Original Article

Psychometric Properties of the Persian Version of Millon Clinical Multiaxial Inventory-IV (MCMI-IV)

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Abstract

Objective: Millon Clinical Multiaxial Inventory (MCMI) is one of the most widely used clinical tools in research studies and clinical settings. MCMI was revised 4 times and its last version was published in 2015. All previous versions of MCMI have been translated to Persian and validated and have been frequently used by Iranian clinicians or researchers. Thus, this study provides the Persian version of the last version of this popular inventory for clinical or research purposes.
Method: The participants of this psychometric study were selected by combining purposeful and convenience sampling methods among inpatients and outpatients who referred to Roozbeh hospital from 2018 to 2019. After data screening by statistical methods and Validity Scales based on MCMI-IV profile, 400 participants' profiles were analyzed to estimate the psychometric properties of the Persian Version of MCMI-IV. MCMI-IV, the Structured Clinical Interview for DSM-5 (SCID-5), and the Brief Symptoms Inventory (BSI) were used for clinical data gathering. Content Validity Ratio (CVR), Correlational Coefficients, Kappa Agreement, Spearman Brown Coefficient, and Cronbach Alpha were performed for data analysis.
Results: According to the results of data analysis, the psychometric properties for MCMI-IV were estimated as follows: the content validity index (CVI, 0.29 to 0.99), criterion validity (0.13 to 0.40), convergent validity (-0.35 to 0.72), The Cronbach's alpha for the personality scales was 0.48 to 0.90, the Spearman-Brown coefficient was from 0.49 to 0.90, and test-retest reliability was from 0.51 to 0.86.
Conclusion: The psychometric properties of the Persian version of MCMI-IV, including validity and reliability indexes, are appropriate and in line with the findings of its original version.

Key words: *Millon Clinical Multiaxial Inventory (MCMI); Psychometric Properties; Personality Disorders; Reliability; Validity*

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Personality disorders (PDs) assessments have always been controversial; PDs are identified with chronic patterns of inner experiences and behaviors that are inflexible and associated with problems in interpersonal relationships and social dysfunction (1, 2). Over the years, much debate raised conceptualization, definition, and assessment of PDs (3). Theodore Millon took a valuable step in all 3 areas to define conceptualizing, and assessing PDs based on his personality evolutionary theory (4).

Millon's description of personality structure and psychopathology had an impact on subsequent definitions, classifications, assessment, and understanding of PDs (5). Millon explained normal and abnormal personality functioning to identify various types of personality disorders and style based on his theoretical framework. Millon's theory has 3 core components, each of which has 2 polarities as follows: (1) existence: pleasure-pain and adaptation; passive-active: replication and self-other.

An individual is in a continuum of each polar (4).

He created many psychological instruments based on his theory, and the most popular and the most widely used of which is the Millon Clinical Multiaxial Inventory (MCMI). MCMI (With the original MISRI [Millon Illinois Self-Report Inventory]) was created around 1972 with 150 items. MCMI assessed personality styles and not just personality disorders. The MCMI was revised and published as an MCMI-II after publishing the DSM-III. MCMI was never intended to be a measure of DSM-III, but it was modified in the latter phases (6). Thereafter, the next versions of MCMI were introduced as clinical instruments and in agreement with DSM (7-10). MCMI-II was replaced with MCMI-III and included a major revision based on face validity following the release of DSM-IV (5), there are the same titles for PDs and even Axis 1 disorders in MCMI and DSM (11). DSM-5 was released in 2013 and then MCMI-IV was produced. Theodor Millon died on January 29, 2014, and MCMI-IV was published in close consultation with Millon's family and Pearson assessments in 2015 (5).

MCMI is a well-known, popular, and widely used instrument and has become an important and commonly used assessment instrument by clinical psychologists. There is a substantial literature base associated with the MCMI, with a large number of published articles and numerous books appearing since the test's introduction in 1977 (3, 12, 13). MCMI has a notable contribution to research and clinical purposes (11). Previous versions of MCMI have been translated and validated in Persian (14-17). MCMI is popular for many reasons: it is up to date, it is in line with DSM modifications, it is shorter than other similar instruments and provide more information, and it measures personality disorders and most of the disorders of Axis 1 (18). The growing number of researches that use MCMI demonstrates that this inventory is a benefit to assess the clinical pattern of personality and severe personality disorders. The last version of this popular tool, MCMI-IV, with major modifications, particularly the addition of a new personality scale, was published in English and Spanish. To apply this inventory in Persian, it is important to prepare, translate, and validate the appropriate version of MCMI-IV. The present study aims to provide a Persian version of MCMI-IV and report its validation.

Materials and Methods

Participants
The participants of the present study were selected from eligible adults who had referred to Roozbeh psychiatric hospital with 1 or more psychiatric complaints. The minimum sample required to estimate the validity and reliability indices by the classical test theory is 250 to 500, so the sample consisted of 400 participants (plus 10% more to prevent the effect of the dropouts), selected from outpatients or inpatients of the hospital by the combination of purposeful and convenience sampling methods. Inclusion criteria were speaking Persian, age over 18 years, and at least 6-grade literacy level. Exclusion criteria were having any kind of severe illness, communication or cognitive problems that made it difficult to understand the meaning of the questions and participate in the research study. The demographic information of this study is presented in Table 1. After data pool screening to find unexpected responses or identifying invalid profiles based on validity indexes (Modifying Indices, an Inconsistency scale, and a Validity scale) of the MCMI-IV profile, finally 400 valid profiles were left for analysis.

Table 1. Distribution of Demographic Characteristics in the Participants of the study to validate MCMI-IV

Variables	Categorized	N (%)/Mean (SD)
Age		30.96(9.23)
Gender	Male	126(31.5)
	Female	274(68.5)
Education	0-12 years of school	56(14.5)
	Diploma or equivalent	89(23.1)
	Associate degree	39(10.1)
	Bachelor's or more	202(52.3)
	Missing	14
Ethnic	Pars	221(65.0)
	Turk	74(21.8)
	Kurd	12(3.5)
	Lor	22(6.5)
	Other	11(3.2)
	Missing	60
	Total	400

Instruments

MCMI-IV: The Millon Clinical Multiaxial Inventory-IV (MCMI-IV) was completed and published in 2015 based on Millon's personality theory. It includes 195 items with true or false answers. This self-report instrument helps clinicians to identify personality pathology and psychopathy assessment in adults aged 18 years or older who are undergoing psychological and psychiatric assessments or treatment. The MCMI-IV provides valuable clinical information by 25 scales. These scales include 15 personality pathology scales, 10 clinical syndrome scales, and 3 modifying indices, an inconsistency scale, and a validity scale. The 12 clinical personality patterns scales are Schizoid, Avoidant, Melancholic, Dependent, Histrionic, Turbulent (NEW Scales in MCMI-IV), Narcissistic, Antisocial, Sadistic, Compulsive, Negativistic, and Masochistic. Also, the 3 severe personality pathology scales are Schizotypal, Borderline, and Paranoid. The 7 clinical syndrome scales are Anxiety, Somatoform, Bipolar Spectrum, Persistent Depression, Alcohol Dependence, Drug Dependence, and Posttraumatic Stress Disorder. The 3 severe clinical syndrome scales are Schizophrenic Spectrum, Major Depression, and Delusional Disorder. MCMI-IV provides clinical insights based on theory and empirical data. Each diagnosis is interpreted according to variation personality dimensions. The theoretical foundations and comprehensive picture of Axis 1 and 2 of psychiatric disorders provide a better understanding of patient's problems. The new scale (4B: Turbulent scale) on the MCMI-IV provides a deeper understanding of abnormal personality traits of the patient, such as a lost sense of reality or unwavering optimism. Most of patients can complete the MCMI-IV in less than 30 minutes. The base rate (BR) score was introduced by Theodor Millon to the MCMI instead of the T or other standard scores to identify pathological cases, BR scores of 85 or greater on the personality scales are said to be diagnostic (10).

SCID-5: The Structured Clinical Interview for DSM-5 (SCID-5) was administered by psychiatrists or clinical psychologists to make a main diagnostic in axis I or axis 2 disorders (19). The Persian version of SCID-5 has been prepared across a psychometric accuracy study with appropriate validity indicators (20). The information from this interview was used for 2 purposes: First, as a criterion to enter the research as a participant; Second, to check MCMI-IV criteria validity in related scales .

BSI: The Brief Symptoms Inventory was developed from its longer parent instrument, the SCL-90-R. Psychometric evaluation reveals it to be an acceptable short alternative to the complete scale. Test-retest and internal consistency reliabilities are shown to be good indexes. High convergence between BSI scale and similar dimensions on MMPI confirms inventory validity. Dimensions measured by this tool are as follow: somatization (SOM), obsessive-compulsive (O-C), interpersonal sensitivity(I-S), depression (DEP), anxiety (ANX), hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR), and psychoticism (21). The Persian version of BSI (22) was used to estimate the convergent validity of MCMI-IV clinical scales .

Procedure: To prepare the Persian version of MCMI-IV, the inventory and manual were translated into Persian. The Persian version of MCMI-IV was translated back into English, and in cases where the translation was not comprehendible, the most appropriate words that could reflect the purpose of the item were selected in the focus group sessions by psychiatrists and clinical psychologists. To determine the accuracy of the Persian version of MCMI-IV, it was compared with the original version of MCMI-IV item by item by 4 clinical psychologists, 2 psychiatrists, and 1 psychometrist. There was a good match between the Persian and English versions as well as the English back-translated version. The translators remained faithful to the content and meaning of the items of the main version of MCMI-IV; however, it is no exact Farsi words for some English terms and words. The team of specialists were very careful to find the most appropriate words; the content of item number of 160 was changed for geographical reasons and not language limitations. The original version of MCMI-IV: "I flew across the Atlantic 30 times last year." This was replaced by the Persian version: "I flew across the Persian Gulf 30 times last year." After several focus group sessions, the Persian version of MCMI-IV was approved as a fitting and qualified version of MCM-IV in Persian. Those inpatients and outpatients who met the inclusion criteria were invited to participate in the study from 2018-2019. After consenting to participate in the project, patients completed the demographic form. In the next step, participants were interviewed by the clinical psychologist or psychiatrist to record their mental health disorders according to SCID-5. In the final step, they filled the Persian version of MCMI-IV and BSI. Finally, data screening was done to explore invalid or unexpected data. Invalid data were detected by validity criteria for MCMI-IV profile (Modifying Indices, an Inconsistency scale, and a Validity Scale). Also, 6 participants were excluded due to outside responses and 34 due to invalid profiles. All of the psychometric analyses were done on 400 participants. Only 40 patients who responded to MCMI-IV completed the test for the second time after 4 weeks; these data were used to estimate the test-retest reliability .

Statistical Analysis: Descriptive statistics were performed to draw up demographic characteristics of sample study and also to provide a brief status of this sample in each scale. Content validity ratio, Kappa agreement coefficient, and Pearson correlation coefficient were performed to estimate validity indexes, Cronbach alpha, and Spearman-Brown coefficient. Pearson correlation coefficient was performed to estimate reliability indexes. Version 21 of Statistical

Package for Social Science (SPSS-21) was used for data analysis.

Results

The results are presented in 3 sections: 1. Demographic characteristics and descriptive statistics for MCMI-IV's scales, 2. reliability results for each scale by Cronbach's alpha, Spearman-Brown coefficient, and test-retest correlation, and 3. validity indexes by content validity index, criteria validity, and construct validity .

Demographic characteristics: Table 1 shows the demographic characteristics of the validation sample. According to these categorical variables, the most frequent sample in terms of age groups are 26 to 35 years (43.8%), in terms of the gender is female (68.5%), in terms of education bachelor's degree or higher (52.3%), and in terms of ethnicity Pars (65%). More information was presented for other levels of the variables in Table 1.

Descriptive Statistics: Table 2 shows the descriptive statistics (Mean and SD) for each scale of MCMI-IV by gender. The highest mean score was observed on the scale of narcissistic personality disorder for men (mean, 73.59; SD, 17.34) and in generalized anxiety disorder for women (mean, 71.39; SD: 29.19). The lowest mean score was observed on the scale of somatic symptoms for men (mean: 49.67; SD, 32.01) and in alcohol use for women (mean: 42.53; SD, 32.53). Other descriptive statistics were presented in Table 2 for each scale by gender groups .

Validity Indexes

Content Validity Index (CVI): CVI for each scale of MCMI-IV was evaluated by 7 specialists. The CVI of MCMI-IV scales were evaluated according to DSM-5 (0.14 to 0.99), Millon's personality theory (0.71 to 0.99), and also from clinical (0.14 to 0.99) (Table 3).

Criterion Validity: The criterion validity of the MCMI-IV was evaluated by concurrent validity that indicated an association between MCMI-IV diagnoses and the psychiatrists' or clinical psychologists' diagnoses. According to Kappa agreement, the results in the coefficient between the 2 diagnostic methods ranged from 0.13 to 0.40.

Construct Validity: The validity of MCMI-IV was assessed by convergent validity as a type of construct validity. To estimate convergent validity, the correlation coefficient between MCMI-IV scores and BSI scores was calculated (Table 4). Table 3 shows correlations for each scale of MCM-IV; each dimension of BSI ranged as a follow: Schizoid PD (0.25 to 0.60), Avoidant PD (0.31 to 0.70), Melancholic PD (0.47 to 0.70), Dependent PD (0.26 to 0.47), Histrionic PD (-0.35 to 0.002), Turbulent PD (-0.24 to -0.02), Narcissistic PD (0.003 to 0.35), Antisocial PD (0.11 to 0.38), Sadistic PD (0.25 to 0.54), Compulsive PD (-0.08 to 0.24), Negativistic PD (0.34 to 0.61), Masochistic PD (0.29 to 0.66), Schizotypal PD (0.28 to 0.48), Borderline PD (0.38 to 0.60), Paranoid PD (0.36 to 0.58), Anxiety (0.36 to 0.63), Somatoform (0.41 to 0.60), Bipolar Spectrum (-0.05 to 0.22), Persistent Depression (0.53 to 0.72), Alcohol Dependence (0.18 to 0.54), Drug Dependence (0.11 to 0.28), Posttraumatic Stress Disorder (0.41 to 0.66), Schizophrenic Spectrum (0.34 to 0.57), Major Depression (0.49 to 0.70), and Delusional Disorder (0.07 to 0.34) .

Reliability Indexes

Internal Consistency Results: The internal consistency for each scale of MCMI-IV tells us whether all items measure the same construct. The Cronbach's alpha was used for internal consistency estimation. As mentioned in Table 3, Cronbach's alpha ranged from 0.60 to 0.88 for clinical personality patterns, 0.73 to 0.86 for severe personality pathology, 0.48 to 0.89 for clinical syndromes, and 0.80 to 0.90 for severe clinical syndrome. (Table 5).

Split-Half Results: Two halves of each scales were used as alternate forms. It is an accessible solution in lack of parallel-forms method faces. The Spearman-Brown Coefficient was used to calculate the reliability index based on 2 halve of data for each scale. As presented in Table 3, Spearman-Brown Coefficient ranged from 0.61 to 0.89 for clinical personality patterns, 0.74 to 0.86 for severe personality pathology, 0.49 to 0.99 for clinical syndromes, and 0.81 to 0.90 for severe clinical syndromes (Table 5).

Test-Retest Reliability Results: MCMI-IV repeatability was assessed by agreement between 4-week gap implementation. Pearson correlation coefficient was performed to investigate test-retest reliability. As mentioned in Table 3, the range of this reliability index is 0.65 to 0.86 for clinical personality patterns, 0.63 to 0.82 for severe personality pathology, 0.51 to 0.82 for clinical syndromes, and 0.62 to 0.78 for severe clinical syndromes (Table 5).

Table 2. Mean and SD of Based Rate Score in Scales of MCMI-IV for Both Genders

MCMI-IV scales	Male		Female	
	Mean	Std. Deviation	Mean	Std. Deviation
Clinical Personality Patterns				
Schizoid	56.95	22.55	56.82	21.11
Avoidant	58.40	29.23	58.92	26.60
Melancholic	64.26	26.34	67.09	27.81

Dependent	55.82	28.77	57.76	27.23
Histrionic	57.10	21.59	58.37	20.26
Turbulent	58.75	22.53	59.51	21.66
Narcissistic	73.59	17.34	70.51	20.59
Antisocial	64.98	21.75	59.67	20.88
Sadistic	67.78	16.92	67.89	15.91
Compulsive	54.48	16.93	57.28	15.88
Negativistic	67.11	20.42	66.71	19.83
Masochistic	61.14	25.09	61.42	22.23
Sever personality Pathology				
Schizotypal	62.62	23.31	62.23	20.87
Borderline	64.17	27.57	66.26	25.68
Paranoid	63.70	22.49	63.37	20.59
Clinical Syndromes				
Generalized Anxiety	70.88	30.08	71.39	29.19
Somatic symptom	49.67	32.01	52.93	29.04
Bipolar spectrum	58.71	26.20	57.69	25.20
Persistent Depression	57.64	29.17	60.31	28.57
Alcohol Use	49.68	33.38	42.53	32.53
Drug Use	61.38	23.98	52.15	27.19
Post-Traumatic Stress	57.67	29.79	62.45	28.82
Severe clinical syndromes				
Schizophrenic Spectrum	59.82	22.31	59.87	19.55
Major Depression	60.76	36.60	64.93	33.31
Delusional	59.71	25.73	62.24	21.27

Table 3. Content Validity Index for Personality Scales of MCMI-IV

MCMI-IV scales	Content Validity Index		
	According to DSM-5	According to Millon's theory	From a clinical perspective
Clinical Personality Patterns			
Schizoid	0.99	0.99	0.86
Avoidant	0.86	0.99	0.86
Melancholic		0.99	0.86
Dependent	0.99	0.99	0.99
Histrionic	0.14	0.84	0.14
Turbulent		0.71	0.43
Narcissistic	0.71	0.99	0.57
Antisocial	0.99	0.99	0.99
Sadistic		0.99	0.86
Compulsive	0.86	0.99	0.86
Negativistic		0.99	0.99
Masochistic		0.86	0.57
Sever personality Pathology			
Schizotypal	0.86	0.99	0.71
Borderline	0.71	0.99	0.71
Paranoid	0.99	0.99	0.86

Table 4. Correlations between the MCMI-IV Scales and the Brief Symptom Inventory

MCMI-IV scales	Brief Symptom Inventory									
	SOM	O-C	I-S	DEP	ANX	HOS	PHOB	PAR	PSY	GSI
Clinical Personality Patterns										
Schizoid	0.39*	0.52**	0.51**	0.48**	0.45**	0.46**	0.42**	0.39*	0.59**	0.23
Avoidant	0.45**	0.69**	0.60**	0.51**	0.45**	0.39*	0.52**	0.44**	0.68**	0.31
Melancholic	0.60**	0.70**	0.57**	0.62**	0.60**	0.54**	0.55**	0.54**	0.63**	0.47**
Dependent	0.36*	0.47**	0.43**	0.32	0.46**	0.43**	0.33*	0.44**	0.29	0.26
Histrionic	-0.16	-0.24	-0.40*	-0.28	-0.10	0.01	-0.33*	-0.14	-0.35*	-0.18
Turbulent	-0.16	-0.22	-0.34*	-0.31	-0.09	-0.02	-0.28	-0.06	-0.12	-0.07
Narcissistic	0.21	0.35*	0.19	0.05	0.23	0.35*	0.27	0.16	0.23	0.01
Antisocial	0.27	0.38*	0.24	0.22	0.13	0.29	0.14	0.21	0.11	0.27
Sadistic	0.26	0.25	0.45**	0.25	0.37*	0.54**	0.33*	0.46**	0.37*	0.32*
Compulsive	0.04	-0.07	0.05	0.08	0.22	0.21	0.03	0.30	0.23	0.09
Negativistic	0.42**	0.63**	0.55**	0.53**	0.54**	0.58**	0.42**	0.60**	0.56**	0.34*
Masochistic	0.46**	0.66**	0.52**	0.51**	0.44**	0.44**	0.44**	0.43**	0.47**	0.29
Sever Personality Pathology										
Schizotypal	0.450**	0.58**	0.41*	0.35*	0.46**	0.46**	0.45**	0.33*	0.46**	0.28
Borderline	0.51**	0.60**	0.48**	0.39*	0.48**	0.52**	0.38*	0.38*	0.46**	0.39*
Paranoid	0.36*	0.37*	0.48**	0.47**	0.45**	0.53**	0.50**	0.58**	0.57**	0.47**
Clinical Syndrome0s										
Generalized Anxiety	0.40*	0.63**	0.48**	0.40*	0.49**	0.49**	0.45**	0.46**	0.42**	0.36*
Somatic symptom	0.56**	0.60**	0.55**	0.58**	0.46**	0.41*	0.51**	0.43**	0.49**	0.58**
Bipolar spectrum	0.08	0.22	-0.05	-0.08	0.08	0.12	0.03	0.04	-0.04	-0.13
Persistent Depression	0.64**	0.72**	0.65**	0.69**	0.64**	0.62**	0.60**	0.57**	0.67**	0.53**
Alcohol Use	0.49**	0.54**	0.38*	0.41*	0.34*	0.26	0.22	0.18	0.24	0.33*
Drug Use	0.11	0.13	0.19	0.17	0.12	0.28	0.11	0.26	0.11	0.28
Post-Traumatic Stress	0.46**	0.52**	0.42**	0.60**	0.57**	0.57**	0.58**	0.58**	0.66**	0.51**
Severe Clinical Syndromes										
Schizophrenic Spectrum	0.47**	0.57**	0.44**	0.41*	0.40*	0.56**	0.42**	0.44**	0.55**	0.34*
Major Depression	0.60**	0.64**	0.63**	0.69**	0.59**	0.60**	0.51**	0.49**	0.67**	0.59**
Delusional	0.07	0.13	0.31	0.07	0.27	0.41*	0.29	0.29	0.34*	0.19

Table 5. Reliability Indexes of the MCMI-IV Scales

MCMI-IV scales	Cronbach's Alpha	Spearman Brown Coefficient	Test retest index
Clinical Personality Patterns	N=400	N=400	N=40
Schizoid	0.73	0.73	0.71
Avoidant	0.84	0.86	0.81
Melancholic	0.88	0.89	0.82
Dependent	0.77	0.74	0.73
Histrionic	0.72	0.77	0.67
Turbulent	0.82	0.83	0.73
Narcissistic	0.71	0.65	0.85
Antisocial	0.66	0.66	0.65

Sadistic	0.73	0.70	0.72
Compulsive	0.60	0.61	0.74
Negativistic	0.80	0.80	0.86
Masochistic	0.83	0.83	0.81
Sever personality Pathology			
Schizotypal	0.73	0.75	0.74
Borderline	0.86	0.86	0.82
Paranoid	0.77	0.74	0.63
Clinical Syndromes			
Generalized Anxiety	0.74	0.75	0.75
Somatic symptom	0.78	0.80	0.81
Bipolar spectrum	0.70	0.70	0.65
Persistent Depression	0.89	0.89	0.82
Alcohol Use	0.48	0.49	0.51
Drug Use	0.76	0.75	0.82
Post-Traumatic Stress	0.84	0.85	0.81
Severe clinical syndromes			
Schizophrenic Spectrum	0.83	0.82	0.62
Major Depression	0.90	0.90	0.78
Delusional	0.80	0.81	0.76

Discussion

MCMI-IV was designed to measures the pathology of personality and provide information for other Axis 1 psychopathologies. Psychologists usually prefer to have an integrated picture of psychiatric disorders for patients that is related to their personality disorders. MCMI-IV can bridge this gap. As a result, the psychometric properties of the Persian version of MCMI-IV is in line with that of the original version. The results showed that CVI are not satisfactory for some scales from the clinical perspective and also DSM-5 criteria. MCMI has been constructed based on Millon theory and not DSM (10) (11). Further, the highest values of CVI was obtained when content was evaluated based on Millon's theory. However, it is similar to previous findings (12, 23), as many scales are consistent with DSM.

Kappa agreement ranged from 0.19 to 0.40 as an index of criterion validity. Criterion validity will be accepted if it is more than 0.30 (24). Many scales of MCMI-IV captured this critical value. These results indicate a relative improvement of MCMI-IV rather than previous versions (25). (6, 10). However, assessing personality disorders has always been associated with difficulties (26, 27). Clinicians often ignore the diagnosis of personality disorders (28).

The high correlation between scales of MCMI-IV's scores and BSI component scores confirm the convergent validity of MCMI-IV. Convergent validity was illustrated by Campbell and Fisk in 1959 (29). These results are in line with a study on the original version of MCMI-IV (10), McCann and Dyer study on MCMI-III scales (30), and other studies (31, 32).

Cronbach's alpha for MCMI-IV scales ranged from 0.48 to 0.90; 3 scales received less than 0.60 of the alpha coefficient; alpha coefficient was acceptable and high for 22 scales of MCMI-IV, so the internal consistency of the Persian version of MCMI-IV is satisfying overall. The alpha value is usually related to the homogeneity of items in measuring a single construct (33). The coefficients of the 2 halves of the MCMI_IV scales transformed to coefficients of Spearman-Brown. These coefficients ranged from 0.49 to 0.90 and showed good reliability for 22 scales of MCMI-IV. Under the assumption of a tau-equivalent pair of the 2 halves, the scale's variance was explained by the common factor and thus $= 1 + r\, y1y2/2$ (34). The test-retest correlation coefficient was performed as a test-retest reliability coefficient (35). The test-retest coefficient for MCMI-IV scales ranged from 0.51 to 0.86. The reliability of a test reveals the effect of measurement error on the observed score (33). Three scales of MCMI-IV did not show acceptable reliability. The MCMI-IV measures psychiatric disorders with 4 fundamental pathological factors (12, 13, 36), and this instability may be related to the consequences of treatment for some scales or instability of the psychological state of patients. Similar tools to PDs assessment also showed a reliability coefficient between 0.65 to 0.87 and the overall reliability of .76, and the correlation with SCID-II was between 0.34 to 0.72 and the overall correlation was 0.51(37).

MCMI-IV considers 6 aspects to establish construct validity: Content, which is the relevant item for purpose of test; substantive, which is referred to the theoretical

foundation to explain components of the test; structural, which is instruction for the scoring of each component; and generalizability, which generalizes the interpretation of scores to a group; external, which is a study with relevant criterion. MCMI-IV covers these aspects and we rarely have access to such instruments in clinical psychology or psychiatry. In addition, the appropriate reliability coefficient adds to MCMI-IV value.

Limitation

The purpose of this study was to prepare and validate the Persian version of the MCMI-IV. Perhaps one of the most important limitations in this study is that the diagnostic validity index for each personality disorder was not investigated. The authors tried to extract the Kappa agreement as an indicator of criterion validity. However, the scope of the study did not let us go beyond the estimation psychometrics properties for the Persian version of MCMI-IV; on the other hand, the range of kappa agreement for scales of MCMI-IV encourages the authors to perform a thorough analysis including Sensitivity, Specificity, Positive and Negative Predictive Values for each scale of MCMI-IV to investigate the diagnostic validity of this inventory in an independent study. We also suggest conducting studies using MCMI-IV to define studies in which personality disorders are diagnosed by a psychiatrist or clinical psychologist. Such diagnoses can be compared with MCMI-IV diagnoses to extract the diagnostic validity index .

The results of CVI also showed some discrepancies between MCMI-IV and DSM-5. The authors intend to compare the underlying factor structure of the MCMI-IV with the dynamic structure of DSM-5 in a separate study. This aim also was beyond the scope of the current study. We believe Theodore Millon, as an expert who has studied PDs for many years, has developed a valuable inventory that should be investigated and studied more carefully. Further studies will allow us to make an unbiased, comprehensive, and fair judgment about MCMI-IV.

Conclusion

The Persian version of MCMI-IV has appropriate psychometric properties. Also, the reliability and validity indexes of the Persian version of MCMI-IV were confirmed by the indicators of the original version of MCMI-IV. Therefore, the translated version of MCMI-IV can be used with confidence in clinical settings and for research purposes.

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Conflict of Interest

None.

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