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The Brazilian-Portuguese MCMI-III: diagnostic validity of the alcohol dependence and drug dependence scales

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Abstract

A Brazilian-Portuguese translation of the MCMI-III (BP-MCMI-III) was developed to be used in Brazil and with the increasing population of Brazilian immigrants in the United States. This paper reports the results of a study that examined the diagnostic validity of the BP-MCMI-III Alcohol Dependence and Drug Dependence scales for identifying substance-related problems among Brazilians. Findings support the scales' validity.

Keywords: MCMI-III, Brazilian, Portuguese, test translation, test validity, alcohol and drug dependence.

1. Purpose of the Study

The Millon Clinical Multiaxial Inventory, third edition (MCMI-III: Millon, Davis, & Millon, 1994, 1997), is a personality inventory that is widely used in the United States and in many other countries to assess psychopathology in a variety of clinical settings (Craig, 2005). The instrument is considered to be well-designed and psychometrically stable, and to have several advantages over similar personality tests currently available (Groth-Marnat, 2003). The MCMI-III is relatively brief (compared to other personality inventories), easy to administer and score, and uses terminology that is similar to that used in the current Diagnostic Statistical Manual of Mental Disorders (DSM-IV-TR: APA, 1994) (Choca & Van Denburg, 1997; Craig, 1997).

Due to the instrument's recognized clinical utility, a Brazilian-Portuguese translation of the MCMI-III (BP-MCMI-III) was developed to be used in Brazil and with the increasing population of Brazilian immigrants in the United States. The initial phases of this project involved the completion of four preliminary steps in cross-cultural test adaptation: (1) the translation phase, which included a series of procedures used to maximize translation accuracy and readability; (2) a pilot test-retest study, which evaluated item equivalency using a bilingual sample; (3) the revision phase, which involved further refinement of problem-items; and (4) a reliability study, which evaluated the psychometric properties of the new version with data collected in Brazil. The results of these studies were

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encouraging and suggest that the translated instrument is psychometrically reliable and comparable to the original test (Magalhaes, 2005).

This paper presents the results of a study that examined the diagnostic validity of the BP-MCMI-III Alcohol Dependence and Drug Dependence scales with a Brazilian sample composed of clinical and non-clinical participants. The diagnostic validity of these scales was studied by comparing participants' group status (patients receiving substance abuse treatment versus controls) against diagnoses made on the basis of the test (Hypothesis 1 and Hypothesis 2), and by comparing diagnoses made on the basis of the DSM-IV-TR against diagnoses made on the basis of the test (Hypothesis 3 and 4). In addition, the construct validity of the Alcohol Dependence scale was examined by comparing the participants' scores on the BP-MCMI-III against scores on the Alcohol Use Disorders Identification Test (Hypothesis 5). Because the investigators did not find a measure of drug abuse/dependence in Portuguese that could be used in this study, the construct validity of the Drug Dependence scale was not tested. Post hoc analyses were conducted to estimate validity indices for both scales.

2. Method

2.1. Participants

The sample utilized in this study (*N*=126) was composed of participants receiving treatment for substance-related disorders (clinical participants) and controls (non-clinical participants). Clinical participants (*N*=75) were contacted through two substance abuse treatment facilities in Rio de Janeiro, Brazil. Twenty-three were receiving treatment due to alcohol related disorders only, twelve due to drug related disorders only, and forty had diagnoses of both alcohol and drug related problems. Clinical participants were mostly male, single, unemployed, and Catholic. Approximately sixty-three percent had completed a minimum of 8th grade level education. Patients' age ranged from 18 to 60 years (M = 37; SD = 10).

Non-clinical participants were recruited through two churches in Rio de Janeiro, Brazil, via local contacts (a convenience sample). The non-clinical sample was composed of thirty-three female and eighteen male participants (*N*=51), with ages ranging from 19 to 67 years (M = 34; SD = 13). Most non-clinical participants identified themselves as Protestant, were either single or married, and had completed a minimum of 8th grade education. Approximately fifty percent had either college or graduate degrees. Regarding occupation, only six percent were unemployed.

2.2. Instrumentation

All participants were administered the following assessment measures: (1) the BP-MCMI-III, (2) the Alcohol Use Disorders Identification Test (AUDIT), (3) a diagnostic questionnaire (DQ), and (4) a demographic questionnaire. Testing was done typically in groups of 5 to 10 participants and subjects were administered the assessment materials in counterbalanced order to control for possible order effects. Approximately half of the sample completed the assessment measures in the following order: demographic questionnaire, BP-MCMI-III, DQ, and AUDIT. The other half completed the assessment measures in the following order: demographic questionnaire, DQ, AUDIT, and BP-MCMI-III.

2.2.1. The BP-MCMI-III Alcohol Dependence and Drug Dependence Scales

Like the original MCMI-III, the BP-MCMI-III is a paper and pencil inventory containing 175 true-false items and a total of 27 subscales: (a) 3 for estimating the individual's test-taking attitude, (b) 14 for measuring different personality styles, and (c) 10 for assessing the presence of clinical syndromes, including anxiety, depression, psychotic disorders, posttraumatic stress, and substance-related problems (Millon, Davis, & Millon, 1997). High scores on the Alcohol Dependence scale are expected to be indicative of current problematic drinking or a history of alcoholism with associated symptoms such as subjective distress, family problems, and deficits in social and occupational functioning. Similarly, high scores on the Drug Dependence scale are expected to be indicative of current drug use or a history of drug addiction with associated symptoms (Craig, 1993, 2005). A reliability study

with 220 Brazilian college students in Rio de Janeiro found test-retest coefficients of .70 and .85 for the BP-MCMI-III Alcohol Dependence and Drug Dependence scales, respectively (Magalhaes, 2005).

2.2.2. The Diagnostic Questionnaire

Structured diagnostic interviews are commonly used in substance abuse research and are generally considered reliable instruments for use with both clinical samples and the general population (Grant and Towle, 1990; Grant, 1997). The diagnostic questionnaire (DQ) used in this study was a reduced version of the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS), one of the most widely used diagnostic instruments of this type. The AUDADIS operationalized the DSM-IV criteria for alcohol abuse and dependence and relies exclusively on respondent self-report (Grant & Hasin, 1992). A study with the AUDADIS found the combined diagnoses of lifetime alcohol abuse and dependence to be highly reliable (Grant, Harford, Dawson, Chou, & Pickering, 1995). The reduced version used in this study was a self-report symptom checklist that contained 11 "yes-no" questions about substance use patterns, each corresponding to a specific diagnostic criterion listed under the DSM-IV-TR diagnostic code. Separate forms for alcohol and drug abuse/dependence were available.

The translation of this instrument to Portuguese was completed by the first author, with the assistance of a professional translator. The translated version was back translated to English by a bilingual research assistant (Brazilian native) and compared with the original version by a monolingual English speaker (American native). No major discrepancies were found between the two English versions and only minimal changes were made on the final Portuguese version that was used in this study. Diagnoses made on the basis of this questionnaire were compared against diagnoses made on the basis of the BP-MCMI-III to test hypotheses 3 and 4 and to calculate diagnostic efficiency indices for both substance dependence scales of the BP-MCMI-III.

2.2.3. The Alcohol Use Disorders Identification Test

The Alcohol Use Disorders Identification Test (AUDIT) was developed by the World Health Organization (WHO) in a six-country collaborative project for early detection of problem drinking, as part of a brief intervention trial (Saunders & Aasland, 1987). Unlike the MCMI-III Alcohol Dependence scale, which assesses drinking problems in the context of general psychopathology, the AUDIT was developed specifically for the detection of problem drinking in primary care settings, where hazardous drinkers seek medical treatment for other health-related concerns (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993; Miles, Winstock, & Strang, 2001; Maisto, S. A., Conigliaro, J., McNeil, M., Kraemer, K., & Kelley, M. E., 2000; Allen, Litten, Fertig, & Babor, 1997; Fleming, Barry, & MacDonald, 1991).

The AUDIT is a paper and pencil "yes-no" questionnaire composed of 10 items related to alcohol consumption patterns – three questions on the amount and frequency of drinking, three questions on harmful use of alcohol, and four on alcohol-related consequences – and with scores ranging from 0 to 40. In a review of the AUDIT literature, Reinert and Allen (2002) reported that the instrument has proven to be internally consistent with diverse samples and in different settings, with median Chronbach's alpha falling in the .80s for the 18 studies included in the review. The four studies that tested the temporal reliability of the AUDIT over a two-week interval found results ranging from .64 to .92. The median sensitivity was .86 and the median specificity was .89 for a cut-off score of 8, across 13 studies.

The AUDIT translation used in this study was developed by a research team in São Paulo, Brazil, in collaboration with the WHO and researchers associated with the University of Connecticut under the leadership of Thomas Babor, one of the principal investigators involved in the development of the original instrument in English (Furtado, 2004). Although data to support the reliability and validity of this translation were not available at the time this study was conducted, data obtained with a similar translation offered support for the test's validity for detecting alcohol related problems in the Brazilian population (Méndez, 1999). Méndez' findings were obtained with a sample composed of 733 participants recruited through two primary care facilities in Pelotas, Brazil. For a cut-off score of 8, sensitivity was .92 and specificity was .62.

Despite the lack of new validity data to support the revised translation, five factors influenced the authors' decision to use Furtado's version in this study: (1) it was developed in collaboration with the original developers of the test, (2) it was up-to-date with the most current AUDIT manual, (3) the wording of the questions was more casual and more appropriate for the location where the data were collected, (4) items were adapted to account for

differences in the amount of alcohol contained in typical Brazilian drinks, and (5) cut-off scores were not needed for analysis (total scores were used).

2.2.4. The Demographic Questionnaire

A demographic questionnaire was used to gather information about the participants' age, gender, marital status, education, religion, occupation, history of substance abuse treatment, and reason for current admission to a substance abuse treatment facility. Information obtained with this questionnaire provided a description of the sample and determined group eligibility for hypotheses 1 and 2.

2.3. Clinical and Control Groups

The composition of clinical and control groups varied for hypotheses 1, 2, 3, and 4. For testing hypothesis 1, the clinical group was composed of participants who were receiving treatment at the time of testing for alcohol-related problems only and those who were receiving treatment for both alcohol- and drug-related problems (N = 63). The control group was composed of non-clinical participants (N = 51). For hypothesis 2, the clinical group was composed of participants who were receiving treatment at the time of testing for drug-related problems only and those who were receiving treatment for both alcohol- and drug-related problems (N = 52); the control group was composed of non-clinical participants (N = 51). For hypothesis 3, the clinical group was composed of participants who were identified as having either an alcohol abuse or an alcohol dependence diagnosis according to DSM-IV-TR criteria (N = 66); the control group was composed of participants who did not meet DSM-IV-TR criteria for alcohol-related disorders (N = 60). For hypothesis 4, the clinical group was composed of participants who were identified as having either a drug abuse or a drug dependence diagnosis according to DSM-IV-TR criteria (N = 72); the control group was composed of participants who did not meet DSM-IV-TR criteria for drug-related disorders (N = 54).

Group equality was tested by performing chi-square tests on the following variables: gender, marital status, occupation, education, religion, alcohol treatment history, drug treatment history, and frequency of drinking. A t-test was used for testing equality in terms of age. Clinical and control groups were found to be (a) non-equivalent on all demographic variables, except age, for hypothesis 1; (b) non-equivalent on all variables, except age, for hypothesis 2; (c) non-equivalent on all variables, except marital status, for hypothesis 3; and (d) non-equivalent on all variables, except age, for hypothesis 4.

3. Results

3.1. Hypotheses Testing

For testing hypotheses 1, 2, 3 and 4, eight analyses of covariance (ANCOVAs) were run using gender, education, history of alcohol treatment, history of drug treatment, frequency of drinking, and dummy coded variables for marital status (1 = married; 0 = other) and religion (1 = Protestant; 0 = other) as covariates. The independent variables for each analysis were dichotomous (two groups = clinical, control) and the dependent variables were the raw and base rate scores for the Alcohol Dependence and Drug Dependence scales. Hypothesis 5 was tested by performing a t-test to determine the significance of the correlation between AUDIT scores and BP-MCMI-III scores.

3.1.1. Hypothesis 1

It was expected that clinical participants would have a significantly higher raw and base rate score than controls on the Alcohol Dependence scale when clinical and control groups were defined based on whether individuals were receiving or not receiving treatment for alcohol-related problems at the time of testing. The diagnostic validity of the Alcohol Dependence scale was supported by the results of the ANCOVAs when both raw (F = 18.19; df = 1, 111; p < .05) and base rate scores (F = 7.79; df = 1, 111; p < .05) were used in the analyzes. The scores of patients receiving treatment for alcohol-related problems at the time of testing (N = 60) were significantly higher than the scores of non-clinical participants (N = 51). The magnitude of the effect (partial eta squared) reached .15 for raw and .07 for base rate scores.

3.1.2. Hypothesis 2

It was expected that clinical participants would have a significantly higher raw and base rate score than controls on the Drug Dependence scale when clinical and control groups were defined based on whether individuals were receiving or not receiving treatment for drug-related problems at the time of testing. The diagnostic validity of the Drug Dependence scale was also supported by the results of the ANCOVAs when both raw ($F = 70.38$; $df = 1, 99$; $p < .05$) and base rate scores ($F = 23.51$; $df = 1, 99$; $p < .05$) were used in the analyzes. The scores of patients receiving treatment for drug-related problems ($N = 48$) were significantly higher than the scores of non-clinical participants ($N = 51$). The magnitude of the effect (partial eta squared) reached .44 for raw and .21 for base rate scores.

3.1.3. Hypothesis 3

For hypothesis 3, groups were defined based on the presence of positive (clinical) versus negative (control) DSM-IV-TR diagnoses. Participants who gave 3 or more "yes" responses for items 1 through 7 of the DQ (alcohol use questions) met the DSM-IV-TR diagnostic criteria for alcohol dependence; those who gave 1 or more "yes" responses for items 8 through 11 met criteria for alcohol abuse. It was expected that individuals diagnosed with alcohol abuse or dependence based on DSM-IV-TR criteria would have significantly higher raw and base rate scores than controls on the BP-MCMI-III Alcohol Dependence scale.

The diagnostic validity of the BP-MCMI-III Alcohol Dependence scale was supported by the results of the ANCOVAs when group eligibility was defined by the presence of positive versus negative DSM-IV-TR diagnoses, for both raw ($F = 10.24$; $df = 1, 121$; $p < .05$) and base rate scores ($F = 6.98$; $df = 1, 121$; $p < .05$). Participants who scored positive for alcohol-related problems on the DQ obtained higher raw and base rate scores on the BP-MCMI-III Alcohol Dependence scale than those who scored negative on the DQ. The magnitude of the effect (partial eta squared) reached .08 for raw and .06 for base rate scores.

3.1.4. Hypothesis 4

For hypothesis 4, groups were also defined based on the presence of positive (clinical) versus negative (control) DSM-IV-TR diagnoses. Participants who gave 3 or more "yes" responses for items 1 through 7 of the DQ (drug use questions) met the DSM-IV-TR diagnostic criteria for drug dependence; those who gave 1 or more "yes" responses for items 8 through 11 met criteria for drug abuse. It was expected that individuals diagnosed with drug abuse or dependence based on DSM-IV-TR criteria would have a significantly higher raw and base rate score than controls on the BP-MCMI-III Drug Dependence scale.

The diagnostic validity of the BP-MCMI-III Drug Dependence scale was supported by the results of the ANCOVAs when group eligibility was defined by the presence of positive versus negative DSM-IV-TR diagnoses, for both raw ($F = 61.83$; $df = 1, 121$; $p < .05$) and base rate scores ($F = 22.99$; $df = 1, 121$; $p < .05$). Participants who scored positive for drug-related problems on the DQ obtained higher raw and base rate scores on the BP-MCMI-III Drug Dependence scale than those who scored negative on the DQ. The magnitude of the effect (partial eta squared) reached .36 for raw and .17 for base rate scores. Table 1 summarizes the results of the ANCOVAs for hypotheses 1 through 4.

3.1.5. Hypothesis 5

It was expected that there would be a significant positive correlation between subjects' scores on the BP-MCMI-III Alcohol Dependence scale and scores on the AUDIT. Pearson correlations between the AUDIT and the BP-MCMI-III Alcohol Dependence scale were obtained using both raw ($r = .81$) and base rate scores ($r = .72$). The results showed strong positive correlations that were significant at the .01 level. Findings indicate that these two scales are measuring similar constructs and support the construct validity of the BP-MCMI-III Alcohol Dependence scale.

3.2. Post Hoc Analyses

Diagnostic validity indices were computed for the BP-MCMI-III Alcohol Dependence and Drug Dependence scales at cut-offs of 75, 80 and 85. The presence of positive versus negative DSM-IV-TR diagnoses, determined by the subjects' scores on the DQ, was considered the "gold standard" to which diagnoses made by the BP-MCMI-III

were compared. As they apply to the clinical syndrome scales, cut-off scores of 75 and above on the MCMI-III indicate the presence of a syndrome; while scores of 85 and above indicate the prominence of a syndrome.

At the cut-score of 75, the BP-MCMI-III alcohol and drug dependence scales performed approximately equal or better than the MCMI-III (at cut-score of 85) for most validity indices when the 1994 MCMI-III data set was used for comparison (Hsu, 2002; Restlaff, 1996). The BP-MCMI-III alcohol and drug dependence scales performed approximately equal or somewhat worse than the MCMI-III (at cut-score of 85) for most validity indices when the 1997 MCMI-III data set was used for comparison (Hsu, 2002; Millon, Davis, & Millon, 1997). These results are not surprising given the fact that there is concern about the possibility of underestimation of the validity of the MCMI-III based on the 1994 validity data and the potential for overestimation based on the 1997 data set (Hsu, 2002). Tables 2 and 3 present validity indices for the MCMI-III (at cut-score of 85) and the BP-MCMI-III (at 75 and 85 cut-offs).

4. Discussion

All hypotheses were supported by the data. Clinical participants scored significantly higher than non-clinical participants in both the alcohol dependence and drug dependence scales when group membership was determined based on participants' treatment/no treatment status (hypotheses 1 and 2) and when determined based on the presence/absence of DSM-IV-TR diagnoses (hypotheses 3 and 4). Additionally, significant positive correlations were found between raw and base rate scores on the BP-MCMI-III alcohol dependence scale and the AUDIT. Diagnostic validity indices obtained with the present sample provided information on the diagnostic efficiency of the BP-MCMI-III substance dependence scales for detecting alcohol- and drug-related disorders among Brazilians.

4.1. Internal and External Validity of the Study

Potential threats to internal validity (associated with group differences in terms of gender, marital status, education, religion, history of alcohol treatment, history of drug treatment and frequency of drinking) were addressed with the use of ANCOVAs during hypotheses testing. Although ANCOVAs can not completely remove the potential for selection bias with intact groups, this method is considered to be a reasonable solution for the problem of unequal groups if caution is exercised when interpreting the results (Stevens, 1990). Given the limitations of ANCOVAs for controlling the potential for selection bias in non-randomized studies, the conclusions about this study are presented tentatively.

The fact that the sample was composed of Brazilians residing in Brazil is one of the strengths of this study. If data had been collected in the United States, the participants' understanding of individual test items potentially would have been affected by acculturation, which in turn would have limited the external validity of the results. Nevertheless, the results of this study must be interpreted in the context of the characteristics of the sample it used. Participants were recruited from low-income and middle-income suburban areas in Rio de Janeiro, the second largest metropolitan region in Brazil. Although it is unlikely that Brazilians residing in other parts of Brazil would have responded differently to the assessment measures, it is possible that regional differences in the use of the Portuguese language may have affected the results.

4.2. Future Directions

This study represents the first validity study with the BP-MCMI-III. Findings supported the validity of the BP-MCMI-III substance dependence scales for detecting substance-related problems among Brazilians. Future studies should focus on examining the diagnostic efficiency of the scales with a sample that includes a more heterogeneous psychiatric population so that new base rates can be computed. The validity of other BP-MCMI-III scales should be examined so that the instrument's overall diagnostic utility can be ascertained.

5. Tables

Table 1. Results of the ANCOVAs for Hypotheses 1 through 4

	F		*P*		η^2	
Hypotheses	**Raw Scores**	**Base Rates**	**Raw Scores**	**Base Rates**	**Raw Scores**	**Base Rates**
Hypothesis 1	18.19	7.79	.000	.006	.15	.07
Hypothesis 2	70.38	23.51	.000	.000	.44	.21
Hypothesis 3	10.24	6.98	.002	.009	.08	.06
Hypothesis 4	61.83	22.99	.000	.000	.36	.17

Table 2. Comparative Table of Validity Indices for the MCMI-III and the BP-MCMI-III Alcohol Dependence Scale

	MCMI-III		BP-MCMI-III	
Validity Indices	**1994[a]**	**1997[a]**	**BR 75**	**BR 85**
Sensitivity	.73**	.80*	.94	.71
Specificity	.86**		.82	.93
Positive Predictive Power	.42**	.88*	.85	.92
Negative Predictive Power	.96**		.93	.75
Overall Diagnostic Power			.88	.82
Incremental Validity of Positive Test Diagnoses	.30***	.71***	.33	.40
Incremental Validity of Negative Test Diagnoses	.08***	.13***	.41	.23
Cohen's Kappa	.45***	.81***	.76	.64
Prevalence	.12**	.17*	.52	.52
Effect Size	1.68***	2.85***	1.89	1.89
Area Under Curve (AUC)	.88***	.98***	.94	.94

[a]Statistic calculated using cut-score of 85.
*In Millon, Davis, & Millon, 1997; **In Restlaff, 1996; and ***In Hsu, 2002.

Table 3. Comparative Table of Validity Indices for the MCMI-III and the BP-MCMI-III Drug Dependence Scale

	MCMI-III		BP-MCMI-III	
Validity Indices	**1994 [a]**	**1997 [a]**	**BR 75**	**BR 85**
Sensitivity	.52**	.82*	.82	.65
Specificity	.95**		.88	.95
Positive Predictive Power	.47**	.93*	.83	.90
Negative Predictive Power	.96**		.87	.78
Overall Diagnostic Power			.85	.82
Incremental Validity of Positive Test Diagnoses	.39***	.82***	.41	.47
Incremental Validity of Negative Test Diagnoses	.04***	.09***	.44	.36
Cohen's Kappa	.47***	.86***	.69	.62
Prevalence	.08**	.11*	.43	.43
Effect Size	1.67***	3.34***	1.90	1.90
Area Under Curve (AUC)	.88***	.99***	.94	.94

[a]Statistic calculated using cut-score of 85.
*In Millon, Davis, & Millon, 1997; **In Restlaff, 1996; and ***In Hsu, 2002.

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