

Afak For Sciences Journal

Issn: 2507-7228 – Eissn: 2602-5345 https://www.asjp.cerist.dz/en/PresentationRevue/351



Volume: 09/ N°: 03 (2024),

P 11-29

The internal structure of the Arabic MMPI-2 :

A Cross-cultural study

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Abstract	Article info
The present study attempts to provide validation for the Arabic MMPI-2 through cross cultural equivalence study. The purpose was to compare the internal structure of the Arabic MMPI-2 with the original (U.S. MMPI-2). We have used the Arabic version of the MMPI-2 translated by Abdallah Mahmoud Soliman (1996). The MMPI-2 was administered to 145 Algerian college students and results were compared to those from an American college sample. The finding of the study showed that a two-factor solution for the content scales replicated very well in Algerian culture as well as in the United States. However, the validity and clinical scales did not possess as stable an internal structure even within U.S. samples. The factor structures that emerged in the Algerian data are nearly identical to the structures obtained in the U.S. college sample; the Algerian female sample showed stable four-factor solution for the validity and clinical scales and stable two-factor solution for the content scales. However, in Algerian male sample, the two-factor solution for the content scales were stable but the third factor (ego control) in the validity and clinical scales was not stable.	Received March 13 ;2024 Accepted April 18 ;2024 Keyword: ✓ Assessment ✓ Personality ✓ Internal structure ✓ cross-cultural ✓ Arabic MMPI-2

1. Introduction

Psychopathology and its assessment have captivated the attention of researchers throughout the past century. One of the central questions that has arisen is whether psychopathology is universal or need a unique classification and specific definition for each country or culture (Zubin, 1969). Cultures vary significantly in terms of language, norms, social structures, roles, and belief systems, all of which are likely to exert influence on our comprehension, clinical presentations, and potentially the diagnosis and prevalence of various disorders. Philips and Dragus (1971) concluded that diagnostic criteria tend to exhibit universal traits. Kaplan and Sadock (1991) conducted a comprehensive review of cross-cultural studies, arriving at the consensus that certain symptoms, such anxiety, depression, as mania, somatization, paranoia, thought and indeed universal. disturbances. are However, Butcher and Pancheri (1976) highlighted the fact that diagnostic criteria are not uniformly applied and standardized across countries, and in some cases, even within the same country, which may contribute to variations in the prevalence of different pathologies. The Minnesota Multiphasic Personality Inventory-2 (MMPI-2) is one of the most widely used psychological assessment tools in the world, known for its reliability and validity in assessing a wide range of psychological conditions and personality traits. The MMPI-2 is a psychological assessment tool designed to measure various psychological constructs and personality traits. Mental professionals. clinicians. health and researchers use it for diagnostic purposes,

treatment planning, and research. Adapting the MMPI-2 for different cultural contexts essential for promoting culturally is ethical psychological competent and assessment. It helps ensure that the tool remains a valuable resource for clinicians and researchers worldwide while respecting diversity the of human experiences and expressions. The process of translating and using psychological assessment instruments across different countries and cultures is a common practice, driven by the desire to tap into the empirical and interpretative knowledge initially established for these instruments in their country of origin. However, it is important to recognize that this practice assumes the consistency of the measures across diverse nations and cultures, an assumption that may not always hold true.

The present study attempts to provide validation for the Arabic MMPI-2 through cross cultural equivalence study. The first level of analysis for examining equivalence of the Arabic MMPI-2 was a comparison of its internal structure against the original MMPI -2. Examination of the factorial structure of the Arabic MMPI-2 in comparison to that of the original MMPI-2 is essential to evaluating the equivalence of the instruments. If an instrument has different structures between groups, it could be argued that it measures different traits in the different groups and would therefore not be meaningful in a discussion of mean differences (Finn, 1984).

> FAK for Sciences Journal Eissn: 2602-5345 ISSN: 2507-72

1.1- Previous studies of the factor structure of the MMPI-2

The factor structure of the Minnesota Multiphasic Personality Inventory (MMPI) and its various versions, including the MMPI-2, has been the subject of extensive research over the years. Researchers have conducted factor analyses to better understand the underlying dimensions of personality and psychopathology assessed by the MMPI.

Studies on the MMPI factor structure have repeatedly found two main factors that have been variously labeled Anxiety and Repression (Welsh, 1956; Eichman, 1961, 1962) or Ego Resiliency and Ego Control (Block, 1965). The first factor-Anxiety or Ego Resiliency reflects general maladjustment. This factor is usually represented by high loadings on Pt and Sc on one pole and K on the opposite pole. The second factor (Repression or Ego Control) is typically defined by high loadings on scales Hs, D, and Hy at one pole and moderate loadings on Ma at the other pole. However, two main factors are usually found only when scales Mf and Si are excluded from the analyses. When the three validitv and all ten clinical scales (including Mf and Si) are included in the correlation matrix used for factoring, four meaningfully interpretable factors usually emerge. They are frequently labeled Masculinity-Anxiety, Repression, Femininity, Social Introversion and (Johnson et al., 1984). Cross-cultural studies with the MMPI and the MMPI-2 have also shown that factors derived from samples in other cultures replicate the U.S. factors fairly well when the same factor analytic method is employed. It is

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important to note that the factor structure of the MMPI and its versions can vary depending on the sample used, the statistical methods applied, and the theoretical framework used for interpretation. (Butcher, Pancheri, 1976; Clark, 1982; Shiota, 1989).

Although, MMPI validity and clinical scales have shown fairly stable four factor structures across cultures, two problems have been identified concerning crosscultural factor analysis: the limitations of scale level factor analysis and the failure to use objective factor comparison indices Several (Ben-Porath. 1990). authors (Guilford, J. P., & Fruchter, B. 1981) have warned against using inter-scale factor analysis because MMPI validity and clinical scales are highly correlated with each other due to item overlap. An item factor analysis, however, cannot always be the best solution because it requires tremendous sample sizes and enormous computer resources. Ben-Porath (1990) recommends using intra-scale factor analysis as an alternative. He argues that because MMPI interpretations rely on both single scale elevation and configural relations among the scales, both inter- and intra-scale factor analysis should be conducted in future cross-cultural research. Another advantage of using intra-scale factor analysis is that translation errors can be uncovered using this method. If there is a drastic change with loading for an item, it may indicate either translation error or true cultural differences for that item (Eysenck & Eysenck, 1983). In either case, it gives the researcher further information in examining item equivalency.



Conducting an intra-scale factor analysis, however, is not without difficulties. It is necessary to reach agreement regarding the MMPI's (MMPI-2's) intra-scale factor structures within the U.S. before crosscultural comparisons can be made.

Another difficulty is choosing among the several factor similarity indices used to examine similarities of the intra-scale factor structures. A simpler solution than that of item factor analysis or intra-scale factor analysis is the use of MMPI scales which are homogeneous in structure and content. Johnson, Butcher, Null, & Johnson (1984) derived 21 factor scales from the full MMPI item pool using 11138 psychiatric patients. However, an attempt by Costa, Zonderman, Williams, & McCrae (1985) to replicate this 21 factors solution using normals was not successful. Costa et al.'s study is the first published study to analyze the entire MMPI item pool with a psychologically normal sample of a large size. They reported nine interpretable components and suggested the use of nine factor scales as MMPI research scales. Neither the 21 factor scales nor the nine factor scales could be used in the present factor analysis because a number of MMPI items were deleted from the MMPI-2. For example, thirty-two items out of the 309 items on the 21 factor scales were dropped from the MMPI-2. Therefore, as a solution, MMPI-2 content scales were selected for use in the current study because they are homogenous, internally consistent and easily interpretable in terms of content (Butcher, Graham, Williams, & Ben-Porath, 1990).

Another problem concerning cross-cultural factor analysis on the MMPI is the failure

to use objective factor comparison indices (Ben-Porath, 1990). Two authors have used congruence coefficients to evaluate similarities in factor structures between the Japanese MMPI and the original MMPI (Clark, 1982) and between the Japanese MMPI-2 and the original MMPI-2 (Shiota, 1989). The congruence coefficient is easy to calculate, yet has several drawbacks. Many authors therefore recommend employing multiple factor similarity indices simultaneously when comparing factors because all the methods have their respective drawbacks and advantages. In the present study, the factor score correlations was used.

In summary, there have been two problems concerning cross-cultural factor analysis on the MMPI: the limitations of scale level factor analysis and the failure to use objective factor comparison indices. In the current study, factor structures of the 15 content scales in addition to those of the 13 basic scales were compared across different samples within the U.S. and crossculturally.

2- Method and Tools

Participants and Procedure

The Arabic MMPI-2 was administered to a sample of Algerian college students and results were compared to those from an American college sample. An identical set of exclusion criteria (Butcher et al., 1989) were used for the Algerian and American samples. A subject's protocol was excludes if MMPI-2 results indicated invalidity, or subjects were currently in psychiatric treatment. Invalidity was determined through one or more of the following

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indicators: (1) omission of 15 or more items. (2) scoring 25 or higher on the standard F (infrequency) scale, or (3) scoring 25 or higher on the Back F (Fb) Scale, or (4) scoring 13 or higher on VRIN (Variable Response Inconsistency). (5) scoring 13 and higher or less than 4 on TRIN (True Response Inconsistency).

Data were collected from different universities in Algiers. The Arabic MMPI-2 was printed in a booklet form and standard MMPI-2 instructions were used. Test administration for the Algerian sample was done during class time. Applying the criteria exclusion outlined above eliminated 21% (n = 184) of the initial sample. Thus, the final Algerian sample consisted of 145 subjects: 35 men (24.14%) and 110 women (75.86%). The mean age for the men was 24.32 (S.d. = 7.45; range = 20-38) and the mean age for the women was 28.5 (S.d. = 8.46; range = 20-44).

The comparison group for the current study consisted of 1513 American college students (515 men and 797 women) who participated in the U.S. MMPI Restandardization Project (Butcher et al., 1989).

Instrument: The MMPI-2

The Minnesota Multiphasic Personality Inventory-2 (MMPI-2) is a widely used psychological assessment tool designed to measure various aspects of an individual's personality, psychopathology, and mental health. It is one of the most wellestablished and researched self-report inventories in the field of psychology and is utilized by mental health professionals, clinicians, and researchers to assess and diagnose psychological disorders, as well as to gain insight into an individual's personality traits and psychosocial functioning.

Developed by Starke R. Hathaway and J.C. McKinley in the late 1930s, the MMPI-2 is an updated version of the original MMPI, which was created for assessing psychopathological symptoms. The MMPI-2 was published in 1989 and has since become the standard assessment tool for evaluating a wide range of mental health conditions, including depression, anxiety, schizophrenia, personality disorders, and more.

The MMPI-2 consists of a comprehensive set of over 567 true-false questions or statements, addressing various aspects of individual's thoughts, emotions. an behaviors, and beliefs. These items are organized into different scales, including clinical scales that measure specific psychological symptoms, validity scales that assess the respondent's honesty and consistency responding, in and supplementary scales that provide additional information about the individual's personality and functioning. One of the key strengths of the MMPI-2 is its ability to provide a standardized and objective assessment of mental health and personality, which can aid in diagnosis, treatment planning, and research in psychology and psychiatry. Additionally, the test has been adapted and translated into numerous languages, making it applicable in various cultural contexts.

The MMPI-2 is composed of various scales designed to assess different aspects of an individual's personality, psychopathology,



and mental health. These scales serve distinct purposes and provide valuable information for clinicians, researchers, and mental health professionals. Here is an introduction to some of the scales of the MMPI-2:

1- Basic Clinical Scales: The 10 Basic clinical scales are used to assess specific psychopathological symptoms and mental health conditions. Each scale focuses on a particular aspect of psychological functioning.

Examples include Scale (Hs) 1 (Hypochondriasis), Scale 2 (D) (Depression), Scale 3 (Hy) (Hysteria), Scale 4 (Pd) (Psychopathic Deviate), Scale 5 (Mf) (Masculinity-Femininity), Scale 6 7 (Pa) (Paranoia). Scale (Pt)(Psychasthenia), Scale 8 (Sc) (Schizophrenia), 9 Scale (Ma) (Hypomania), and Scale 0 (Si) (Social Introversion).

2- Validity Scales : (Lie (L), Defensiveness (K) and Frequency (F)): These scales assess the respondent's test-taking attitude, including their level of honesty and defensiveness. They help identify response styles that may affect the validity of the test results. (Butcher et al., 1989; Graham, 2000).

3-Content Scales: The 15 content scales were developed using a more modern rational-deductive approach to scale construction, and cover a wide range of clinical and normal-range concerns. They are designed to assess specific areas of concern or content domains, such as Anxiety (ANX; tension, worry, fears, lack of confidence, and somatic indications of

anxiety). Fears (FRS; specific fears such as high places, snakes, spiders, fires, and storms). Obsessiveness (OBS; rumination about decisions and problems, and compulsions such as counting and saving unimportant things). Depression (DEP; brooding, crying easily, pessimism, suicidal ideation, and guilt). Health Concerns (HEA: gastrointestinal neurological symptoms, symptoms, dermatological problems, and pain). Bizarre Mentation (BIZ; paranoid ideation, ideas of reference, delusional thinking, and hallucinations). Anger (ANG; fear of self-control losing over aggressive impulses. impatience, irritability, stubbornness, physical and/or verbal abusiveness, and explosivity). Cynicism (CYN; hostility, suspicion, misanthrope, selfishness). Antisocial distrust. and Practices (ASP; antiauthority ideation, rationalization and identification with criminal behavior, admission of antisocial or unlawful behaviors). Type A (TPA; hard driving. fast paced, task-orientation, competitiveness, and workaholism). Low Self-Esteem (LSE; a lack of self-esteem, feelings of unattractiveness and uselessness). Social Discomfort (SOD; introversion, social avoidance, dislike of crowds, parties, or group activities). Family Problems (FAM; general problems with family). Work Interference (WRK: difficulties concentrating, anxiety, tension, lack of self-confidence, and indecisiveness about career choices). Negative Treatment Indicators (TRT; negative attitudes towards health care providers and treatment, pessimism about individuals being understanding or helpful). They provide a more detailed analysis of the respondent's psychological functioning within these



domains. (Butcher et al., 1989; Butcher, Graham, Williams, &Ben-Porath, 1990; Graham, 2000).

4-Supplementary Scales: These scales provide additional information about the individual's personality, behavior, and psychosocial functioning. They are not focused on psychopathology but offer valuable insights into the respondent's overall psychological makeup. Examples include the College Maladjustment Scale, Correctional Offender Profile. and Personality Psychopathology Five scales. Each of these scales serves a unique purpose in assessing different aspects of an psychological functioning, individual's making the MMPI-2 a comprehensive tool for diagnosing mental health conditions, understanding personality traits, and aiding in treatment planning. Clinicians and researchers use these scales in combination to gain a holistic view of the respondent's psychological profile.

The Arabic version of the MMPI-2 used in this study was translated by Abdallah Mahmoud Soliman (1996).The translation was done in simple Arabic language, which understood, read and spoken by all Arabic –speaking people. After the step of the translation, the University of Minnesota Press carried out the back translation and the evaluation of this translation using a professional linguist; then, after a few editorial and stylistic changes, the Arabic translation of the MMPI-2was approved for use by the University of Minnesota.

3- Results and Discussion

The performance of Algerian college sample were compared to those of

American college sample. Before crosscultural comparisons can be made, it is necessary to examine first the degree of convergence of the factors across samples within the U.S.

United States MMPI-2 Factor Structures

The normative adult sample (1138 men and 1462 women) and college sample (515 men and 797 women) were used for this purpose. The normative adult sample was randomly solicited in seven regions of the United States as part of the MMPI Restandardization Project. This sample is described in greater detail in the MMPI-2 Manual (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989).

The factor analyses were carried out in the following manner. First, for each sample, correlation matrices of the 13 basic scales were subjected to a principal components analysis with varimax rotation. The Kaiser-Guttman criterion (Guttman, 1954; Kaiser, 1958) indicated four factors for the normative adult males and females and female college sample and three for the male college sample. The eigenvalue for the fourth factor of the male college sample (eigenvalue = .93), approached 1.0 suggesting four factors may also be appropriate for them. The scree test (Cattell, 1966) showed a major break after the first large general factor in all samples. Subsequent minor breaks appeared after four factors in the normative adult male and female samples and the female college sample, and after three factors in male college sample. Therefore, four-factor solutions were retained for each sample and were examined for their similarities. However, because of the overriding



superiority of the four-factor solution in all cases, it was decided to focus on the four-factor solution here.

Second, correlation matrices of the 15 content scales for each sample were subjected to a principal components analysis with varimax rotation. The Kaiser-Guttman criterion indicated two factors for all samples. The scree test showed a major break after the first large general factor in all samples. Subsequent minor breaks appeared after three factors in all samples. Therefore, both the two-and three-factor solutions were computed in each sample and were examined for similarities. However, the two-factor solution is chosen for presentation here because the twofactor solution showed a far clearer convergence across samples and was more interpretable than the three-factor solution.

Factor structure of the basic scales. The scale loadings of the four factors and the percent of variance accounted for in each sample are presented in Table 01(Male) and Table 02 (Female).

The factors have been reordered as necessary to match the factors for comparison. Although there is some sample variation, *factor 1* is characterized by high loadings on scales F, Hs, Pd, Pa, Pt, Sc, and Ma. In the normative male sample, scale K defines the opposite pole. In the female college sample, scales D and Hy also load on this factor. Hs does not load on this factor in the normative female sample and Ma does not load on this factor in the female college sample. This factor is usually referred to as *general maladjustment*.

Factor 2 is defined in all samples by high loadings on scales D and Si, with high Pt and Sc loadings in all samples except the normative males. K defines the opposite pole for both female samples. This factor is labelled *social introversion*.

Factor 3, labelled *repression or ego control*, is represented by high or moderate loadings on scales L, K, and Hy. In the normative female sample, L and K have fairly low loadings on this factor. Ma, rather than Hy loads on this factor for the female college sample.

Factor 4 is represented by a single scale, Mf, and is labelled *masculinity-femininity*. In the normative samples, scale L has negative loadings on this factor.

To determine the degree of similarity of the factor solutions, two indices of factorial (or factor loading) similarity, congruence coefficients and factor score correlations were computed across the four samples. In Table 03, congruence coefficients (CC) appear below the main diagonal and factor score correlations (FSC) appear above the diagonal.



Table 01: Factor loading on the four Factors extracted from the MMPI-2 Basic scales fo
the American (Normative and college) and Algerian Males samples

		Factor	1		Factor	2		Factor 3	3		Factor	4
Scales	Alg ^a	Am C ^b	Am N ^c	Alg	Am C	Am N	Alg	Am C	Am N	Alg	Am C	Am N
L	61	15	13	09	.02	.11	04	.71	.47	.22	36	57
F	.84	.73	.77	03	.42	.20	03	.01	01	.36	.07	02
K	73	38	51	21	41	18	.04	.72	.72	24	.03	05
Hs	.29	.58	.65	.12	.56	.44	.75	.18	.19	.18	.11	10
D	.11	.15	.33	.44	.75	.77	.74	.32	.29	.13	.30	.09
Hy	07	.24	.17	20	.15	.11	.93	.72	.85	08	.44	.15
Pd	.67	.64	.70	.06	.28	02	.30	02	.19	04	.38	.30
Mf	.023	.08	.05	.06	.20	.11	.06	07	.13	.92	.84	.83
Pa	.59	.59	.43	15	.16	.04	.24	.11	.37	.53	.45	.45
Pt	.87	.54	.72	.17	.64	.40	.35	37	33	00	.22	.26
Sc	.94	.73	.85	.06	.51	.23	.10	24	22	.18	.18	.22
Ma	.74	.81	.66	51	22	59	17	34	19	01	12	.04
SI	.17	.12	.25	.93	.89	.78	.04	23	40	.00	.11	.05
Variance	40.6	25.9	29.6	10.5	22.3	15.9	16.7	15.8	16.3	9.6	12.2	11.3
%												
"Alg: Alge	rian Mal	es. ^b Am	C: Amer	ican Co	lege Mal	es. 'Am N	: Amer	ican Nom	native adu	lte Ma	les	

Table 02: Factor loading on the four Factors extracted from the MMPI-2 basic scales forthe American (Normative and college) and Algerian females samples

Scales		Factor	1		Factor 2	2		Factor :	3		Factor	4
	Alg ^a	Am C ^b	Am N ^c	Alg	Am C	Am N	Alg	Am C	Am N	Alg	Am C	Am N
L	.04	.02	36	.06	09	04	49	.79	.30	04	21	57
F	.56	.55	.65	.10	.48	.40	.54	20	.13	.17	37	18
K	04	02	43	00	78	68	81	.43	.36	12	.06	11
Hs	.81	.69	.34	.03	.35	.55	.11	05	.49	.04	08	06
D	.69	.61	.03	.50	.51	.74	.11	.25	.49	10	.21	.06
Hy	.90	.81	.10	06	35	06	29	.16	.91	05	.10	.01
Pd	.65	.69	.71	.05	.24	.19	.24	26	.31	.22	11	.07
Mf	.12	.09	.17	02	.04	.07	.10	06	.18	.93	.88	.84
Pa	.66	.69	.44	.09	.21	.17	.19	13	.38	.17	.12	.26
Pt	.57	.50	.53	.24	.74	.75	.72	29	.07	02	01	.18
Sc	.63	.57	.73	.10	.63	.58	.71	35	.12	11	22	.04
Ma	.19	.27	.83	62	.09	11	.43	68	11	.18	41	.00
SI	.26	.13	05	.90	.91	.93	.18	.16	08	.11	.11	.03
Variance %	30.9	26.3	23.9	12.1	24.9	25.4	20.6	13.3	14.2	8.2	9.7	9.1

Table 03: Congruence Coefficients (CC) and Factor Score Correlations (FSC) among fourfactors extracted from MMPI-2 Basic scales for Normative and College American Samples

	N M ⁴	n=11	38)			C M	^b (n=51	5)		N F ^c	(n=146	52)		C Fd	(n=797	0	
		F 1	F 2	F 3	F 4	F 1	F 2	F 3	F 4	F 1	F 2	F 3	F 4	F 1	F 2	F 3	F 4
N M ^a	F 1		.00	.00	.00	.92	.29	07	02	.86	.37	20	.07	.65	.40	38	34
	F 2	.38		.00	.00	29	.92	.16	.09	43	.86	.24	.00	.19	.66	.55	.32
	F 3	15	02		.00	.13	15	.94	.31	10	35	.93	11	.70	60	.45	.08
	F 4	.38	.14	00		.03	03	32	.93	.09	01	.09	.98	.19	01	44	.88
C Mb	F 1	.97	.23	06	.42		.00	.00	.00	.93	.08	.23	05	.66	.15	48	38
	F 2	.72	.90	14	.32	.59		.00	.00	10	.96	.16	03	.27	.85	.33	.14
	F 3	29	.07	.93	29	25	13		.00	27	21	.84	42	.54	48	.70	12
	F 4	.43	.37	.29	.91	.45	.49	.04		02	05	.38	.90	.36	15	20	.89
N F ^c	F 1	.93	.07	20	.37	.96	.46	40	.32		.00	.00	.00	.50	.14	70	42
	F 2	.74	.85	32	.27	.61	.97	30	.37	.51		.00	.00	.19	.94	19	.11
	F 3	.36	.39	.82	.23	.38	.40	.71	.58	20	23		.00	.85	29	.38	.17
	F 4	.15	.09	11	.93	.18	.19	37	.80	.13	.16	04		.05	.00	47	.88
C F ^d	F 1	.84	.47	.36	.42	.84	.69	.19	.63	.72	.61	.79	.15		.00	.00	.00
	F 2	.77	.71	50	.28	.64	.89	50	.29	.60	.96	.02	.17	.52		.00	.00
	F 3	60	.25	.53	48	-69	10	.76	22	78	22	.26	-42	26	37		.00
	F 4	30	.25	.18	.62	.08	.09	.09	.64	44	00	.16	.77	08	10	.23	

Source : (Han, 1993, p 66)

Table 04 : Factor loadings on the two Factors extracted from the MMPI-2 Content scales forthe American (Normative adult and College) and Algerian sample.

Alg ^a	Factor	1				Females						
Alg ^a				Factor	2		Factor	1	Factor 2			
	Am C ^b	Am N ^c	Alg	Am C	Am N	Alg	Am C	Am N	Alg	Am C	Am N	
.90	.73	.71	.24	.44	.42	.77	.74	.71	.43	.43	.45	
.62	.54	.44	.05	.20	.24	.41	.30	.27	.22	.36	.44	
.64	.62	.68	.52	.54	.45	.72	.69	.69	.44	.44	.48	
.76	.81	.77	.43	.33	.36	.84	.79	.77	.23	.36	.42	
.70	.60	.49	23	.25	.27	.39	.45	.39	.23	.40	.44	
.16	.46	.24	.50	.55	.62	.31	.36	.17	.56	.64	.70	
.48	.27	.25	.55	.78	.74	.37	.30	.36	.65	.70	.66	
07	.23	.27	.73	.82	.80	.04	.26	.23	.82	.83	.81	
01	.17	.13	.82	.81	.82	.09	.08	.09	.72	.81	.79	
.30	.22	.24	.67	.82	.76	.26	.22	.27	.68	.79	.69	
.64	.79	.81	.47	.28	.23	.81	.84	.82	.26	.25	.27	
.20	.70	.63	.39	.04	10	.52	.64	.66	20	.04	07	
.23	.49	.45	.65	.51	.57	.27	.46	.44	.65	.51	.57	
.79	.79	.82	.46	.42	.39	.81	.81	.81	.37	.41	.42	
.53	.73	.79	.64	.43	.38	.82	.77	.76	.23	.40	.43	
30.2	34.5	32.0	31.9	28.7	27.5	32.3	32.4	31.1	24.7	28.7	29.6	
	.62 .64 .76 .70 .16 .48 .07 .01 .30 .64 .20 .23 .79 .53 30.2	.62 .54 .64 .62 .76 .81 .70 .60 .16 .46 .48 .27 07 .23 01 .17 .30 .22 .64 .79 .20 .70 .23 .49 .79 .79 .53 .73 30.2 34.5 ian samlpe. ^b An	.62 .54 .44 .64 .62 .68 .76 .81 .77 .70 .60 .49 .16 .46 .24 .48 .27 .25 .07 .23 .27 .01 .17 .13 .30 .22 .24 .64 .79 .81 .20 .70 .63 .23 .49 .45 .79 .79 .82 .53 .73 .79 30.2 34.5 .32.0 *Am C : Ame	.62 .54 .44 .05 .64 .62 .68 .52 .76 .81 .77 .43 .70 .60 .49 23 .16 .46 .24 .50 .48 .27 .25 .55 .07 .23 .27 .73 .01 .17 .13 .82 .30 .22 .24 .67 .64 .79 .81 .47 .20 .70 .63 .39 .23 .49 .45 .65 .79 .79 .82 .46 .53 .73 .79 .64 30.2 34.5 32.0 31.9 ian samlpe. bAm C : American C	.62 .54 .44 .05 .20 .64 .62 .68 .52 .54 .76 .81 .77 .43 .33 .70 .60 .49 23 .25 .16 .46 .24 .50 .55 .48 .27 .25 .55 .78 .07 .23 .27 .73 .82 .01 .17 .13 .82 .81 .30 .22 .24 .67 .82 .64 .79 .81 .47 .28 .20 .70 .63 .39 .04 .23 .49 .45 .65 .51 .79 .79 .82 .46 .42 .53 .73 .79 .64 .43 .30.2 .34.5 .32.0 31.9 28.7	.62 .54 .44 .05 .20 .24 .64 .62 .68 .52 .54 .45 .76 .81 .77 .43 .33 .36 .70 .60 .49 23 .25 .27 .16 .46 .24 .50 .55 .62 .48 .27 .25 .55 .78 .74 .07 .23 .27 .73 .82 .80 .01 .17 .13 .82 .81 .82 .30 .22 .24 .67 .82 .76 .64 .79 .81 .47 .28 .23 .20 .70 .63 .39 .04 .10 .23 .49 .45 .65 .51 .57 .79 .79 .82 .46 .42 .39 .53 .73 .79 .64 .43 .38	.62 .54 .44 .05 .20 .24 .41 .64 .62 .68 .52 .54 .45 .72 .76 .81 .77 .43 .33 .36 .84 .70 .60 .49 23 .25 .27 .39 .16 .46 .24 .50 .55 .62 .31 .48 .27 .25 .55 .78 .74 .37 .07 .23 .27 .73 .82 .80 .04 .01 .17 .13 .82 .81 .82 .09 .30 .22 .24 .67 .82 .76 .26 .64 .79 .81 .47 .28 .23 .81 .20 .70 .63 .39 .04 .10 .52 .23 .49 .45 .65 .51 .57 .27 .79 .79 .82 .46 .42 .39 .81 .53 .73	.62 .54 .44 .05 .20 .24 .41 .30 .64 .62 .68 .52 .54 .45 .72 .69 .76 .81 .77 .43 .33 .36 .84 .79 .70 .60 .49 23 .25 .27 .39 .45 .16 .46 .24 .50 .55 .62 .31 .36 .48 .27 .25 .55 .78 .74 .37 .30 .07 .23 .27 .73 .82 .80 .04 .26 .01 .17 .13 .82 .81 .82 .09 .08 .30 .22 .24 .67 .82 .76 .26 .22 .64 .79 .81 .47 .28 .23 .81 .84 .20 .70 .63 .39 .04 .10 .52 .64 .23 .49 .45 .65 .51 .57 .27	.62 .54 .44 .05 .20 .24 .41 .30 .27 .64 .62 .68 .52 .54 .45 .72 .69 .69 .76 .81 .77 .43 .33 .36 .84 .79 .77 .70 .60 .49 23 .25 .27 .39 .45 .39 .16 .46 .24 .50 .55 .62 .31 .36 .17 .48 .27 .25 .55 .78 .74 .37 .30 .36 .07 .23 .27 .73 .82 .80 .04 .26 .23 .01 .17 .13 .82 .81 .82 .09 .08 .09 .30 .22 .24 .67 .82 .76 .26 .22 .27 .64 .79 .81 .47 .28 .23 .81 .84	.62 .54 .44 .05 .20 .24 .41 .50 .27 .22 .64 .62 .68 .52 .54 .45 .72 .69 .69 .44 .76 .81 .77 .43 .33 .36 .84 .79 .77 .23 .70 .60 .49 23 .25 .27 .39 .45 .39 .23 .16 .46 .24 .50 .55 .62 .31 .36 .17 .56 .48 .27 .25 .55 .78 .74 .37 .30 .36 .65 .07 .23 .27 .73 .82 .80 .04 .26 .23 .82 .01 .17 .13 .82 .81 .82 .09 .08 .09 .72 .30 .22 .24 .67 .82 .76 .26 .22 .27 .68 .64 .79 .81 .47 .28 .23 .81	.62 .54 .44 .05 .20 .24 .41 .50 .27 .22 .50 .64 .62 .68 .52 .54 .45 .72 .69 .69 .44 .44 .76 .81 .77 .43 .33 .36 .84 .79 .77 .23 .36 .70 .60 .49 .23 .25 .27 .39 .45 .39 .23 .40 .16 .46 .24 .50 .55 .62 .31 .36 .17 .56 .64 .48 .27 .25 .55 .78 .74 .37 .30 .36 .65 .70 .07 .23 .27 .73 .82 .80 .04 .26 .23 .82 .83 .01 .17 .13 .82 .81 .82 .09 .08 .09 .72 .81 .30 .22 .24 .67 .82 .76 .26 .22 .27 .68 .	



 Table 05 : Factor Score Correlations (FSC) among two factors extracted from MMPI-2 content scales for American (Normative and College) Samples

		N M ^a (n=1138)		C (n=	М ^ь 515)	N (n=1	F ^c 1462)	C F ^d (n=797)		
		F 1	F 2	F 1	F 2	F 1	F 2	F 1	F 2	
N M ^a	F 1		.00	.99	.02	.98	.07	.99	.02	
	F 2	.66		.01	.99	03	.98	-00	.99	
C M ^b	F 1	.99	.67			.96	.11	.98	.05	
	F 2	.68	.99	.68		.00	.96	.01	.98	
N F ^c	F 1	.99	.65	.97	.68			.99	03	
	F 2	.71	.98	.73	.98	.69		.05	.99	
C F ^d	F 1	.99	.66	.98	.68	.99	.71		.00	
	F 2	.68	.99	.70	.99	.67	.99	.68		

adult females. ^dCF: College females.

Values below diagonal are congruence coefficients. Values above diagonal are factor score correlation. Values of corresponding factors given in boldface.

Source : (Han, 1993, p 69)

			Am F				Al	g F			A	m M			Alg	М	
		F 1	F 2	F 3	F 4	F 1	F 2	F 3	F 4	F 1	F 2	F 3	F 4	F 1	F 2	F 3	F 4
Alg ^a M	F 1	.56	.68	88	34	.51	.10	.77	.06	.94	18	.00	.10				-
	F 2	04	.67	.22	.29	09	.94	.17	06	.41	.84	.35	.10				
	F 3	.69	01	.13	.21	.95	.17	10	.22	82	25	.34	20				
	F 4	05	.15	08	.54	.08	02	28	.76	.17	.13	.36	.52				
m ^b M	F 1	.65	.53	.87	47	.57	29	.84	.04					.94	18	.00	.10
	F 2	37	88	.10	.10	.50	.76	.55	07					.41	.84	.35	.10
	F 3	09	75	.81	.08	07	05	89	33					82	25	.34	2
	F 4	.33	.03	25	.78	.34	.09	.16	.61					.17	.13	.36	.52
lg F	F 1	.97	.35	.32	.13					.57	29	.84	.04	.51	.10	.77	.06
	F 2	03	.55	.38	.26					.50	.76	.55	07	09	.94	.17	0
	F 3	.42	.81	.81	23					07	05	89	33	.95	.17	10	.22
	F 4	23	.00	25	.63					.34	.09	.16	.61	.08	02	28	.76
m F	F 1					.97	.35	.32	.13	.65	.53	.87	47	.56	.68	88	3
	F 2					03	.55	.38	.26	37	88	.10	.10	04	.67	.22	.29
	F 3					.42	.81	.81	23	09	75	.81	.08	.69	01	.13	.21
	F 4					23	.00	25	.63	.33	.03	25	.78	05	.15	08	.54

 Table 06 : Factor Score Correlations (FSC) among four factors extracted from MMPI-2 Basic

 scales for American and Algerian Samples



		Alg	MI.	Am 1	M	AlgI	7	Am F		
		F 1	F 2	F 1	F 2	F 1	F 2	F 1	F 2	
Alg ^a M	F 1			.73	44	.82	25	.69	52	
	F 2			.49	.67	44	.55	52	.52	
Am ^b M	F 1	.73	44			.90	.76	.94	86	
	F 2	.49	.67			.56	.93	60	.95	
Alg F	F 1	.82	25	.90	.76			.94	.60	
	F 2	44	.55	.56	.93			.69	.94	
Am F	F 1	.69	52	.94	86	.94	.60	_		
	F 2	52	.52	60	.95	.69	.94			

 Table 07 : Factor Score Correlations (F.S.C) among two factors extracted from MMPI-2

 content scales for American and Algerian Samples

The CC and FSC between the two male samples were all very high, ranging from .91 to .98, indicating that the four factor structures for the male samples are nearly identical. The solution for the normative adult females shows good convergence with the male samples, though not as high as between the male samples. The convergence between the female college sample and the other samples are somewhat low. Specifically, the CC and FSC for factor 3 between the female college sample and the two normative samples are extremely low.

The CC and FSC for the noncorresponding factors (e.g., factor 3 for normative females and factor 1 for the female college sample) are even higher than those for the corresponding factors. The most surprising finding is that the factor structure of the male college sample is more similar to that of normative females than that is the female college sample.

Since the factor structures of the normative female and female college samples were quite different, it was decided to randomly split each sample in half to examine whether the differences were caused by chance. Differences within a sample can be looked at as pure sampling error and used as a basis for interpretation of any between sample differences.

The CC for the four factors within each sample were very high, ranging from.98 to 1.0 for normative females and from.94 to .99 for the female college sample. However, again, CC between random halves of the normative female sample and of the female college sample are extremely low. These results strongly suggest that the divergence for factor 3 between normative females and the female college sample does reflect true sample differences rather than chance variance.



Careful inspection of Table 03 reveals some interesting aspects of the two similarity indices. First, the two similarity indices give different values for the same factor comparisons. The FSC measure a factor similarity. Moreover, as seen in Table 03, they even give opposite orders of degree of convergence for the four factors. In the comparison between male and female college samples, the lowest congruence coefficient (.65) was for the fourth factor, whereas the FSC for factor 4 gives the highest value (.90). Second, as expected, compared to the FSC, CC for the non-corresponding factor pairs were very high, indicating the lack of a convergent-discriminant factor pattern.

Factor structure of the 15 content scales. The two factor solutions for the normative adult and college samples on the 15 content scales are given in Table 04.

The first factor is primarily represented by scales: ANX, OBS, DEP, LSE, SOD, WRK, and TRT for all samples. This factor seems to measure negative emotionality (Tonsager & Finn, 1992).

The second factor, labelled impulsivity, is characterized by high loadings on scales BIZ, ANG, CYN, ASP, TPA, and FAM.

Scales FRS and HEA load on factor 1 in both male samples, but in both female samples, FRS loads on factor 2 and HEA loads moderately on factors 1 and 2.

The CC and FSC for the two factors are extremely high, ranging from .96 to .99 in all factor comparisons (Table 06).

They clearly indicate that two factor structures that emerge from the normative adult and college samples are very similar. The high factor convergence across all samples for the content scales may be due to the homogenous content within the content scales.

To summarize, the four-factor solutions for the 13 basic scales demonstrated fairly high factor convergence between the two U.S. male samples. The convergence between the female college sample and other samples was somewhat low. The two-factor solution for the 15 content scales demonstrated very high convergence across samples and genders.

Arabic MMPI-2 Factor Structure

The same methodologies described in the American study were employed to examine the factor structures of the Arabic MMPI-2 basic and content scales, respectively.

First, the correlation matrices of the Kcorrected raw scores for the three validity and 10 clinical scales for the Algerian male and female college samples were submitted to a principal component analysis followed by a varimax rotation. The Kaiser-Guttman criterion indicated the presence of four factors for males and females. Second, for the content scales, the "eigenvalue greater than one" criterion indicated two factors for the males and the females

However, the four factor solutions for the 13 basic scales and the two factor solutions for the 15 content scales will



discussed here because these factor solutions showed far better convergence within the U.S samples.

Factor structure of the basic scales.

For each sex, Table 01 and Table 02 shows the scales loadings on the fourfactor solution and the percent of variance accounted for. The factors have been reordered as necessary to match the factors for comparison. In the fourfactor solution, the scales are somewhat differently aligned. For the male sample, the first factor is defined by high factor loadings on the L, F, K, Pd, Pa, Pt, Sc and Ma scales. This corresponds to the general maladjustment factor in the United States data. For females, the first factor is characterized by high loadings on the neurotic scales (Hs, D, and Hy) and moderate loadings on the psychotic scales (F, Pd, Pa, Pt, and Sc).

The second factor, which corresponds to social introversion, is represented by high positive loadings on scales Si and Ma for males and represented by high positive loadings on Si and moderate loadings on D and Ma for Females. The third factor, which corresponds to overcontrol or repression, is marked by high loadings on Hs, D, and Hy scales for males. For femals, this factor is marked by high negative loadings on K and high loadings on F, Pt and Sc scales. This factor in females is pretty similar to the first factor (general maladjustment) in males. The fourth factor in the female and male sample corresponds to the masculinity-femininity factor in the United States data.

As expected, the FSC for factors 2 and factor 4 and between males and females are fairly high (FSC of .94 and .76), indicating that the second and Forth factors in males and females are very similar. The The general maladjustment (factor1) a moderate factor has convergence between genders, with a FSC of .51. But the factor 3 has low convergence between males and females with a FSC of .10), this mean that the factor 3 is not similar between the two samples.

Factor structure of the content scales.

Table 04 present the two-factor solutions for the Algerian male and female college samples on the 15 content scales. Looking first at the two factor solution, the first factor is primarily represented by scales ANX, OBS, DEP, HEA, LSE, SOD, WRK, and TRT for both samples. This corresponds to the *negative* emotionality factor in the United States data. The second factor, equating with the U.S. impulsivity factor. is characterized by scales: BIZ, ANG, CYN, ASP, TPA, and FAM.

The FSC for the two factors between sexes showed that the factor 1 is high with FSC of .82 and the factor 2 is moderate with FSC of .55 this indicate that the two factor structures that emerged from these Algerian male and female samples are identical. (see Table 07).

Comparison of the Arabic MMPI-2 Factor Structure with American MMPI-2 Factor structures

The four-factor solutions for the 13 basic scales and the two-factor solutions for the 15 content scales in Algerian and samples were American college examined for similarity. However, the four factor-solutions for the 13 basic scales and the two-factor solutions for the 15 content scales will be discussed here because as noted above, the four factor solution for the basic scales and two factor solution for the content scales showed convergence within the U.S. samples. These factor solutions were also more interpretable and supported by prior research (Butcher & Pancheri, 1976; Shiota, 1989; Tosager & Finn, 1992). To determine the degree of similarity of the factor solutions a factor score correlations (FSC) was computed across the four samples.

Factor structure of the basic scales.

Table 01 and 02 present scale factor loading and percentage of variance. The order of factors has been rearranged as necessary to make the factors maximally comparable to each other and to the other data sets. In the two male samples, the first factor is characterized by scales F, Pd, Pa, Pt, Sc and Ma, the neurotic Hs also has moderate loading on this factor in the American samples. In the female sample, the first factor is characterized by high loadings on the neurotic scales (Hs, D, and Hy) and moderate loadings on the psychotic scales (F, Pd, Pa, Pt, and Sc) the neurotic scale load on this factor more highly than do the psychotic

 $\odot \odot \odot \odot$

scales. This factor is usually referred to as general maladjustment.

The second factor is represented by the D and Si in all samples. Scales Pt and Sc also load on this factor in American male and female samples, with Hs also loading on this factor in American male sample and K loading negatively on this factor in American female samples, Ma has a high negative loading on this factor in the Algerian male and female samples. This factor can be labeled social introversion.

The third factor, labeled repression or ego control, is characterized by high loading on L and K, with Hy loading highly in the American male sample and Hs loading in the Algerian male sample. For females, this factor is characterized by high on L and K (except American females) and moderate to high negative loadings on Ma. For Algerian females, this factor also includes some psychotic scales (Pt and Sc).

The last factor is characterized solely by Mf for all samples, and can be considered masculinity-femininity.

For the male factor structure, convergence between American and Algerian men for the four factors are high, with factor score coefficient (FSC) of .94, .84, .34, and .52 (see table 03). Overall, when one compare Algerian males with American males the three factors appear to be somewhat similar except for the third factor.

For females, the factor structure between American and Algerian subjects are very similar. The FSC for the four factors



are .97, .55, .81 and .63. Overall, however, the Algerian female sample has similar factor structures to American females. These results lead to the conclusion that Algerian female sample have a fairly stable four-factor solution for the 13 basic scales (general maladjustment, over-control, social introversion, and masculinityfemininity).

Factor structure of content scales.

The two factor solutions on the 15 content scales are given in Table 04 and 05. The first factor, labeled *negative emotionality*, is primarily represented by scales: ANX, OBS, DEP, HEA, LSE, SOD, WRK, and TRT for all samples. The second factor, labeled *impulsivity*, is characterized by scales: BIZ, CYN, ASP, TPA, and FAM.

The FSC for the two factors are high, ranging from .55 to .94 in factor comparisons across four samples (see Table 06) and extremely high between American and Algerian female samples with FSC of .94 for the two factors. They clearly indicate that the factor structures of the content scales are identical in the college samples cross-nationally.

To summarize, factor structure of the basic scales between American and Algerian samples are so similar for each gender that factor congruence crossnationally was even higher than that between samples within the US for each gender. For the content scales, a twofactor solution emerged with high convergence across all four samples. Factor analyses of the content scales showed that a two-factor solution for the content scales replicated very well in other cultures as well as in the United States. However, the validity and clinical scales did not possess as stable an internal structure even within U.S. samples (Butcher, 1996).

The robustness of the two-factor solution for content scales require some comment. It might be argued that reducing the number of factors increases factor stability. Content scales may have yielded high convergence across sample simply because the number of factors extracted for the content scales was smaller than for the basic scales. This result demonstrates that an inappropriate reduction of factors can make factors less comparable across samples. Furthermore, a comparison of threefactor solutions for the basic and content scales revealed that overall, three factor for the content scales yielded higher convergence across samples than did three factors for the basic scales.

According to Butcher & Han (1996), the basic scales might be a poorer candidate for examining the internal structure of MMPI-2 because the scales are correlated highly with each other, owing partly to item overlap. The content scales, on the other hand, are more internally consistent, and few items overlap across scales. Are the basic scales, then, not a reliable source for examining the internal structure of the MMPI-2? There is at least some evidence for the stability of the factor structure of the basic scales, depending on the sample.



A remaining problem with these factor analysis results lies in their interpretation when there is low factor convergence. In spite of the factor structure differences between American normative females and American college females, there is little doubt that the MMPI-2 basic scales measure the same construct in both American female samples. Similarity. when factor structure differences are identified across cultures, we should not be quick to claim that the scales measure different construct.

4. CONCLUSION

In conclusion, although the content scales provide unequivocal evidence for factor invariance, the basic scales also add some information about the factor structure of the MMPI-2. Owing its robustness, it is recommended that the factor invariance of the content scales be considered a minimum condition for further investigation of the internal structure of the MMPI-2. However, both sets of scales should be used for exploring the internal structure of the instrument.

The preceding discussion clearly shows that the Arabic version of the MMPI-2 has the same internal structure then valid as the original MMPI-2. However, the sample used in the present study is relatively small and does not sufficiently represent the general Algerian adult population. То make possible a comparison of Arabic MMPI-2 profiles with an appropriate normative group, an Arabic MMPI-2 normative project should be an immediate goal for future

research. Ideally, a normative sample should match the population census in of age, education level. terms socioeconomic background, and geographic distribution. Data from clinical setting should be collected, since the utility of the Arabic MMPI-2 will ultimately be determined by the efficacy with psychiatric populations. It will be important to determine whether the Arabic MMPI-2 can be used effectively as the U.S. MMPI-2 to differentiate disturbed persons from normal and to make clinically useful distinction among individuals manifesting various type of psychopathology.



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