the scores were well distributed.

Table 4

Descriptive Statistics and Alpha Reliability Coefficients of the MAIA-2 and its Subscales in the Main Study (N = 300)

Scale	Items (K)	*M*	*SD*	α	Potential	Actual	Skew.	Kurt.
MAIA-2 total scale	37	98.38	18.70	.77	0–185	52–143	−.31	−.25
Subscale Noticing	4	11.49	4.21	.71	0–20	0–20	−.56	.14
Subscale Not-Distracting	6	11.82	5.59	.73	0–30	1–30	.72	.47
Subscale Not-Worrying	5	12.28	4.57	.57	0–25	1–25	−.18	.69
Subscale Attention Regulation	7	20.03	6.49	.75	0–35	0–32	−.56	.11
Subscale Emotional Awareness	5	14.37	4.43	.62	0–25	0–25	−.51	.81
Subscale Self-Regulation	4	11.90	3.67	.56	0–20	2–19	−.59	−.43
Subscale Body Listening	3	8.00	3.32	.67	0–15	0–14	−.11	−.41
Subscale Trusting	3	8.31	3.20	.55	0–15	0–15	−.42	.20

Note. MAIA-2 = Multidimensional Assessment of Interoceptive Awareness; *M* = Mean; *SD* = Standard Deviation; α = Cronbach's alpha; Skew. = Skewness; Kurt. = Kurtosis.

Confirmatory Factor Analysis

Confirmatory factor analysis was used to test the factor structure of the Urdu MAIA-2, in which the 37 items load on their eight respective subscales and the eight subscales load on the overall MAIA-2 factor (Figure 1). The factor loadings of the items are presented in Table 6. The fit indices of the models are presented in Table 5.

The first measurement model (Model 1: 37 items with independent errors) did not provide a good fit to the data. In the second model (Model 2), the theoretically justifiable error terms were allowed to covary (see the error terms in Figure 1), and the fit of the model improved significantly. The change in chi-square was significant ($\Delta\chi^2$ (41) = 648.10, $p < .001$). The values of RMSEA (.07) and χ^2/df (2.72) were in the acceptable range.

Table 5

Confirmatory Factor Analysis with Factor Loading of Multidimensional Assessment of Interoceptive Awareness (MAIA-2)

Subscales	Items	Loading	Subscales	Items	Loading
Noticing	1	.716	Emotional Awareness	23	.687
	2	.830		24	.666
	3	.624		25	.576
	4	.695		26	.590
Not-Distracting	5	.550		27	.821
	6	.543	Self-Regulation	28	.542
	7	.608		29	.526
	8	.622		30	.608
	9	.610		31	.915
	10	.524	Body Listening	32	.676
Not-Worrying	11	.560		33	.510

	12	.581		34	.829
	13	.511	Trusting	35	.589
	14	.602		36	.778
	15	.876		37	.526
Attention Regulation	16	.831			
	17	.635			
	18	.531			
	19	.646			
	20	.577			
	21	.656			
	22	.569			

Table 6

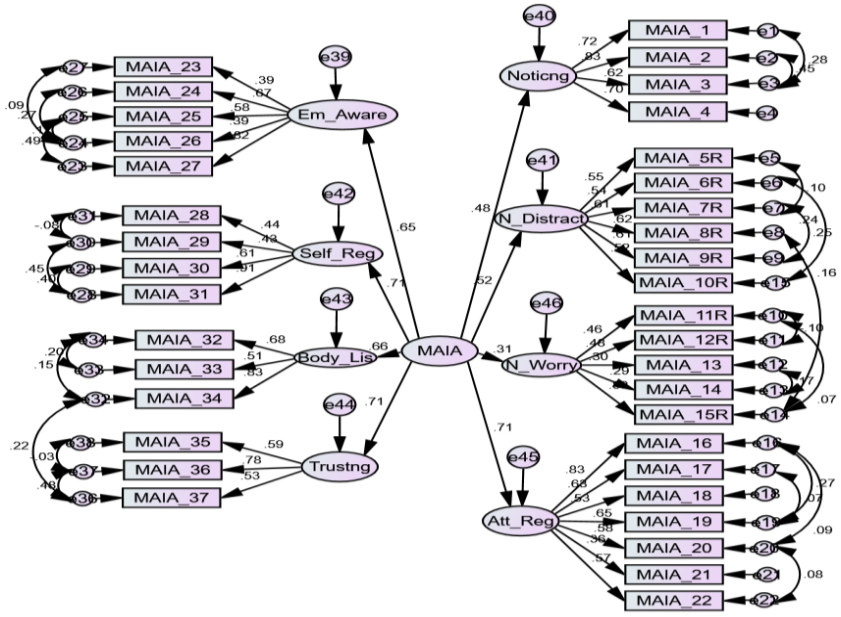
Model Fit Indices for Confirmatory Factor Analysis of Multidimensional Assessment of Interoceptive Awareness Scale for Patients with Polysubstance use (N=300)

			Fit Indices					Δχ2 (Δdf)
Model	**χ2 (df)**	**χ2/df**	**GFI**	**IFI**	**TLI**	**CFI**	**RMSEA**	
Model 1 (37 items, independent errors)								
	1998.3 (538)	3.71	.71	.63	.59	.63	.11	
Model 2 (37 items, error terms allowed to covary)								
	1350.2 (497)	2.72	.90	.88	.84	.89	.07	648.10*** (41)

Note. χ^2 = Chi-square, df = Degrees of Freedom, GFI = Goodness of Fit Index, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, IFI = Incremental Fit Index, RMSEA = Root Mean Square Error of Approximation.

*** $p < .001$*

Figure 1: Confirmatory Factor Analysis for the Model Fit Structure of Multidimensional Assessment of Interoceptive Awareness Scale (MAIA-2) Among Patients with Polysubstance Use



Construct Validity

The construct validity of the Urdu MAIA-2 examined through its relationship with the other study variables (Table 8). The MAIA-2 total score had a significant negative relationship with psychological distress (r = −.36), depression (r = −.29), anxiety (r = −.26) and stress (r = −.23), with suicidal ideation (r = −.43), with alexithymia (r = −.43) and with emotion dysregulation (r = −.45). It has a significant positive relationship with perceived social support (r = .52). All the correlations were significant at the $p < .01$ level.

Table 8

Relationship of the Multidimensional Assessment of Interoceptive Awareness Scale (MAIA-2) with the Study Variables Among Patients with Polysubstance Use (N = 300)

Study variable	Correlation with MAIA-2 total score (*r*)
Psychological distress (DASS-21 total)	−.36**
Depression	−.29**
Anxiety	−.26**
Stress	−.23**
Suicidal ideation (SS-SIIA)	−.43**
Alexithymia (TAS-20)	−.43**
Emotion dysregulation (DERS-18)	−.45**
Perceived social support (MSPSS)	.52**

Note. **$p < .01$.

Discussion

The present study translated the MAIA-2 into Urdu and evaluated its psychometric properties among patients with polysubstance use. There was no Urdu version of the scale available, and therefore a standard forward-backward translation procedure, expert review and a tryout on patients were used so that the Urdu items are linguistically clear, culturally appropriate and equivalent in meaning to the original scale. This is important because a pilot phase and a translation procedure before the main study help to identify and address problems at a lower cost (Connelly, 2008; Hertzog, 2008).

The internal consistency of the MAIA-2 total scale was adequate in the pilot study (α = .82) and in the main study (α = .77), which is within the range reported when the scale was originally validated (α = .66 to .87; Mehling et al., 2012). The item-total correlations in the pilot study ranged from .25 to .70, which shows that all items contributed to the scale. The alpha values of the subscales ranged from acceptable to excellent in the pilot study. In the main study, a few subscales, i.e., Not-Worrying (α = .57), Self-Regulation (α = .56) and Trusting (α = .55), showed lower internal consistency, and Emotional Awareness was also relatively low (α = .62). This could be related to the small number of items in these subscales (three to five items). Therefore, the scores of these subscales should be interpreted carefully, and the total score and the other subscales showed satisfactory reliability.

The confirmatory factor analysis showed that the first model with independent errors did not fit well with the data. When the theoretically justifiable error terms were allowed to covary, the model fit improved significantly. The values of RMSEA (.07) and χ^2/df (2.72) were acceptable, and GFI (.90) was at the recommended level, while the values of CFI (.89), IFI (.88) and TLI (.84) were slightly below .90. This indicates a reasonable fit of the eight-facet structure of the MAIA-2 in this sample, and the revised measurement model was used in the further analyses of the study. As the model was modified, it needs to be replicated in an independent sample.

The relationships of the MAIA-2 with the other variables support the construct validity of the Urdu version. Interoceptive awareness was negatively related to alexithymia, emotion dysregulation, psychological distress and suicidal ideation, which is in line with the theoretical background and previous literature (Verdejo-García et al., 2012; Taylor & Bagby, 2021). It was positively related to

perceived social support, which is also in line with the literature on social support as a protective resource (Grove et al., 2022; Uthis et al., 2025). The magnitude of these correlations was low to moderate, which is expected, since these are related but different constructs.

Overall, the findings show that the Urdu MAIA-2 is a reliable and valid instrument for measuring interoceptive awareness among patients with polysubstance use, and it can be used in research and in clinical settings. It would help researchers and mental health professionals to assess interoceptive awareness in the Urdu language, which can ultimately help in planning psychologically informed rehabilitation programmes.

Limitations

The study used a convenience sampling technique and a cross-sectional design. The sample included only patients from male inpatient rehabilitation centres located in Islamabad and Rawalpindi, and patients from rural areas or other parts of Pakistan, or those who were not in rehabilitation, were not included. Therefore, the findings may not be generalizable to all polysubstance users, due to differences in culture and socioeconomic status from region to region. Data were collected using self-report questionnaires, which may have been influenced by social desirability and response bias. Additionally, the test-retest reliability of the scale was not assessed. Future studies should examine the factor structure of the scale using larger and more diverse samples, including the general population, and assess its test-retest reliability.

Conclusion

The Urdu version of the Multidimensional Assessment of Interoceptive Awareness Scale (MAIA-2) has acceptable psychometric properties among patients with polysubstance use. It has satisfactory overall reliability, a reasonable eight-facet factor structure and supported construct validity through its expected relationships with psychological distress, suicidal ideation, alexithymia, emotion dysregulation and perceived social support. It is a culturally appropriate measure that can be used in research and clinical settings with Urdu-speaking patients with polysubstance use.

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