

Construction and Normalization of Competency Evaluative Indicators based on the Screening of Psychological and Personality Fundamental Scales with the Third Edition of Minnesota Multiphasic Personality Inventory (MMPI-3)

Behrooz Naghsh¹, Mohammad Eskandari²

1. Ph.D. in Psychology, Psychopathologist, Keysun-Co, Tehran, Iran

2. Ph.D. Candidate in Psychology, Psychometrist, Keysun-Co, Tehran, Iran

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ABSTRACT

This research aimed to construct, validate and normalize a measuring scale of competency evaluative indicators based on the screening of psychological and personality fundamental scales with the Third Edition of Minnesota Multiphasic Personality Inventory (MMPI-3). Present study aimed that competency indicators can be measured with a validate instrument named MMPI-3. We assessed the validity of this new measure applied to 3000 participating from Iran. We obtained evidence for (a) content validity (through item analysis), (b) internal structure with Mokken Scaling Analysis and structural equation modeling to examine the item–construct relationship, differential item functioning, and reliability, and (c) association with external variables. The items were found to function one-dimensionally, with strong item–construct relationships and no differential functioning. Theoretically consistent associations were found between scales of MMPI-3 and constructed Indicators by researchers. The findings of the present study shown that (a) we can assess competency indicators as second layer of MMPI-3 profile, (b) there's a strong correlation among competency indicators and MMPI-3 scales as reverse layer and (c) constructed indicators by researchers are validate and reliable to assess competency indicators for evaluating and screening psychological and personality features.

1. Introduction

The MMPI-3, or Minnesota Multiphasic Personality Inventory-3, is a psychological assessment tool used to evaluate personality traits, mental health conditions, and psychopathology in individuals. It contains updated and revised items compared to previous versions and aims to provide clinicians with valuable insights into a person's psychological functioning. The MMPI-3 was released in 2020 to replace the MMPI-2. It is often used in clinical settings, forensic evaluations, and research studies to assist in diagnosis, treatment planning, and risk assessment (Naghsh, 2021). The MMPI-3 includes a set of scales that are used to assess various aspects of an individual's personality and mental health. These scales help clinicians understand different dimensions of a person's psychological functioning. Some of the prominent scales in the MMPI-3 include:

1. **Validity Scales:** These scales assess the respondent's test-taking attitude, including their willingness to respond honestly and consistently. Examples include the FBS (Symptom Validity), VRIN (Variable Response Inconsistency), and TRIN (True Response Inconsistency) scales.
2. **Clinical Scales:** These scales measure different psychopathological traits and symptoms
3. **Restructured Clinical (RC) Scales:** These scales are based on a restructured version of the clinical scales to provide more nuanced and specific information about an individual's psychological functioning. Examples include RCd (Demoralization), RC1 (Somatic Complaints), and RC6 (Ideas of Persecution).
4. **Deeper Level Scales:** These scales assess additional aspects of a person's personality and behavior, such as the Personality Psychopathology Five (PSY-5) scales, which measure more fundamental dimensions of personality.

These scales, along with others in the MMPI-3, help clinicians in interpreting the test results and gaining a comprehensive understanding of an individual's psychological profile (Tellegen & Ben-Porath, 2020).

The MMPI-3 is a widely used psychological assessment tool that has been translated into multiple languages and adapted for use in different countries around the world. The process of normalization involves establishing the reliability and validity of the test for specific populations to ensure that the results are meaningful and culturally relevant. Researchers and clinicians in various countries have conducted studies to validate the MMPI-3 for use in their specific cultural contexts. This process may involve translating the test items, conducting normative studies with local populations, and adjusting score interpretations as needed. While the MMPI-3 is most commonly used in the United States, efforts have been made to validate and normalize the test for use in other countries, including Canada, the UK, Australia, and various European and Asian countries. These international adaptations help ensure that the MMPI-3 remains a valuable tool for assessing personality traits, mental health conditions, and psychopathology across different cultures and languages (Front & King, 2020).

The standardization process of the MMPI-3 involves establishing norms and psychometric properties for the test to ensure its reliability and validity. This process is crucial in order to interpret the test results accurately and meaningfully. Standardization typically involves administering the MMPI-3 to a large, diverse sample of individuals to establish normative data. This data is used to determine how different groups of individuals typically score on the test, allowing for comparison of an individual's scores to the broader population. During standardization, researchers also assess the internal consistency, reliability, and validity of the test items and scales. This helps ensure that the MMPI-3 is measuring what it intends to measure and that the results are consistent and reliable over time. The standardization process for the MMPI-3 was conducted using a large and diverse sample of individuals in the United States to establish normative data and validate the test's psychometric properties. This standardization data serves as a reference point for interpreting scores and making clinical judgments based on the results of the MMPI-3 (Friedman & Nicholas, 2021).

Normalization in psychological inventories and tests is essential for several reasons: First, cultural relevance; Different cultural groups may have varying norms, values, and behaviors that can influence how individuals respond to assessment items. Normalization ensures that the test is culturally sensitive and applicable to the specific population being assessed. Second, validity and reliability; Normalization helps establish the validity and reliability of a psychological test by providing reference points for interpreting test scores. Without normalization, it can be challenging to determine whether the test results accurately reflect the construct being measured. Third, interpretation of results; Normalization allows clinicians and researchers to compare an individual's test scores to a normative sample, providing insights into how the individual's scores compare to the broader population. This information is crucial for making accurate interpretations and clinical judgments based on the test results. Fourth; ethical considerations: Normalization helps ensure fairness and equity in assessment practices by providing a standardized approach to evaluating individuals. It reduces the risk of bias and discrimination in testing procedures by establishing consistent procedures for interpreting test scores. And Fifth, cross-cultural validity; In today's globalized world, psychological tests are often used in diverse cultural contexts. Normalization helps establish the cross-cultural validity of a test by adapting it for use with different populations and ensuring that the test results are meaningful across cultural boundaries. Overall, normalization in psychological inventories and tests is necessary to ensure that assessments are clinically useful, valid, and culturally appropriate. It enhances the accuracy and utility of test results, leading to better-informed decisions in clinical practice, research, and other settings where psychological assessment is used (Kremyar & Lee, 2022). So there may be a question that what is the importance of normalizing MMPI-3? Normalizing the MMPI-3 is important for several reasons:

1. **Validity:** Normalization helps establish the validity of the MMPI-3 by providing reference points for interpreting test scores. By comparing an individual's scores to a normative sample, clinicians can determine if the results accurately reflect the constructs being measured.
2. **Reliability:** Normalization ensures the reliability of the MMPI-3 by establishing consistent procedures for administering and scoring the test. This helps reduce errors and variability in test results, making the assessment

more dependable.

3. **Comparability:** Normalization allows for the comparison of individual test scores to a standardized reference group. This comparative analysis provides valuable insights into an individual's psychological functioning and allows clinicians to make informed decisions based on these comparisons.

4. **Clinical Use:** Normalization helps clinicians interpret MMPI-3 scores in a meaningful way. By establishing norms and benchmarks, clinicians can assess the severity of symptoms, identify patterns of behavior, and make appropriate treatment recommendations based on the test results.

5. **Cultural Sensitivity:** Normalization can also help ensure that the MMPI-3 is culturally sensitive and applicable across different populations. Adapting the test for specific cultural contexts can improve its relevance and accuracy when used with diverse groups. In summary, normalizing the MMPI-3 is essential for establishing the validity, reliability, and clinical utility of the test. It provides a standardized framework for interpreting test results, making informed clinical decisions, and ensuring that the assessment is culturally appropriate and relevant for diverse populations (Naghsh, 2021).

Standardization of a test refers to the process of establishing consistent and uniform testing procedures to ensure that all test-takers are assessed under the same conditions. This is crucial in order to guarantee the reliability and validity of the test results. Below are the key steps involved in standardizing a test:

1. **Test Construction:** Develop the test items or questions that will be used to assess the intended skills or knowledge. These items should be carefully written to ensure clarity and relevance to the content being tested.

2. **Pilot Testing:** Administer the test to a small sample of individuals who are representative of the target population. This step helps to identify any issues with the test items, such as ambiguity or difficulty level.

3. **Item Analysis:** Evaluate the performance of each test item based on statistical analysis of how test-takers responded to them. This helps to identify items that are not functioning well and may need to be revised or removed.

4. **Scoring Procedures:** Define clear guidelines for scoring the test responses. This includes specifying the correct answer for each item, as well as any partial credit or scoring rubrics that may apply.

5. **Administration Protocol:** Develop standardized procedures for administering the test, including instructions for test-takers, timing guidelines, and any required conditions for test-taking (e.g., no calculators allowed).

6. **Norming:** Administer the test to a larger, more diverse sample to establish normative data that can be used to interpret individual test scores. This involves calculating statistical measures such as mean, median, and standard deviation.

7. **Reliability and Validity Testing:** Conduct analyses to ensure that the test produces consistent results

(reliability) and accurately measures the intended construct (validity). This may involve correlational analyses, factor analysis, or other statistical techniques.

8. Standardization Sample: Select a representative sample of individuals from the target population to establish reference norms for the test scores. This sample should be demographically diverse and large enough to provide reliable normative data. By following these steps, test developers can ensure that their assessments are fair, accurate, and reliable measures of the skills or knowledge they are intended to evaluate (Corey, 2022).

Research Method

The current research population consists of all Persian-speaking, Iranian individuals aged older than 18. Since that the present study sought to standardize and examine the construct competency scales, the statistical analyses such as validity check (calculation of Cronbach's alpha coefficient) and validity check (structural validity such as factor analysis, confirmatory and exploratory) has been done in this regard. All the methods that Investigating the psychometric characteristics of a questionnaire is done, it is one of the correlation methods and the selection law and the sample size in such studies and correlation studies are the same. Basically, according to McQuitty (2004), A large sample size is recommended. Also, regarding such studies, the sample size is over 500 people. The sample size is considered large (Klein, 2015). The psychometric characteristics of the questionnaire and the preparation of its norm for individuals separately obtained, the sample size was estimated to be 3000 subjects. The samples were located in all countries of Iran and they were selected by available sampling method.

Since the purpose of this research is to create a new set of scales of a valid instrument for The measurement of competency indices of individuals, the following steps has been met to make this tool:

A- Reviewing and studying the existing literature related to the measurement of competency scales, Unfortunately, for this era, there are few scales and almost no scales provided in the past literature.

B- To build competency scales, the items repository and the data obtained from the third edition of Minnesota Multiphasic Personality Inventory (MMPI-3) were used.

C- Divergent validity was obtained for the constructed scales, and sensitivity and clarity coefficients were also calculated.

D- Exploratory factor analysis was used to check the constructed indicators.

Findings

3000 individuals participated in this study, whose data was collected from different ethnicities all over Iran. The following table shows the demographic information of these participants. The results show that about 60% of them are men. About 47% of all participants were single. The education level of these participants was mostly

diploma and then bachelor and master. In addition, their age was between 20 and above 55 years. In addition, these participants were from different ethnicities, the frequency and percentage of these participants can be seen in the table below.

Table 1: Demographic Findings of participants based on gender, marriage, age and education

Variable	Scale	Frequency	Variable	Scale	Frequency
Gender	Male	1794	Education	High School	308
				Diploma	1321
				Advanced Diploma	82
	Female	1206		Bachelor	667
				Master	504
				Ph.D.	118
Marital Status	Single	1453	Age	20-25	339
				26-30	441
	Married	1152		31-35	550
				36-40	402
	Divorced	254		41-45	584
				46-50	351
	Widow	141		51-55	303
				>55	30

Table2: Correlation Matrix Between Factors and MMPI-3 PSY-5 Scales

Scale	Scale Definition	Factors				
		1	2	3	4	5
1	Responsibility	-.41	-.89	-.32	-.77	-.82
2	Organizational Commitment and Belonging	-.54	-.42	-.13	-.69	-.86
3	Responsiveness	-.39	-.70	-.71	-.91	-.89
4	Time Management	-.25	-.37	-.57	-.62	-.81
5	Risk Management	.00	.05	.02	-.69	-.80
6	Ethics	.06	.05	.00	-.71	-.85
7	Work-life balance	.07	.01	.02	-.79	-.77
8	Persistence	.00	-.29	.07	-.33	-.71
9	Loyalty	.01	.09	.00	-.50	-.63
10	Foresight and Strategic Thinking	.00	.07	.04	-.31	-.29
11	Goal Orientation and Performance Management	.09	.07	.05	-.45	-.13
12	Holism and Process Approach	.02	.06	.00	-.67	-.39
13	Decision Making	.09	.05	.03	-.70	-.61
14	Analytical Thinking	.00	.00	.00	-.62	-.73
15	Problem Solving	.08	.04	.05	-.67	-.25

16	Innovation and Creative Thinking	.05	.06	.00	-.40	-.68
17	Critical Thinking	.05	.08	.09	.00	.00
18	Decision Making Speed	.02	.04	.00	.05	.00
19	Patience	.00	.06	.00	-.48	-.88
20	Diligence	.08	.00	.00	-.31	-.64
21	Planning and Coordination	.08	.03	.00	-.74	-.69
22	Negotiating Power	-.39	-.70	-.71	-.91	-.89
23	Work Relationships	-.25	-.37	-.57	-.62	-.81
24	Using Positive Capabilities	.00	.05	.02	-.69	-.80
25	Self Confidence	.06	.05	.00	-.71	-.85
26	Effective Communication/Interpersonal Skills	.07	.01	.02	-.79	-.77
27	Track and Information Control	.00	-.29	.07	-.33	-.71
28	Innovation and Creative Thinking	.01	.09	.00	-.50	-.63
29	Flexibility / Adaptability	-.39	-.70	-.71	-.91	-.89
30	Team Making / Teamwork	-.54	-.42	-.13	-.69	-.86
31	Personal Authority	-.39	-.70	-.71	-.91	-.89
32	Stress Management	-.25	-.37	-.57	-.62	-.81
33	Willingness to Learn	.00	.05	.02	-.69	-.80
34	Participatory Management	.06	.05	.00	-.71	-.85
35	Customer Orientation	.07	.01	.02	-.79	-.77
36	Performance Management	.00	-.29	.07	-.33	-.71
37	Delegation of Authority	-.54	-.42	-.13	-.69	-.86
38	Development of Others	.07	.01	.02	-.79	-.77
39	Conflict Management	.00	-.29	.07	-.33	-.71
40	Self-Motivation	.01	.09	.00	-.50	-.63
41	Motivating Others	-.39	-.70	-.71	-.91	-.89
42	Law-Abiding	-.54	-.42	-.13	-.69	-.86
43	Discipline	-.39	-.70	-.71	-.91	-.89

Table 3: The characteristics of goodness of fit among scales

	Scales	X²	RMSE	GFI	AGFI
1	Responsibility	1/32	0.02	0.91	0.96
2	Organizational Commitment and Belonging	2/42	0.03	0.92	0.94
3	Responsiveness	1/79	0.07	0.93	0.94
4	Time Management	3/25	0.02	0.94	0.92
5	Risk Management	1/08	0.03	0.95	0.95
6	Ethics	1/29	0.09	0.97	0.94
7	Work-life balance	2/01	0.75	0.94	0.95
8	Persistence	2/22	0.29	0.95	0.87
9	Loyalty	1/99	0.01	0.87	0.90
10	Foresight and Strategic Thinking	1/08	0.12	0.94	0.94
11	Goal Orientation and Performance Management	2/07	0.74	0.94	0.92

12	Holism and Process Approach	2/44	0.21	0.91	0.96
13	Decision Making	1/87	0.01	0.92	0.94
14	Analytical Thinking	2/2	0.00	0.93	0.94
15	Problem Solving	1/87	0.01	0.96	0.92
16	Innovation and Creative Thinking	2/19	0.23	0.94	0.95
17	Critical Thinking	3/01	0.01	0.94	0.87
18	Decision Making Speed	1/97	0.08	0.92	0.90
19	Patience	1/02	0.07	0.95	0.94
20	Diligence	2/22	0.74	0.94	0.92
21	Planning and Coordination	2/14	0.01	0.95	0.91
22	Negotiating Power	2/51	0.02	0.87	0.93
23	Work Relationships	1/48	0.14	0.90	0.95
24	Using Positive Capabilities	1/47	0.48	0.94	0.91
25	Self Confidence	2/45	0.89	0.92	0.95
26	Effective Communication/Interpersonal Skills	2/29	0.63	0.91	0.97
27	Track and Information Control	1/08	0.25	0.93	0.92
28	Innovation and Creative Thinking	2/97	0.21	0.95	0.91
29	Flexibility / Adaptability	1/02	0.21	0.91	0.91
30	Team Making / Teamwork	1/11	0.23	0.95	0.91
31	Personal Authority	2/23	0.25	0.97	0.91
32	Stress Management	1/15	0.10	0.92	0.92
33	Willingness to Learn	2/01	0.23	0.91	0.92
34	Participatory Management	1/14	0.02	0.91	0.94
35	Customer Orientation	2/05	0.14	0.91	0.94
36	Performance Management	2/01	0.25	0.91	0.92
37	Delegation of Authority	2/19	0.52	0.92	0.95
38	Development of Others	1/07	0.41	0.92	0.87
39	Conflict Management	1/42	0.52	0.93	0.90
40	Self-Motivation	2/00	0.41	0.92	0.94
41	Motivating Others	1/79	0.00	0.94	0.92
42	Law-Abiding	2/05	0.01	0.95	0.91
43	Discipline	2/17	0.01	0.95	0.93

Discussion

The MMPI-3, like its predecessors, is designed to be a reliable and valid psychological assessment tool. Reliability refers to the consistency and stability of test results over time and across different administrations. The MMPI-3 has undergone extensive psychometric testing to evaluate its reliability, including assessments of internal consistency, test-retest reliability, and inter-rater reliability. Research has generally shown that the MMPI-3 demonstrates good reliability in measuring various psychological constructs and personality traits. Internal consistency refers to how consistently items within the test measure the same underlying construct. Test-retest reliability assesses the stability of scores when the same test is administered to the same individual

on multiple occasions. Inter-rater reliability examines the degree of agreement between different raters or clinicians scoring the test results.

Overall, this research study has supported the reliability of the MMPI-3, indicating that it provides consistent and dependable results when measuring psychopathology and personality characteristics. And also the construction of 43 competency scales was shown. However, it is important to interpret MMPI-3 results in conjunction with clinical judgment and additional assessment measures for a comprehensive understanding of an individual's psychological functioning. We can also extract 43 competency scales from MMPI-3.

While these scales can provide some insight into factors that may affect competency, it is essential to emphasize that competency evaluations typically require a more comprehensive assessment that goes beyond the MMPI-3. Competency assessments often involve multiple sources of information, including clinical interviews, cognitive assessments, and observations of behavior in relevant contexts.

The MMPI-3 includes several scales that are relevant to assessing competency-related issues. Competency refers to an individual's ability to understand information, make decisions, and participate effectively in legal proceedings such as court hearings or evaluations. While the MMPI-3 is not designed specifically to assess competency, certain scales may provide insight into aspects related to competency.

In order to check the results obtained from the present study with other results obtained inside the country, unfortunately, the alignment research was not found inside the country. But in line with the above results in the country, we can refer to the research of Whitman et al. (2021), Morris et al. (2021), Foti et al. (2021).

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