Short-form Analysis of the Restructured Clinical Scales and PSY-5 Scales of the MMPI-2

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Abstract

The Restructured Clinical (RC) Scales and Personality Psychopathology Five (PSY-5) Scales of the MMPI-2 are becoming more popular for interpretation of standard MMPI-2 profiles. These scales were initially developed using all 567 questions of the MMPI-2, making it necessary for the patient to complete all items for interpretation of these scales. This study generated estimations of the RC and PSY-5 scales with protocols in which only 370 questions were completed. Equations were created with over 1000 protocols and then cross-validated with a different set of protocols. The results showed moderate utility of the RC and PSY-5 scales with only 370-items completed. The following research provides tables which can be used in situations when only the first 370-items are completed, but additional interpretation with RC and PSY-5 scales is still desired.

Introduction

The MMPI-2 is an objective personality inventory that was restandardized in 1989 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). More recently, two sets of scales have been developed. The Restructure Clinical (RC) scales offer conceptually meaningful constructs of affective presentation (Tellegen, Ben-Porath, McNulty, Arbisi, Graham, & Kaemmer, 2003) while the PSY-5 offers scales to evaluation personality constructs (Harkness, McNulty, Ben-Porath, & Graham, 2002). Both sets of subscales offer additional interpretation options to MMPI-2 profiles. Unfortunately, both sets of scales are composed of items from all 567 questions of the MMPI-2, which limits their utility when a patient fails to complete an entire protocol.

Despite cogent arguments against intentionally offering a shortened form of the MMPI-2 (cf. Butcher & Hostetler, 1990), attempts have been made to find reasonable versions of the MMPI-2 that might indeed reduce the number of test items (e.g., Dahlstrom & Archer, 2000; Gass & Luis, 2001). Even the newest version of the MMPI-2, known as the MMPI-2-RF (Ben-Porath & Tellegen, 2008), was in part developed to generate maximal information from a reduced item set.

Despite explicit prohibitions to shortening the MMPI-2, there may be times when a patient fatigues or refuses to complete the full MMPI-2 prior to the end of the task. Finishing the first 370-items of the MMPI-2 nonetheless offers the opportunity for valid interpretation using the basic 10 clinical scales and three validity scales. Such is not the case for the RC or PSY-5 scales as many items appear through the end of the MMPI-2. The goal of this research is to

examine the utility of the RC scales and PSY-5 scales if only the first 370-items of the MMPI-2 have been completed.

Method

Participants. The original database consisted of 2468 records taken from the general psychological testing service at a large metropolitan Department of Veterans Affairs Medical Center (VAMC). After screening for invalid profiles (F with T> 100, raw > 20) there were 1938 cases remaining. Of those cases, 1747 are male and 191 female.

Procedure. Restructured Clinical Scale variables were developed using the information gained from the RC scales manual (Tellegen, Ben-Porath, McNulty, Arbisi, Graham, & Kaemmer, 2003). Variables for the PSY-5 scales were developed using information from its manual (Harkness, McNulty, Ben-Porath, & Graham, 2002). The following procedures were performed on both the male only sample (n= 1747) and female only sample (n=191).

In order to establish regression equations, 70% of each sample was selected as an origination group. The origination group for the male only sample was n= 1257, and for the female only, n= 142. Those cases were used in establishing the predictive regression equation. Raw scores from the shorter version of the tests were regressed onto the total raw scores for each scale. This procedure was performed instead of a simple arithmetic prorating as there is no information that indicates whether all items within each scale are responded to in the same manner. Individuals who endorse certain RC or PSY-5 items may respond more during the latter half of the scale as opposed to earlier, and vice versa. Therefore, eliminating one half of the scale and prorating would fail to address the true nature of item responses within the scale. The regression analysis controls for these potential differences of response rates, whereas prorating does not.

Estimated raw scores were computed by using the raw scores for the cross validation sample and applying the obtained regression equations. For conversion of raw predicted scores to T-scores, all scales were converted to uniform T-scores.

Cross-validation of this equation was used on the remaining 489 cases in the male sample, and on the remaining 49 cases in the female sample. The following are reported analyses for the full MMPI-2 data set (567 items) and the short-form version (370 items) of the MMPI-2 RC scales and PSY-5 scales

Results

Restructured Clinical Scales. The observed and estimated raw scores for all RC scales are presented in Table 1. The first column presents the predicted raw score estimation equations based on the multiple regression analyses. Results of paired sample t-tests with Bonferroni correction between mean raw scores of RC scale full-item and short-form versions revealed no significant differences observed on any of the 10 scales, except for RC3 for women (t (1,48)= -3.392, p= .001).

As Table 1 indicates, high raw mean score correlations between full-item and 370-item short-forms on all RC scales were also observed. Predictive short-form raw scores accounted for roughly 90% of the overall variance in the full-item version on all RC scales.

With regard to classification accuracy rates within 5 T score points, scales RCD, RC2, and RC9 had accuracy rates as high as 92%, 96%, and 98% respectively. The RC1 scale had a

perfect 100% classification rate within 5 T. All remaining scales had classification accuracy rates between 80-87%. When a more liberal classification criterion is applied (i.e. within 10 T score points) all scales had accuracy rates of 99% or better, except for RC6 (95%). RC9 and RC1 had perfect or near perfect classification accuracy rates (100%), while the prediction equation for RC7 for women was relatively weak.

When raw scores on all scales were converted to uniform T-scores, within subjects ANOVA between full-item and short-form versions revealed significant differences for males on scales RCD, $F(1, 488)= 5.488$, $p= .020$, eta$^2= .011$; RC1, $F(1, 445)= 14.242$, $p< .001$, eta$^2= .031$; and RC6, $F(1, 488)= 45.557$, $p< .001$, eta$^2= .085$. The results for females revealed significant differences only on scales RCD $F(1, 48)= 5.917$, $p= .019$, eta$^2= .110$, RC3 $F(1, 48)= 5.421$ $p= .024$, eta$^2=.101$, and RC6 $F(1,48)= 5.250$, $p= .026$, eta$^2= .099$. The effect size on these scales is very small indicating these differences may be statistically significant but are clinically innocuous.

PSY-5 Scales. The observed and estimated raw scores for all PSY-5 scales from the samples are presented in Table 2. Results of paired sample t-tests with Bonferroni correction between mean raw scores of PSY-5 scales full-item and short-form versions revealed significant differences on the INTR scale for men ($t (1, 488)= -3.420$, $p= .001$) and no significant differences for any PSY-5 scales for females.

Raw score correlations ranged from .877 to .987, indicating short-form versions accounted for a range from 77% of the variance to as high as 97% of the variance. Classification rates between PSY-5 full and short-form versions within 5 T score points revealed relatively low accuracy rates for males on all scales except for the INTR (99% within 5 T) and INTR (96%) and DISC (94%) for females. The second highest accuracy rate was on the AGGR scale for both males (81%) and females (84%). The remaining scales were 80% and below. When a more liberal classification rate is applied (e.g. 10 T score points) most scales improved to 96% or better, with the DISC scale for males only improving mildly (84%). When raw scores on all scales were converted to uniform T-scores, within subjects ANOVA between full-item and short-form versions revealed significant differences for males on scales AGGR ($F(1, 488)= 11.153$, $p= .001$, eta$^2= .022$), PSYC ($F(1, 488)= 13.034$, $p< .001$, eta$^2= .026$), and INTR ($F(1, 488)= 13.823$, $p< .001$, eta$^2= .028$). The low eta^2 on these scales indicate that the differences may have little to due with the variance of item numbers between tests. Females had no significant differences across T-scores.

Discussion

The results of the following study revealed overall high raw mean score correlations on the RC scales for both the men and women samples. Classification accuracy rates within 5 T score points of 90% and above were revealed on four scales in the male sample and five scales in the female sample. Highest classification rates within 5 T were observed for RCD, RC2, and RC9 in the male sample, whereas in the female sample, the highest classification rates were noted on scales RC2, RC4, RC8, and RC9. A perfect classification rate of 100% was observed on RC1 in both the male and female sample. RC7 was consistently low in both samples. The results offer evidence that in some cases, the 370-item short-form version of the RC scales can be a useful tool to gain further clinical interpretation of the results of a patient's MMPI-2 profile, for both males and females. Though statistically significant differences between full-form and

short-form versions were found on some scales, the low effect size observed on all scales indicates this may have little to do with the difference in number of items.

The results of the PSY-5 scales showed moderately high raw mean score correlations between full and short-form versions on all scales for both the male and female samples. Classification accuracy rates within 5 T were highest on the INTR scale for both samples (male= 99%, female= 96%). The remaining scales in both samples had overall poor classification rates with the exception of DISC in the female sample (94% versus 80% in male sample).

As with other MMPI-2 short-forms, these tables and results are to be used with caution and in emergency situations only. The purpose of this research was to analyze the use of RC and PSY-5 scales when only the first 370 items of the MMPI-2 were completed. Different results in paired samples t-tests, correlations, classification accuracy rates, and within subjects ANOVA between the male and female sample support the continued use of gender specific tables. It is recommended this study be cross-validated on another sample. Future research should continue to focus on the utility of supplementary MMPI-2 scales develop using all 567 items when applied to protocols which have only been completed up to 370-items. The 370-item benchmark is proposed because it is the number of items completed to ensure basic clinical and validity scale interpretation.

Table 1: Means, standard deviations of raw scores, correlations, and converted T-scores for cross-validation samples for Full and 370-item Short Forms of the Restructured Clinical Scales.

Scale	Regression Equation	Mean (Std.Dev.) Raw Scores	Pearson's r (raw)	Mean(Std.Dev.) T-scores	%5 T	%10T
MALES						
RCD		11.46 (7.12)	.970	64.61(13.86)**	92	99.6
RCDpr	**(X*1.604) + .172**	11.36(6.83)		64.22(13.52)		
RC1		11.81(6.08)	.997	72.84(14.40)**	100	100
RC1pr	**(X*1.036) - .064**	11.83(6.08)		73.01(14.17)		
RC2		7.52(4.07)	.980	62.52(14.87)	96	99.8
RC2pr	**(X*1.194) + .113**	7.54(3.96)		62.54(14.26)		
RC3		8.37(3.70)	.946	56.74(11.56)	83	99
RC3pr	**(X*1.331) + .223**	8.39(3.56)		57.05(11.022)		
RC4		6.54(4.22)	.935	53.13(11.71)	87	99
RC4pr	**(X*1.530) - .084**	6.49(3.93)		54.02(10.49)		
RC6		2.17(2.33)	.975	57.30(11.99)**	87	95
RC6pr	**(X*1.092) + .258**	2.23(2.29)		56.10(12.64)		
RC7		9.76(5.86)	.948	59.98(14.07)	80	99
RC7pr	**(X*1.725) + 1.170**	9.81(5.75)		60.23(13.71)		
RC8		4.62(3.64)	.969	60.37(13.56)	87	99.4
RC8pr	**(X*1.200) + .411**	4.68(3.54)		60.47(13.63)		
RC9		12.85(5.03)	.966	51.07(10.15)	98	100
RC9pr	**(X*1.257) + .519**	12.80(4.85)		51.00(9.87)		
FEMALES						
RCD		10.33 (6.76)	.962	62.55(13.28)**	86	100
RCDpr	**(X*1.631) + .724**	10.94 (6.99)		63.90(13.37)		
RC1		10.86 (5.13)	.996	72.82(13.77)	100	100
RC1pr	**(X*1.031) + .129**	10.86 (5.11)		72.82(14.38)		
RC2		7.23 (3.91)	.980	62.70(13.60)	94	100
RC2pr	**(X*1.226) - .095**	7.49 (3.99)		63.38(13.79)		
RC3		6.00 (4.02)*	.966	50.59(11.84)**	88	100
RC3pr	**(X* 1.369) + .473**	6.51 (3.86)		51.82(11.44)		
RC4		5.02 (3.24)	.925	48.86(8.97)	94	100
RC4pr	**(X*1.551) + .108**	5.30 (3.31)		49.31(9.12)		
RC6		1.90 (2.20)	.976	55.41(12.33)**	88	98
RC6pr	**(X* 1.097) + .176**	1.89 (2.13)		54.41(12.32)		
RC7		9.02 (5.31)	.928	58.24(12.72)	72	98
RC7pr	**(X* 1.743) + .909**	8.88 (5.11)		57.80(12.11)		
RC8		3.14 (3.48)	.968	53.65(13.83)	92	96
RC8pr	**(X*1.239) + .346**	3.20 (3.55)		53.06(14.38)		
RC9		9.84 (4.26)	.943	45.22(7.77)	94	100
RC9pr	**(X*1.267) + .202**	9.82 (3.98)		45.10(6.71)		

Table 2: Means, standard deviations of raw scores, correlations, and converted T-scores for cross-validation samples for Full and 370-item Short Forms of the Personality Psychopathology Five (PSY-5) Scales.

Scale	Regression Equation	Mean (Std.Dev.) Raw Scores	Pearson's r (raw)	Mean(Std.Dev.) T-scores	%5 T	%10T
MALES						
AGGR		9.14 (2.99)	.888	53.30(10.77)**	81	97
AGGRpr	**(X*1.380) + 2.521**	9.07 (2.59)		52.55(9.89)		
PSYC		5.93 (3.83)	.925	58.11(12.92)**	72	99.4
PSYCpr	**(X*1.451) + 1.163**	6.04 (3.56)		58.94(11.72)		
DISC		12.57 (4.14)	.945	44.17(12.93)	80	84
DISCpr	**(X*1.199) + 1.562**	12.63 (3.94)		43.96(12.75)		
NEGE		15.75 (6.96)	.922	61.84(13.25)	77	96
NEGEpr	**(X*2.041) + .246**	15.69 (6.47)		61.88(12.87)		
INTR		15.66 (6.41)*	.987	60.76(14.89)**	99	100
INTRpr	**(X*1.102) + 1.106**	15.81 (6.30)		61.18(14.56)		
FEMALES						
AGGR		7.37 (3.16)	.906	47.47(10.07)	86	98
AGGRpr	**(X*1.382) + 2.247**	7.41 (2.61)		47.45(8.31)		
PSYC		4.49 (3.88)	.923	52.88(13.54)	67	100
PSYCpr	**(X*1.489) + 1.014**	4.84 (3.45)		54.35(11.56)		
DISC		9.16 (2.74)	.877	38.67(5.96)	94	98
DISCpr	**(X*1.148) + 1.364**	9.47 (2.59)		39.59(5.12)		
NEGE		15.51 (6.67)	.922	61.33(12.60)	74	98
NEGEpr	**(X* 2.070) + .642**	15.51 (6.05)		61.12(11.09)		
INTR		15.39 (5.77)	.985	60.04(13.41)	96	100
INTRpr	**(X*1.102) + 1.175**	15.64 (5.60)		60.80(13.01)		

Significant difference between raw scores with Bonferroni correction
*Significant difference between converted T scores with a within subjects ANOVA**

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References

Ben-Porath, Y.S., & Tellegen, A. (2008). MMPI-2-RF (Minnesota Multiphasic Personality Inventory-2 Restructured Form): Manual for administration, scoring, and interpretation. Minneapolis: University of Minnesota Press.

Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A., & Kaemmer, B. (1989). Minnesota Multiphasic Personality Inventory (MMPI-2): Manual for administration and scoring, Minneapolis, MN: University of Minnesota Press.

Butcher, J. N., & Hostetler, K. (1990). Abbreviating MMPI item administration: What can be learned from the MMPI for the MMPI-2? Psychological Assessment: A Journal of Consulting and Clinical Psychology, 2, 12-21.

Dahlstrom, W. G., & Archer, R. P. (2000). A shortened version of the MMPI-2. Assessment, 7, 131-137.

Gass, C. S., & Luis, C. A. (2001). MMPI-2 short-form: Psychometric characteristics in a neuropsychological setting. Assessment, 8, 213-219.

Harkness, A. R., McNulty, J. L., Ben- Porath, Y. S., & Graham, J. R. (2002). MMPI-Personality Psychopathology Five (PSY-5) Scales: Gaining an overview for case conceptualization and treatment planning. Minneapolis: University of Minnesota Press.

Tellegen, A. T., Ben-Porath, Y. S., McNulty, J. L., Arbisi, P. A., Graham, J. R., & Kaemmer, B (2003). The MMPI-2 Restructured Clinical(RC) Scales: Development, validation, and interpretation. Minneapolis: University of Minnesota Press.