Journal of Personality Assessment, *90*(5), 443–455, 2008

ISSN: 0022-3891 print / 1532-7752 online
DOI: 10.1080/00223890802248711

Routledge
Taylor & Francis Group

The Factor Structure of the MMPI–2 Restructured Clinical (RC) Scales

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We investigated the MMPI–2 Restructured Clinical (RC) scales (Tellegen et al., 2003) to determine if they had a more differentiated factor structure than the MMPI–2 Clinical scales. When factored alone, the RC scales had a 5-dimensional structure; the Clinical scales had 3 dimensions. When factored in combination with the Content scales, both sets of scales produced 5 dimensions. However, the RC and Content factors generally provided more efficient and logical markers of psychopathology than the Clinical and Content factors. We discuss interpretive considerations.

The original Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1940) was created to guide differential diagnoses. To do so, it primarily relied on eight Clinical scales: Scale 1 (Hs/Hypochondriasis), 2 (D/Depression), 3 (Hy/Hysteria), 4 (Pd/Psychopathic Deviance), 6 (Pa/Paranoia), 7 (Pt/Psychasthenia), 8 (Sc/Schizophrenia), and 9 (Ma/ Hypomania). When the revised version of the test, the MMPI–2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989; Butcher et al., 2001), was published, it facilitated the same goals of differential diagnosis, although it now provided users with 15 new and relatively homogeneous Content scales to supplement the Clinical scales. The most recent change to the MMPI was the creation of the Restructured Clinical (RC) scales (Tellegen et al., 2003). Understanding the similarities and differences between the new RC scales and the original Clinical scales will help enhance clinical applications of the MMPI–2.

The Clinical scales were developed with an "empirical keying" technique that involved selecting a criterion group of clinical patients (e.g., depressed individuals) and investigating how they responded to a pool of items relative to a normal group. Items differentially responded to by the criterion group were selected and included on a scale that corresponded to that clinical group (e.g., a Depression scale). This approach was strictly empirical; there was no underlying theoretical rationale as to why items were included on specific scales (Greene, 2000). Because the original MMPI criterion groups were comprised of mostly psychiatric inpatients, these groups likely shared common but nonspecific features related to their hospitalized status such as low levels of energy and dysphoric affect (Tellegen et al., 2003). As a result, the Clinical scales share common variance emphasizing general maladjustment and subjective distress rather than assessing features that are unique to the criterion group. Tellegen et al. (2003) labeled this variance *demoralization* and posited that it leads to excessively high intercorrelations between scales, which in turn compromises the discriminant validity of the Clinical scales.

Received September 20, 2006; Revised December 16, 2007.

Editor's Note: Roger Greene served as the Editor with full decision authority for this submission.

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The RC scales were developed to remove demoralization from each Clinical scale while preserving and enhancing the core component unique to each scale. The RC scales were created in four major steps, which are detailed in the RC monograph (Tellegen et al., 2003). The first step identified a set of items from Clinical Scales 2 and 7 that defined demoralization. The remaining MMPI–2 items were then investigated to locate items related to the demoralization marker. The second step consisted of eight principal components analyses (PCAs) using items within each Clinical scale and the selected set of Demoralization items. Analyses for each Clinical scale yielded a Demoralization factor and also at least one non-Demoralization factor that was designated as representing the core component of the Clinical scale. The third step created "seed scales" of items to represent the unique core component of each Clinical scale. The fourth step involved examining the full pool of MMPI–2 items and adding specific items to a seed scale if they correlated sufficiently and uniquely with it to form the final set of nine RC scales with nonoverlapping items: RCd (Demoralization), RC1 (Somatic Complaints), RC2 (Low Positive Emotions), RC3 (Cynicism), RC4 (Antisocial Behavior), RC6 (Ideas of Persecution), RC7 (Dysfunctional Negative Emotions), RC8 (Aberrant Experiences), and RC9 (Hypomanic Activation).

RC Scales Psychometric Properties and Empirical Correlates

In addition to the RC monograph (Tellegen et al., 2003), there is a growing body of literature examining the psychometric properties of these scales. With the exception of Scale 3 and RC3, the RC scales are highly correlated with their corresponding Clinical scales, and the RC scales generally have lower interscale correlations than the Clinical scales (e.g., Rogers, Sewell, Harrison, & Jordan, 2006; Sellbom, Ben-Porath, & Graham, 2006; Sellbom, Graham, & Schenk, 2006; Simms, Casillas, Clark, Watson, & Doebbeling, 2005; Wallace & Liljequist, 2005). Two promising studies have evaluated the associations between RC scales and measures of personality in undergraduate samples and have illustrated that RC scales were logically associated with normal personality factors (Sellbom & Ben-Porath, 2005) and also with relevant Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996) factors and subscales (Sellbom, Ben-Porath, Lilienfeld, Patrick, & Graham, 2005).

Further, in these investigations, the RC scales were generally more successful at predicting conceptually relevant normal and abnormal personality scales than the Clinical scales.

The direct clinical validity of the RC scales has been evaluated in four studies (Sellbom, Ben-Porath, et al., 2006; Sellbom, Graham, et al., 2006; Simms et al., 2005; Tellegen et al., 2006). RC scales were significantly correlated with conceptually relevant clinical variables during the course of treatment (e.g., admission diagnoses; Current Axis V Global Assessment of Functioning scores; Symptom Checklist–90–Revised [Derogatis, 1994] Analogue Depression ratings), and were generally more successful at predicting these criteria than other MMPI–2 scales evaluating similar constructs (Sellbom, Ben-Porath, et al., 2006; Tellegen et al., 2006). Using hierarchical regression analyses, two studies have found general support for the RC scales to add incrementally over the Clinical scales in the prediction of various dependent measures (Sellbom, Graham, et al., 2006; Simms et al., 2005). Typically, the magnitude of incremental gain was larger when RC scales were entered after the Clinical scales rather than in the reverse order, although Simms et al. (2005) found several instances involving Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. [*DSM–IV*]; American Psychiatric Association, 1994), by First, Spitzer, Gibbon, and Williams (1997), diagnoses in which little incremental gains were observed for either set of scales.

Although the published research has supported the psychometric properties of the RC scales, Nichols (2006) articulated several criticisms and potential drawbacks to the scales. One concern is that the RC scales may be redundant with various preexisting scales such as the Content scales. Caldwell (2006), Nichols (2006), Sellbom, Ben-Porath, et al. (2006) and Sellbom, Graham, et al. (2006) have reported that the associations between some conceptually related RC and Content scales can be quite large ($r > .90$) and can even exceed the reliability of the component scales. Although not a focus of their research, Simms et al. (2005) also reported several very large correlations between RC and conceptually related Content scales (e.g., RC1-HEA $r = .95$). Although some researchers have commented on the specific relationship between certain RC and Content scales (e.g., Butcher, Hamilton, Rouse, and Cumella, 2006, posited that RC3 is a psychometric parallel to CYN), there appears to be multiple meaningful correlations between the two sets of scales. As evidence of this, Nichols reported correlations $\geq .80$ for six of the nine RC scales with one or more Content scales.

This Investigation

This is a factor analytic study examining the impact of the RC scales on the MMPI–2. Clinically, it is important to understand how the variance of an instrument is partitioned because it permits a more accurate understanding of its distinct dimensions, which in turn influences its clinical utility. The factor structure of the set of RC scales has been investigated twice (Hoelzle & Meyer, 2005; Tellegen et al., 2006). Tellegen et al. (2006) conducted a very focused set of analyses. First, Tellegen et al. (2006) generated two separate PCAs for the eight non-Demoralization RC scales and then their eight Clinical scale counterparts, forcing eight dimensions from each data set so that each dimension was defined by a single scale. Tellegen et al. (2006) followed this with an image factor analysis in which they combined the two sets of eight rotated components in a 16-variable analysis. Tellegen et al. (2006) extracted eight dimensions from this matrix and found that each corresponding RC and Clinical scale jointly defined a unique and independent dimension, which supported their position that each RC scale captured the major and distinctive variance associated with its parent scale.

Hoelzle and Meyer (2005) conducted a secondary analysis of the scale-by-scale correlation matrices for the inpatient, outpatient, and nonpatient samples reported in the RC monograph (Tellegen et al., 2003). Hoelzle and Meyer conducted PCA separately within the set of nine RC scales and eight Clinical scales[1] to determine if the RC scales had a more differentiated factor structure. These scale-level analyses indicated that two similar factors were present in both sets of scales. However, this investigation was restricted because the analyses were conducted using just eight or nine scales, and research has shown that three or more marker variables are generally needed to identify a distinct factor (Velicer & Fava, 1998). Thus, it was highly unlikely that these analyses could have identified more than two factors in each set of scales.

To overcome this limitation, we made use of item-level data to determine whether the RC scales measure a more differentiated factor structure than the Clinical scales. As a first step, we examined the original Clinical scales and the RC scales. This comparison permits clinicians and researchers to evaluate whether the RC scale profile is successful at organizing item variance into a more meaningful, multidimensional manner than the traditional Clinical scale profile. That is, a more differentiated RC scales factor structure would suggest a cleaner organization of the core constructs of psychopathology, which should aid clinical interpretation.

Next, we examined the factor structure of the Clinical and RC scales in conjunction with the Content scales. Specifically, we investigated the Clinical and Content scales together and then the RC and Content scales. Although numerous independent scales are highly correlated with specific RC scales, we selected the full set of 15 Content scales for these analyses because they are an organized set of preexisting scales used to understand personality and clarify psychopathology during MMPI–2 interpretation. We also selected the full set of Content scales because many of them are highly correlated with RC scales, and it has been argued that they even may be redundant with the RC scales. For instance, Nichols (2006) stated, "At best, the RC scales are hybrids: Content scales with clinical roots" (p. 135).

The magnitude of the associations between many RC and Content scales suggest both sets of scales are likely to account for similar MMPI–2 variance. Thus, the factor structure of only the RC scales is expected to be similar to the factor structure of the RC and Content scales. However, it is still unknown whether (a) the factor structure of the Clinical and Content scales is more differentiated than the factor structure of only the Clinical scales and (b) whether the factor structure of the RC and Content scales is more differentiated or coherent than the factor structure of the Clinical and Content scales. The latter comparison will be meaningful when considering whether the RC scales help identify unique dimensions of psychopathology relative to the Clinical scales even when both are considered

[1] Scale 5 and Scale 0 do not have corresponding RC scales and are not believed to assess core components of psychopathology (Tellegen et al., 2003).

alongside the already existing and regularly interpreted Content scales.

METHOD

Participants

A sample of 483 patients was given the MMPI–2 during treatment or evaluation in a medical center located in Chicago. MMPI–2 protocols were excluded for content nonresponsiveness if omitted items were ≥ 30, VRIN or TRIN T scores were ≥ 80, or a raw Infrequency score was ≥ 30. The final sample included 448 individuals who had an average age of 36.72 years ($SD = 12.73$, range = 17–86). The sample was comprised mainly of psychiatric inpatients (44%) and outpatients (25%), but also included general medical patients (15%), chronic pain patients (14%), forensic patients (<1%), and students receiving mental health services at an affiliated college counseling center (1%). The sample was predominantly White (61.6%; 29.9% African American) and female (56.7%). Nearly half of the sample (48.7%) had never been married. Diagnostic information was obtained from electronic records entered into the hospital billing system before the evaluation began (i.e., the assessment results did not influence the diagnoses). Billing codes were not available for 160 patients included in the sample. The overlapping diagnoses for the remaining 288 patients are as follows: 45% depressive disorders, 25% thought disorders, 21% personality disorders, 7% anxiety disorders, 7% bipolar or cyclothymic disorder, and 3% gender identity disorders. The types of medical populations in this sample included individuals with diabetes (10%), pain patients (13%), and heart or liver transplant candidates (5%). MMPI–2 data from this sample were used in previous research (see Hoelzle & Meyer, 2005; Meyer, 1999), although these analyses are new.

Procedures

We conducted principal components analysis (PCA), which differs from traditional factor analysis, such as principle axis factor analysis (PAFA), because it strives to explain all variance, not just that which is shared among the variables. However, if the data are well suited for analysis, factors derived through PCA or PAFA will not differ meaningfully (Goldberg & Velicer, 2006; Velicer, Eaton, & Fava, 2000). One of the main reasons we selected PCA over PAFA is that two of the three recommended extraction criteria we initially applied (described following) were designed for PCA. We believe consistency across these analyses is important, and they outweigh potential benefits from conducting PAFA. However, results from both analyses were quite similar.

A potential drawback of using dichotomous item-level MMPI–2 data in a factor analysis is that large differences in item distributions influence the magnitude of correlations among the items and thus the nature of any factor derived from them (Goldberg & Velicer, 2006). To overcome this limitation, we randomly assigned items to three packets of items per scale with the intention of creating more normally distributed dimensional variables. Three packets per scale provided enough marker variables to permit the variance associated with a single scale to define a unique dimension if warranted. Several advantages of parceled data over item-level data have been noted by Little, Cunningham, Shalar, and Widaman (2002). Little et al. posited that resulting factor solutions are more parsimonious, have fewer dual loadings, and decreased sampling error. On the other hand, Little et al. noted there is a debate regarding the merits of parceling data prior to analyses, with the most notable problem being that for multidimensional scales, the packets may no longer reflect the full diversity of content that is present at the item level. Given the limitations of factoring dichotomous items, we believe it is psychometrically desirable to analyze aggregated item packets. However, we realize that these packets are good markers of the composite scale but not necessarily of all the potentially differentiated sources of item-level variance that contribute to it.

One of the most important methodological decisions to make when conducting factor analyses is determining the number of factors to retain. Factor analytic investigations commonly rely on Kaiser's (1960) rule or the interpretation of scree plots to determine the appropriate number of factors. These procedures are problematic in several respects and not recommended (see Goldberg & Velicer, 2006; Velicer et al., 2000), so we used several alternatives.

First, we conducted parallel analysis (PA), which involves creating random parallel data matrices with the same number of "variables" and "participants" as the actual data set. Obtained eigenvalues are compared to the corresponding randomly generated eigenvalues, and if they are larger, the factor is retained. Using the mean eigenvalue from PA as a comparison has a slight tendency to overestimate the number of factors to retain, so we compared observed eigenvalues to the 95th percentile of randomly generated data (Cota, Longman, Holden, Fekken, & Xinaris, 1993; Glorfeld, 1995; Longman, Cota, Holden, & Fekken, 1989).

Second, we used Velicer's (1976) minimum average partial (MAP) procedure, which considers the average partial correlation matrix after extracting successive components. Extracting a dimension that contains common variance results in decreased associations between the partialled variables and decreased MAP values. However, when an extracted factor is comprised of variance unique to one variable, it increases associations between the residualized variables and thus increases the MAP. The number of factors to retain is identified as the point at which the average partial is at its minimum. The results of this procedure were rather ambiguous across analyses (e.g., in several instances, the average partials were equivalent for up to seven different extracted roots) and not generally helpful in determining the appropriate number of factors to retain. Based on editorial feedback, the results of these analyses were removed, although readers can obtain the findings by writing J. B. Hoelzle.

As a protection against overextraction, we also conducted sets of analyses after including 12 random variables (RVs) in the actual data matrix. We sequentially extracted and rotated components to determine the point when a RV began to define a factor (i.e., pattern matrix loading $\geq |.40|$). For each set of scales, we repeated these analyses 10 times using a new set of RVs each time.[2] If a factor is defined by one or more RVs across iterations, it suggests overextraction has occurred because the dimension is defined by random error, and this implies that genuine factors will be present when extracting one less factor. This procedure has been described and recommended by Gorsuch (1983) and Wood, Tataryn, and Gorsuch (1996) but to

[2] All RV pattern matrices are available on request.

TABLE 1.—Eigenvalues and parallel analysis results.

	Clinical Scales		RC Scales		Clinical and Content Scales		RC and Content Scales	
Factor	Ob EV	PA EV	Ob EV	PA EV	Ob EV	PA EV	Ob EV	PA EV
1	11.22	1.52	10.76	1.55	31.67	1.94	32.31	1.97
2	2.74	1.42	3.40	1.46	5.74	1.85	6.57	1.88
3	**1.82**	**1.36**	1.69	1.40	4.17	1.79	3.65	1.82
4	1.15	1.31	1.42	1.35	2.48	1.74	2.54	1.77
5	.82	1.26	**1.33**	**1.30**	**1.82**	**1.70**	2.18	1.72
6	.64	1.22	.99	1.26	1.45	1.66	**1.70**	**1.68**
7	.62	1.19	.70	1.23	1.27	1.62	1.54	1.64
8	.59	1.15	.54	1.19	1.14	1.59	1.21	1.61
9	.51	1.12	.52	1.16	.89	1.55	1.03	1.58
10	.47	1.09	.51	1.12	.86	1.52	.96	1.54

Note. Bolded values signify recommended number of factors to retain. Ob = observed; EV = eigenvalue; PA = parallel analysis. Parallel analysis eigenvalue is the 95th percentile of mean random eigenvalues generated in 1,000 random data sets.

our best knowledge has not been investigated in simulation studies. In these analyses, we first determined the minimum number of factors suggested by PA and then successively extracted factors, ensuring there were no RV pattern matrix loadings $\geq$ |.40|. We used a combination of these procedures to increase the likelihood of retaining the most appropriate number of substantial dimensions.

After determining the number of factors to retain, we used oblique (oblimin) rotation to maximize fit and allow for correlated constructs (see, e.g., Byrne, 2005). To determine if the factors extracted across solutions emphasized similar constructs, we correlated the factor scores obtained from the four sets of analyses[3] (i.e., Clinical, RC, Clinical and Content, and RC and Content). We were interested in the correlations between Clinical dimensions and RC scale dimensions, Clinical dimensions and Clinical and Content dimensions, RC dimensions and RC and Content dimensions, and Clinical and Content dimensions and RC and Content dimensions.

It is frequently challenging to comprehensively name the constructs identified by factors. We approached this task by considering the full range of variables defining a factor, emphasizing the content with the strongest and clearest loadings while simultaneously taking into account the content that differentiated one factor from another. However, we realize that others may come to slightly different conclusions regarding the most appropriate names for factors.

RESULTS

Clinical Scale Analyses

Creating three packets of randomly assigned items per Clinical scale resulted in 24 variables for analyses. PA results clearly indicated three factors (see Table 1). When 10 sets of 12 RVs were sequentially added to the matrix of genuine variables, all 10 solutions produced substantive RV loadings $\geq$ |.40| on the fourth dimensions.[4] When three factors were extracted, there were no RVs with loadings $\geq$ |.30|, which we interpreted as support for retaining three dimensions.

We ultimately retained three factors because of the converging support from the PA and RV procedures. The obliquely rotated pattern coefficients are given in Table 2. Unlike structure coefficients, which indicate the simple correlation between a factor and a variable, the pattern coefficients indicate the regression weights necessary to predict variables from the factors when controlling for the correlations between factors (i.e., they are analogous to ß weights in multiple regression). The pattern coefficients indicate Factor 1 is a complex factor that encompasses all of the Clinical scales except for somatic symptoms and Scale 9. It is a dimension of general maladjustment and subjective distress. This factor has meaningful loadings from Scales 7, 8, 4, 6, and 2. Factor 2 emphasizes the somatic symptoms and health concerns that are central to Scales 1 and 3, although the somatic content in Scale 2 (e.g., lethargy, sleep problems) also contributes. Factor 3 is only defined by Scale 9 markers, suggesting it is a dimension of heightened energy, low frustration tolerance, and impulsivity. As can be seen at the bottom of Table 2, Factors 1 and 2 were modestly correlated.

The last row of Table 2 also presents the amount of variance accounted for by each factor after rotation, which was computed by summing the squared pattern matrix loadings and dividing by the number of variables (Tabachnick & Fidell, 2001). Factor 1 accounted for the most variance, about one third of the total, with each subsequent factor accounting for notably smaller amounts of information. We also examined the proportion of variance associated with each factor before variance was redistributed through rotation. Table 3 shows that the first unrotated dimension for the Clinical scales was quite dominant; it accounted for about 47% of total variance, whereas the second and third unrotated dimensions accounted for about 11% and 8%, respectively.

RC Scale Analyses

Creating three packets of randomly distributed items per RC scale resulted in 27 variables for analyses. PA results provided support for retaining five factors, although the observed eigenvalue in this solution was just a bit larger than the 95th

[3]Varimax rotation produced similar factors and levels of correspondence across solutions.

[4]The RV loadings $\geq$ |.40| on a fourth dimension were as follows: three solutions had one, four solutions had two, two solutions had three, and one solution had four. Of these salient RV loadings, 14 were between |.40| and |.50|, 5 were between |.50| and |.60|, and 2 were $\geq$ |.60|. Across iterations, only one genuine scale packet had a salient loading (.42) on a fourth dimension, whereas the remaining packets did not have loadings > |.34|.

TABLE 2.—Rotated pattern matrix: Clinical scales analysis.

	Factor			
Scale: Packet (P)	1	2[a]	3	h^2
Scale 1: P 1	.13	**−.81**	.20	.81
Scale 1: P 2	.11	**−.79**	.28	.79
Scale 1: P 3	.13	**−.78**	.29	.80
Scale 2: P 1	**.47**	**−.51**	−.18	.66
Scale 2: P 2	**.56**	**−.41**	−.18	.66
Scale 2: P 3	**.56**	**−.42**	−.34	.71
Scale 3: P 1	−.10	**−.82**	−.01	.62
Scale 3: P 2	.23	**−.68**	−.14	.64
Scale 3: P 3	−.06	**−.69**	−.18	.48
Scale 4: P 1	**.75**	−.05	.07	.62
Scale 4: P 2	**.71**	.17	−.05	.43
Scale 4: P 3	**.82**	.06	−.02	.64
Scale 6: P 1	**.60**	−.05	.08	.41
Scale 6: P 2	**.64**	.08	.19	.46
Scale 6: P 3	**.71**	.11	−.31	.47
Scale 7: P 1	**.81**	−.20	.02	.82
Scale 7: P 2	**.78**	−.19	.13	.81
Scale 7: P 3	**.76**	−.20	.11	.77
Scale 8: P 1	**.79**	−.10	.26	.84
Scale 8: P 2	**.81**	−.17	.16	.86
Scale 8: P 3	**.74**	−.18	.18	.77
Scale 9: P 1	.29	−.06	**.65**	.59
Scale 9: P 2	.29	.31	**.61**	.54
Scale 9: P 3	−.10	−.16	**.77**	.60
Factor Correlations				
Factor 2[a]	−.38			
Factor 3	.18	−.01		
% Variance	32.57	18.60	8.84	

Note. Pattern matrix loadings ≥ .40 are underlined and bolded for emphasis. Scale 1 = Hypochondrias (Hs); Scale 2 = Depression (D); Scale 3 = Hysteria (Hy); Scale 4 = Psychopathic Deviate (Pd); Scale 6 = Paranoia (Pa); Scale 7 = Psychasthenia (Pt); Scale 8 = Schizophrenia (Sc); Scale 9 = Hypomania (Ma); h^2 = communality; % Variance = percent variance accounted for after rotation.

[a] Sign of factor is reversed.

percentile of the random eigenvalues (see Table 1). When the sets of 12 RVs were added to the matrix of genuine variables, all 10 solutions produced substantive RV loadings ≥ |.40| on the sixth dimension of a six-factor solution.[5] When five factors were extracted, there were no RVs with loadings ≥ |.39|, which supported retaining five factors.

Based on the convergent evidence from PA and RV analyses, we extracted and interpreted a five-factor, RC scale structure (see Table 4). Factor 1 emphasizes content contained in RC4 and to a lesser degree RC9. It reflects externalizing antisocial behavior, substance abuse, argumentativeness, and grandiosity. Factor 2 embodies the depressive withdrawal, helplessness, emotional discomfort, and demoralization that is reflected in the content from RC2 and RCd. Factor 3 reflects the somatic symptoms and bodily concerns that are evaluated by RC1. Factor 4 has significant loadings from RC6 and RC8, which in combination emphasize psychotic symptoms including persecutory ideas and bizarre experiences such as hallucinations. The remaining factor assesses a cynical view that others are untruthful or untrustworthy, with prominent loadings from RC3. RC Factors 1, 4, and 5 had moderate associations with one another as did Factors 3, 4, and 5.

[5] The random variable loadings ≥ |.40| per matrix were as follows: one solution had two, five had three, three had four, and the remaining solution had five loadings. Of the random variables, 16 had loadings between |.40| and |.50|, 15 were between |.50| and |.60|, and 3 were ≥ |.60|. No genuine scale packet had salient loadings on a sixth dimension (highest loading = |.26|).

TABLE 3.—Percent of variance for unrotated dimensions.

Factor	Clinical Scales	RC Scales	Clinical and Content Scales	RC and Content Scales
1	46.76	39.84	45.92	44.88
2	11.40	12.58	8.32	9.13
3	7.57	6.24	6.05	5.06
4	4.80	5.24	3.59	3.52
5	3.41	4.93	2.63	3.02
6	2.65	3.68	2.10	2.37
7	2.59	2.59	1.84	2.14
8	2.46	2.00	1.65	1.68
9	2.14	1.92	1.29	1.43
10	1.97	1.88	1.25	1.34

Note. RC = Restructured Clinical.

It is noteworthy that in contrast to the Clinical factors, after rotation, each of the RC factors accounted for roughly similar percentages of variance (i.e., about 11% to 15%; see the last row of Table 4). Also, Table 3 shows that prior to rotation, the first RC scale dimension accounted for slightly less total variance (39.8%) than the first unrotated Clinical scale dimension (46.8%). However, the subsequent unrotated RC factors accounted for amounts of variance similar to the Clinical scale factors (see Table 3).

Clinical and Content Scale Analyses

Randomly assigning items to three packets per Clinical and Content scale resulted in 69 dimensional variables for analyses. PA results clearly supported retaining five factors (see Table 1). Iteratively investigating the Clinical and Content factor structure in combination with 10 sets of added RVs illustrated it was inappropriate to retain six factors, as the sixth factor included RV loadings ≥ |.40|.[6]

However, RV procedures clearly supported a five-dimensional structure. Across 10 iterations of a five factor solution, no RV had a loading ≥ |.29|. PA and RV procedures supported retaining five Clinical and Content factors, which are presented in Table 5. Unlike the previous tables in which scales were presented in order, in Table 5, scales are presented in descending order based on their average loading across item packets. Factor 1 is comprised of numerous Clinical and Content scales, and it emphasizes general maladjustment and subjective distress. This dimension is more specific than the first Clinical scale dimension, and it emphasizes depressive withdrawal, negative affect, and a preference for isolation. Factor 2 is mainly

[6] Of the 10 solutions, 3 had a random variable loading ≥ |.40| on a sixth factor. Five of the remaining solutions did not have 6th dimensions that were distinguishable from random variables, as no genuine packets had loadings ≥ |.40|. However, two matrices had notable genuine loadings. One had a genuine loading of .43, although the next two highest loadings were just .31 and .28. We did not consider this dimension interpretable because the three highest loadings from the random variables were nearly identical in size: .39, .35, and –.29, respectively. The remaining matrix had genuine loadings of –.61, –.51, and –.46, and the largest random variable loadings were .20, .19, and .16. On this iteration, a Scale 4 dimension was differentiated from random "noise." However, because this dimension was observed only once across 10 iterations, we do not think it provides sufficient evidence to warrant retaining six Clinical and Content factors.

TABLE 4.—Rotated pattern matrix: RC scales analysis.

	Factor					
Scale: Packet (P)	1	2[a]	3[a]	4	5	h^2
RCd: P 1	.22	**−.64**	−.11	.15	.15	.80
RCd: P 2	.18	**−.72**	−.07	.14	.15	.83
RCd: P 3	.24	**−.69**	−.16	.04	.12	.81
RC1: P 1	−.02	−.09	**−.84**	.04	−.04	.77
RC1: P 2	−.04	−.10	**−.85**	−.07	.02	.73
RC1: P 3	−.01	.00	**−.90**	−.04	−.02	.77
RC2: P 1	.03	**−.84**	.03	−.01	−.03	.70
RC2: P 2	−.01	**−.76**	−.17	−.02	−.01	.69
RC2: P 3	−.10	**−.85**	.03	.01	.03	.70
RC3: P 1	−.13	−.08	.00	−.03	**.90**	.73
RC3: P 2	−.02	−.09	.03	−.02	**.86**	.73
RC3: P 3	.00	.00	.03	.08	**.82**	.72
RC4: P 1	**.78**	−.06	−.05	.06	−.13	.63
RC4: P 2	**.81**	−.01	.00	−.01	−.04	.63
RC4: P 3	**.78**	−.16	.12	−.04	.02	.61
RC6: P 1	.00	.00	.02	**.79**	.11	.71
RC6: P 2	.00	−.11	.12	**.80**	.00	.62
RC6: P 3	−.01	.00	.13	**.89**	−.06	.67
RC7: P 1	.32	−.31	−.15	.20	.26	.69
RC7: P 2	.21	**−.41**	−.28	.15	.23	.73
RC7: P 3	.30	−.31	−.25	.21	.20	.72
RC8: P 1	.11	−.05	−.39	**.47**	.02	.63
RC8: P 2	−.13	.04	−.27	**.54**	.10	.47
RC8: P 3	.13	.04	−.29	**.57**	−.04	.59
RC9: P 1	**.48**	.25	−.11	.02	**.43**	.66
RC9: P 2	**.41**	**.44**	−.08	.16	.39	.69
RC9: P 3	.38	.21	−.19	.20	.30	.60
Factor Correlations						
Factor 2[a]	−.17					
Factor 3[a]	−.30	.32				
Factor 4	.42	−.19	−.40			
Factor 5	.42	−.12	−.36	.45		
% Variance	10.60	15.45	10.73	11.60	10.79	

Note. Pattern matrix loadings ≥ .40 are underlined and bolded for emphasis. RC = Restructured Clinical; RCd = Demoralization; RC1 = Somatic Complaints; RC2 = Low Positive Emotions; RC3 = Cynicism; RC4 = Antisocial Behavior; RC6 = Ideas of Persecution; RC7 = Dysfunctional Negative Emotions; RC8 = Aberrant Experiences; RC9 = Hypomanic Activation; h^2 = communality; % Variance = percent variance accounted for after rotation.

[a] Sign of factor is reversed.

comprised of variance included in the Content scales CYN and ASP, although it is also defined to a lesser degree by TPA, ANG, Scale 9, and TRT. Collectively, this dimension emphasizes cynicism, mistrust, irritability, and a sense of being wronged or thwarted by people in the environment. Factor 3 conveys somatic symptoms and health concerns that are included in Scale 1, HEA, Scale 3, and also the somatic content included in Scale 2. Factor 4 includes high loadings from Scale 4, Scale 6, and to a lesser degree FAM and DEP. This dimension reflects resentment, suspiciousness of others, familial conflict, alienation, and entitlement. Factor 5 included high loadings from the Content scale FRS and lower loadings from BIZ, which conveys general and specific fears related to environments, events, or objects, some of which may be associated with unusual beliefs or experiences. Correlations between the Clinical and Content factor scores show modest associations of similar magnitude between all factors with the exception of Factor 2 with Factors 1 and 3, which have essentially small associations.

Table 5 also indicates the percent of variance associated with each rotated factor. Compared to the Clinical scales alone (Table 2), the factors now are more equivalent in size, although Factor 1 continues to account for the most variance, and it is several times larger than Factor 5, the smallest dimension. With respect to the size of dimensions before rotation, Table 3 shows that the first unrotated dimension was quite dominant, accounting for about 46% of the variance and about five times as much as the next largest component.

RC and Content Analyses

Randomly assigning the RC and Content scale items to three packets per scale resulted in 72 dimensional variables. PA results suggested retaining six factors, although the difference between the sixth observed eigenvalue and the 95th percentile of the PA generated eigenvalue was small, suggesting a five-factor structure may be appropriate (see Table 1). The RV analyses did not provide clear support for retaining six factors but did clearly supported retaining five factors. Across 10 iterations, each dimension was readily differentiated from random noise and contained no RVs with loadings ≥ |.28|.

The first RC and Content factor is defined by many RC and Content scales, and it emphasizes depressive withdrawal and distress (see Table 6). Factor 2 includes loadings from RC3, CYN, and ASP, thus it assesses a cynical mistrust of others. Factor 3 is defined by somatic symptoms and health issues that are identified by HEA and RC1. This dimension also is partially defined by lower magnitude loadings from FRS. On the fourth factor, BIZ, RC6, and RC8 have meaningful loadings, and thus this factor reflects psychotic symptoms, atypical experiences, suspicious distrust, and persecutory beliefs. Factor 5 includes moderately strong loadings from RC4, ANG, RC9, and lesser loadings from FAM. This dimension reflects externalizing and antisocial behaviors including impulsive acting out, irritability, and poor interpersonal relationships. The RC and Content factors are moderately correlated with one another, although the most notable associations were observed between Factors 2, 4, and 5. It is noteworthy that the RC and Content dimensions have a slightly higher average association between factors than the Clinical and Content dimensions (average correlations of .37 and .31, respectively).

Factor 1 accounts for the greatest percentage of variance after rotation (18.61%), whereas the remaining dimensions account for similar percentages and are about half as large (see Table 6). It is noteworthy, however, that the unrotated RC and Content factors account for similar percentages of variance as the unrotated Clinical and Content factors (see Table 3). The first unrotated dimension was dominant, accounting for about and 45% of the variance, and it was about five times larger than the next component.

Association Between Clinical, RC, Clinical and Content, and RC and Content Factors

To examine correspondence across these factor solutions, factor score correlations are presented for the Clinical and RC factors (Table 7), Clinical and Clinical and Content factors (Table 8), RC and RC and Content factors (Table 9), and RC and Content and Clinical and Content factors (Table 10). In general, factor score correlations of .90 or higher indicate clear factor convergence.

The correlations between the Clinical and RC factors indicate the extent to which the clinical and RC scales provide similar information. As can be seen in Table 7, there was not clear correspondence between any Clinical and RC dimensions.

TABLE 5.—Rotated pattern matrix: Clinical and Content scales analysis.

Scale: Packet (P)	Factor 1	2	3	4	5	h^2	Scale: Packet (P)	Factor 1	2	3	4	5	h^2
SOD: P 1	**.82**	.05	−.14	−.10	.12	.65	ANG: P 3	.00	**.45**	.07	.35	−.03	.45
SOD: P 2	**.78**	−.02	−.11	−.14	.17	.59	Scale 9: P 1	−.21	**.42**	.20	.32	.08	.46
SOD: P 3	**.81**	−.02	−.02	−.10	.07	.63	Scale 9: P 2	**−.49**	.32	−.08	**.64**	.01	.59
LSE: P 1	**.62**	.07	.11	.14	.14	.67	Scale 9: P 3	−.37	**.58**	.18	.00	.15	.48
LSE: P 2	**.63**	.07	−.01	.31	.10	.75	Scale 1: P 1	.08	.13	**.83**	−.11	.10	.81
LSE: P 3	**.67**	.01	.03	.17	.16	.71	Scale 1: P 2	.01	.18	**.83**	−.09	.10	.80
DEP: P 1	**.51**	.12	.21	**.41**	−.01	.84	Scale 1: P 3	−.01	.20	**.83**	−.08	.10	.82
DEP: P 2	**.58**	.08	.15	**.43**	−.07	.82	HEA: P 1	.02	.13	**.82**	.01	.06	.78
DEP: P 3	**.53**	.09	.21	.37	−.03	.76	HEA: P 2	−.08	.13	**.72**	−.07	.26	.70
Scale 2: P 1	**.43**	−.05	**.55**	.09	−.07	.64	HEA: P 3	−.12	.22	**.80**	−.12	.23	.81
Scale 2: P 2	**.53**	−.03	**.45**	.12	−.09	.67	Scale 3: P 1	−.12	−.18	**.86**	−.01	−.06	.65
Scale 2: P 3	**.63**	−.20	**.40**	.03	.02	.71	Scale 3: P 2	.17	−.25	**.72**	.12	−.03	.66
WRK: P 1	**.66**	.19	.14	.15	.07	.80	Scale 3: P 3	−.12	**−.44**	**.72**	.12	−.01	.60
WRK: P 2	**.40**	.34	.12	.26	.16	.76	Scale 4: P 1	.17	.03	.21	**.62**	−.04	.65
WRK: P 3	**.48**	.12	.28	.31	−.03	.73	Scale 4: P 2	.08	.06	.01	**.62**	−.07	.44
Scale 7: P 1	**.51**	.10	.27	.34	.06	.84	Scale 4: P 3	.32	.04	.05	**.58**	.02	.64
Scale 7: P 2	**.45**	.18	.25	.32	.12	.83	Scale 6: P 1	.12	−.21	.07	**.47**	.39	.52
Scale 7: P 3	**.49**	.21	.23	.23	.16	.83	Scale 6: P 2	.01	.02	.07	**.60**	.12	.47
TRT: P 1	**.49**	.39	.08	.21	.01	.72	Scale 6: P 3	.18	**−.46**	−.02	**.69**	.13	.59
TRT: P 2	**.40**	**.49**	.02	.06	.12	.62	FAM: P 1	.14	.24	.04	.37	.17	.47
TRT: P 3	**.43**	**.43**	.08	.26	.03	.75	FAM: P 2	.16	.26	−.03	**.52**	.14	.63
ANX: P 1	**.47**	.11	.26	.34	.08	.79	FAM: P 3	.23	.26	−.03	**.41**	.12	.53
ANX: P 2	**.41**	.20	.25	.34	.02	.73	FRS: P 1	.03	−.01	.11	−.16	**.78**	.63
ANX: P 3	.32	.25	.37	.19	.11	.69	FRS: P 2	.07	−.16	.06	−.05	**.79**	.61
OBS: P 1	.28	.38	.10	.26	.25	.74	FRS: P 2	.11	−.01	.10	−.15	**.75**	.62
OBS: P 2	**.46**	.20	.10	.22	.16	.64	BIZ: P 1	−.11	.12	−.06	**.41**	**.48**	.53
OBS: P 3	.33	.31	.11	.12	.23	.57	BIZ: P 2	.01	.20	.02	**.42**	**.40**	.62
CYN: P 1	.21	**.76**	.03	−.14	.12	.71	BIZ: P 3	−.17	.17	−.07	.34	**.55**	.57
CYN: P 2	.08	**.77**	.01	−.08	.17	.72	Scale 8: P 1	.31	.24	.17	.38	.23	.84
CYN: P 3	.03	**.80**	.06	−.07	.06	.67	Scale 8: P 2	.33	.16	.24	**.41**	.20	.86
ASP: P 1	.06	**.82**	−.02	.02	−.08	.66	Scale 8: P 3	.31	.13	.24	.36	.22	.75
ASP: P 2	−.01	**.65**	−.03	.11	.03	.49	Factor Correlations						
ASP: P 3	−.04	**.69**	−.14	.07	.06	.53	Factor 2	.21					
TPA: P 1	.28	**.54**	.00	.07	.11	.56	Factor 3	.33	.16				
TPA: P 2	**.41**	**.42**	.08	.17	.07	.65	Factor 4	.37	.36	.31			
TPA: P 3	**.49**	**.49**	.05	.12	.03	.74	Factor 5	.31	.38	.35	.32		
ANG: P 1	.20	**.50**	.16	.19	.04	.59	% Variance	14.03	11.24	10.83	9.21	5.12	
ANG: P 2	.08	**.42**	.12	.37	.04	.56							

Note. Scales with the highest average packet loading are presented in descending order. Pattern matrix loadings ≥ | .40| are underlined and bolded for emphasis. SOD = Social Discomfort; LSE = Low Self-esteem; DEP = Depression; Scale 2 = Depression (D); WRK = Work Interference; Scale 7 = Psychasthenia (Pt); TRT = Negative Treatment Indicators; ANX = Anxiety; OBS = Obsessiveness; CYN = Cynicism; ASP = Antisocial Practices; TPA = Type A Personality; ANG = Anger; Scale 9 = Hypomania (Ma); Scale 1 = Hypochondrias (Hs); HEA = Health Concerns; Scale 3 = Hysteria (Hy); Scale 4 = Psychopathic Deviate (Pd); Scale 6 = Paranoia (Pa); FAM = Family Problems; FRS = Fears; BIZ = Bizarre Mentation; Scale 8 = Schizophrenia (Sc); h^2 = communality; % Variance = percent variance accounted for after rotation.

However, modest convergence was seen for factors associated with somatic symptoms as well as between the Clinical general maladjustment and subjective distress dimension (Factor 1) and the RC depressive withdrawal dimension (Factor 2).

The correlations between factors derived from the either Clinical or RC scales and these scales in combination with the Content scales indicate the extent to which there is redundancy between both sources of information. The Clinical and Clinical and Content factor associations in Table 8 show clear convergence for the dimensions assessing somatic symptoms. However, as would be expected when comparing a three-factor solution to a five-factor solution, the variance associated with the Clinical scales is more differentiated when they are considered in combination with the Content scales. The Clinical general maladjustment and subjective distress dimension (Factor 1) was reflected on two Clinical and Content dimensions: depressive withdrawal (Factor 1) and resentment/suspiciousness (Factor 4). The Clinical Scale 9 dimension (Factor 3) is most associated with and largely subsumed by the Clinical and Content cynicism dimension (Factor 2), which also emphasizes mistrust and irritability. Regarding the similarity of RC and RC and Content factor structures, each RC dimension was highly correlated ($r \geq |.92|$) with a similar RC and Content dimension (see Table 9).

The final set of correlations between the five Clinical and Content and five RC and Content dimensions indicates the extent to which the factor structure for the Clinical or RC scales is similar depending on which set of scales is used in the analyses. As Table 10 indicates, there are three clearly congruent Clinical and Content and RC and Content dimensions assessing depressive withdrawal, cynicism, and somatic symptoms. However, the remaining two dimensions differ fairly substantially in terms of the content and characteristics that are emphasized in each solution.

TABLE 6.—Rotated pattern matrix: RC and Content scales analysis.

Scale: Packet (P)	Factors 1	2	3	4	5[a]	h^2	Scale: Packet (P)	Factors 1	2	3	4	5[a]	h^2
RC2 : P 1	**.88**	−.10	−.03	−.01	.13	.67	ASP: P 1	−.02	**.75**	−.06	.03	−.16	.68
RC2 : P 2	**.76**	−.12	.18	−.07	.03	.62	ASP: P 2	−.06	**.52**	−.02	.00	−.33	.51
RC2 : P 3	**.83**	−.07	.03	−.09	.16	.61	ASP: P 3	−.11	**.51**	−.13	.19	−.25	.51
SOD : P 1	**.79**	.18	−.13	.02	.18	.60	HEA: P 1	.10	−.05	**.84**	−.07	−.06	.75
SOD : P 2	**.75**	.14	−.12	.10	.25	.54	HEA: P 2	−.04	.01	**.84**	.07	.06	.71
SOD : P 3	**.81**	.11	−.05	−.05	.18	.59	HEA: P 3	−.11	.07	**.94**	−.04	−.01	.83
RCd : P 1	**.70**	−.02	.08	.12	−.25	.81	RC1: P 1	.06	−.02	**.82**	.05	.00	.74
RCd : P 2	**.78**	−.01	.05	.09	−.18	.83	RC1: P 2	.04	.04	**.88**	−.09	.01	.76
RCd : P 3	**.73**	−.05	.15	.02	−.25	.81	RC1: P 3	−.02	.05	**.86**	−.04	.00	.73
LSE : P 1	**.69**	.03	.09	.11	−.05	.67	FRS: P 1	−.01	.08	**.47**	.22	.10	.36
LSE : P 2	**.74**	−.04	−.02	.16	−.19	.76	FRS: P 2	.09	−.06	.39	.30	.10	.33
LSE : P 3	**.74**	−.04	.05	.11	−.10	.70	FRS: P 3	.09	.09	**.42**	.24	.12	.37
DEP : P 1	**.70**	−.01	.12	.10	−.24	.83	BIZ: P 1	.01	−.02	−.02	**.91**	.06	.76
DEP : P 2	**.75**	.00	.04	.06	−.22	.79	BIZ: P 2	.10	−.02	.10	**.67**	−.17	.70
DEP : P 3	**.69**	−.03	.12	.06	−.23	.74	BIZ: P 3	−.08	.08	.03	**.82**	.02	.70
WRK : P 1	**.72**	.13	.13	.01	−.14	.80	RC6: P 1	−.01	.10	−.05	**.82**	.02	.70
WRK : P 2	**.47**	.22	.16	.16	−.21	.77	RC6: P 2	.11	.04	−.09	**.66**	−.01	.48
WRK : P 3	**.64**	.01	.22	.01	−.21	.73	RC6: P 3	−.02	−.04	−.11	**.81**	.00	.56
ANX : P 1	**.62**	.00	.23	.10	−.20	.78	RC8: P 1	.07	.01	.27	**.55**	−.08	.62
ANX : P 2	**.53**	.06	.23	.03	−.30	.72	RC8: P 2	−.01	.02	.13	**.67**	.09	.50
ANX : P 3	.39	.12	**.41**	.00	−.23	.70	RC8: P 3	−.02	−.04	.17	**.67**	−.11	.60
TRT: P 1	**.52**	.25	.07	.03	−.27	.72	RC4: P 1	.05	−.06	.03	.11	**−.67**	.53
TRT: P 2	.37	.37	.06	.08	−.17	.59	RC4: P 2	.01	.06	−.01	.04	**−.64**	.47
TRT: P 3	**.47**	.26	.07	.07	−.33	.75	RC4: P 3	.16	.06	−.12	.07	**−.54**	.40
OBS: P 1	.34	.22	.18	.25	−.22	.74	ANG: P 1	.19	.29	.24	−.04	**−.41**	.63
OBS: P 2	**.54**	.08	.14	.14	−.18	.64	ANG: P 2	.14	.13	.17	.07	**−.53**	.61
OBS: P 3	.36	.21	.19	.16	−.12	.56	ANG: P 3	.04	.08	.10	.02	**−.64**	.55
RC7: P 1	.39	.18	.07	.21	−.32	.72	RC9: P 1	−.22	**.41**	.07	.03	**−.57**	.68
RC7: P 2	**.47**	.11	.23	.16	−.23	.74	RC9: P 2	−.39	.39	.01	.24	**−.45**	.65
RC7: P 3	.38	.11	.18	.26	−.28	.74	RC9: P 3	−.13	.28	.10	.24	**−.41**	.55
TPA: P 1	.23	.37	.07	.09	−.25	.53	FAM: P 1	.24	.05	.11	.13	**−.41**	.48
TPA: P 2	**.40**	.27	.10	.06	−.28	.64	FAM: P 2	.29	.00	.00	.22	**−.53**	.64
TPA: P 3	**.48**	.39	.07	−.01	−.23	.73	FAM: P 3	.35	.14	−.01	.15	−.35	.53
RC3: P 1	.06	**.87**	.07	−.01	.19	.70	Factor Corrs						
RC3: P 2	.10	**.83**	.03	−.04	.05	.69	Factor 2	.28					
RC3: P 3	.01	**.84**	.03	.05	.06	.73	Factor 3	.42	.31				
CYN: P 1	.10	**.85**	.10	.01	.07	.80	Factor 4	.35	.48	.43			
CYN: P 2	−.02	**.77**	.07	.17	.02	.77	Factor 5[a]	−.29	−.45	−.29	−.41		
CYN: P 3	−.06	**.84**	.09	.03	−.01	.76	% Variance	18.61	9.47	8.44	8.10	7.21	

Note. Scales with the highest average packet loading are presented in descending order. Pattern matrix loadings ≥.40 are underlined and bolded for emphasis. RC = Restructured Clinical; RC2 = Low Positive Emotions; SOD = Social Discomfort; RCd = Demoralization; LSE = Low Self-esteem; DEP = Depression; WRK = Work Interference; ANX = Anxiety; TRT = Negative Treatment Indicators; OBS = Obsessiveness; RC7 = Dysfunctional Negative Emotions; TPA = Type A Personality; RC3 = Cynicism; CYN = Cynicism; ASP = Antisocial Practices; HEA = Health Concerns; RC1 = Somatic Complaints; FRS = Fears; BIZ = Bizarre Mentation; RC6 = Ideas of Persecution; RC8 = Aberrant Experiences; RC4 = Antisocial Behavior; ANG = Anger; RC9 = Hypomanic Activation; FAM = Family Problems; h^2 = communality; % Variance = percent variance accounted for after rotation.

[a] Sign of factor is reversed.

Associations Between RC Scales and First Unrotated Principal Components

On the advice of a reviewer, we also investigated the correlations between the RC scales and the first unrotated principal component (PC), which largely consists of the nonspecific variance (i.e., demoralization) that was theoretically isolated on RCd during the development of the RC scales. Because the first PC can be defined in different ways, we derived it in all four sets of factored scales. We then correlated the RC scales with each PC, focusing particularly on RCd and RC7. As can be seen in Table 11, when defined by the Clinical scales, RCd had the strongest association with the first PC. RC7 had a strong correlation as well, although notably less strong than RCd, and it was followed closely by RC1. For the Clinical and Content scales, RCd and RC7 were equally strong markers of the first PC, and no other scale was nearly as good. However, in both data sets using the RC scales, RCd and RC7 switched positions such that RC7 was the best marker of the first PC.

Replication of Factor Structures

Finally, a reviewer questioned whether the dimensions reported here would replicate in other samples. Roger Greene offered several potential data sets for a replication effort and ultimately provided a random sample of 20,000 patients from the Caldwell data set, which is described more fully in Greene (2000). After screening these profiles for invalidity and nonresponsiveness in the same manner that we used for our data, a sample of 19,818 patients remained. We created three item-packets per scale, extracted three Clinical factors, five RC factors, five Clinical and Content factors, and five RC and Content

TABLE 7.—Correlations between Clinical and RC factors.

RC Factor/ Scale	Clinical Factor/Scale: Factor 2[a]/ **C1-C3-**C2	Factor 1/ **C7-C8-C4-C6-**C2	Factor 3/ **C9**
Factor 3/**RC1**	.78	−.52	−.44
Factor 2[a]/**RC2-RCd**	.47	−.75	.31
Factor 5/**RC3**	−.08	.41	.59
Factor 1/**RC4**-RC9	−.01	.61	.51
Factor 4/**RC6**-RC8	−.09	.62	.48

Note. Factor label scale names are presented in descending order based on mean packet loading. Scale names with mean loadings ≥ .40 are in plain text, means ≥ .50 are underlined, and means ≥ .60 are bolded. Scales with mean loadings < .40 are not reported. C1 = Hypochondrias (Hs); C3 = Hysteria (Hy); C2 = Depression (D); C7 = Psychasthenia (Pt); C8 = Schizophrenia (Sc); C4 = Psychopathic Deviate (Pd); C6 = Paranoia (Pa); C9 = Hypomania (Ma); RC1 = Somatic Complaints; RC2 = Low Positive Emotions; RCd = Demoralization; RC3 = Cynicism; RC4 = Antisocial Behavior; RC9 = Hypomanic Activation; RC6 = Ideas of Persecution; RC8 = Aberrant Experiences.

[a] Sign of factor is reversed.

factors from this sample, and used Barrett's (2005) Orthosim program to produce congruence coefficients across samples. For each comparison, two sets of congruence coefficients are obtained, one for each sample in turn as the target and the comparison matrix. Congruence coefficients greater than .90 are typically interpreted as indicating a replicated factor, and values greater than .85 indicate the core of the factor is consistent (Barrett, Petrides, Eysenck, & Eysenck, 1998). Across the two samples, congruence ranged from excellent to very good. For the three Clinical factors and five RC factors, the 16 coefficients were ≥ .93. For the Clinical and Content factors, the results were Factor 1 = .99/.99, Factor 2 = .87/.90, Factor 3 = .91/.89, Factor 4 = .98/.98, and Factor 5 = .97/.97, respectively. For the RC and Content factors, the results were Factor 1 = .95/.95, Factor 2 = .95/.92, Factor 3 = .88/.95, Factor 4 = .97/.92, and Factor 5 = .95/.98, respectively. Thus, it is reasonable to believe these dimensions replicate in other samples and are generalizable if similar methodology is applied.

TABLE 8.—Correlations between Clinical and Clinical-Content factors.

Clinical–Content Factor/Scale	Clinical Factor/Scale: Factor 2[a]/ **C1**-**C3**-C2	Factor 1/ **C7**-**C8**-**C4**-**C6**-C2	Factor 3/ **C9**
Factor 3/**C1**-**HEA**-**C3**-C2	−.96	.49	.18
Factor 4/**C4**-C6-FAM-DEP	−.12	.85	.33
Factor 1/**SOD**-**LSE**-DEP-C2-WRK-C7-TRT-ANX	−.38	.74	−.21
Factor 2/**CYN**-**ASP**-TPA-ANG-C9-TRT	−.05	.39	.76
Factor 5/**FRS**-BIZ	−.31	.50	.39

Note. Factor label scale names are presented in descending order based on mean packet loading. Scale names with mean loadings ≥ .40 are in plain text, means ≥ .50 are underlined, and means ≥ .60 are bolded. Scales with mean loadings < .40 are not reported. C1 = Hypochondrias (Hs); C3 = Hysteria (Hy); C2 = Depression (D); C7 = Psychasthenia (Pt); C8 = Schizophrenia (Sc); C4 = Psychopathic Deviate (Pd); C6 = Paranoia (Pa); C9 = Hypomania (Ma); HEA = Health Concerns; FAM = Family Problems; DEP = Depression; SOD = Social Discomfort; LSE = Low Self-Esteem; WRK = Work Interference; TRT = Negative Treatment Indicators; ANX = Anxiety; CYN = Cynicism; ASP = Antisocial Problems; TPA = Type A Personality; ANG = Anger; FRS = Fears; BIZ = Bizarre Mentation.

[a] Sign of factor is reversed.

TABLE 9.—Correlations between RC and RC-Content factors.

RC and Content Factor/Scale	RC Factor/Scale: Factor 4/ RC6-**RC8**	Factor 3[a]/RC1	Factor 5/RC3	Factor 2[a]/ RC2-RCd	Factor 1/ RC4-**RC9**
Factor 4/**BIZ**-**RC6**-**RC8**	.97	−.47	.48	−.20	.45
Factor 3/**HEA**-**RC1**-FRS	.36	−.96	.34	−.36	.26
Factor 2/**RC3**-**CYN**-ASP	.46	−.34	.96	−.08	.46
Factor 1/**RC2**-**SOD**-**RCd**-**LSE**-**DEP**-**WRK**-ANX-TRT-OBS-RC7	.34	−.41	.31	−.95	.32
Factor 5[a]/**RC4**-ANG-RC9-FAM	−.40	.34	−.45	.14	−.92

Note. Scales are presented in descending order based on mean packet loading. Scales with mean loadings ≥ .40 are in plain text, means ≥ .50 are underlined, and means ≥ .60 are bolded. Scales with mean loadings < .40 are not reported. RC6 = Ideas of Persecution; RC8 = Aberrant Experiences; RC1 = Somatic Complaints; RC3 = Cynicism; RC2 = Low Positive Emotions; RCd = Demoralization; RC4 = Antisocial Behavior; RC9 = Hypomanic Activation; BIZ = Bizarre Mentation; HEA = Health Concerns; FRS = Fears; CYN = Cynicism; ASP = Antisocial Practices; SOD = Social Discomfort; LSE = Low Self-esteem; DEP = Depression; WRK = Work Interference; ANX = Anxiety; TRT = Negative Treatment Indicators; OBS = Obsessiveness; RC7 = Dysfunctional Negative Emotions; ANG = Anger; FAM = Family Problems.

[a] Sign of factor is reversed.

DISCUSSION

The goal of this study was to explore the impact of the RC scales on the factor structure of the MMPI–2. Prior scale-level analyses suggested that the RC and Clinical scales had similar two-dimensional structures (Hoelzle & Meyer, 2005). However, these analyses were restricted by the small number of marker variables used. In this investigation, we corrected this problem by using item parcels for each scale and found the RC scales have a more differentiated five-factor structure than the three-factor structure of the Clinical scales. The Clinical scale factors included a broad dimension of general maladjustment and subjective distress, a more narrow dimension of somatic symptoms, and one even more narrow factor that was specific to Scale 9 content. In contrast, the five RC factors were all of similar size and consisted of factors assessing depressive withdrawal, psychotic symptoms, cynicism, somatic symptoms, and externalizing antisocial behavior.

Several conclusions can be drawn from these results. First, when the Clinical scales were factored, Scale 2 had similar moderate size loadings on very different affective and somatic dimensions (see Table 2). Given that depression does have somatic correlates, this finding is not unexpected, and in clinical practice the meaning of an elevation on Scale 2 is routinely determined by considering it in relation to other scales. Nonetheless, the results highlight how it would be challenging to interpret Scale 2 independently given how its item variance is dispersed across such distinct dimensions. RC2 does not have the same kind of interpretive ambiguity (see Table 4). Second, even though RC2 is readily predicted from a single dimension, and Scale 2 is not, the situation was reversed for RC7 and Scale 7. RC7 is not clearly predicted by any one of the extracted RC dimensions (see Table 4), although Scale 7 is clearly predicted by the first Clinical scale factor as indicated by its large and distinct pattern loadings (see Table 2). Third, even though there are limitations to each set of scales, the more differentiated five-factor structure of the RC scales has clinical advantages over the three-factor

TABLE 10.—Correlations between Clinical-Content and RC-Content factors.

RC and Content Factor/Scale	Clinical and Content Factor/Scale				
	Factor 1/**SOD**-**LSE**-DEP-C2-WRK-C7-TRT-ANX	Factor 2/**CYN**-**ASP**-TPA-ANG-C9-TRT	Factor 3/**C1**-**HEA**-**C3**-C2	Factor 5/ **FRS**-BIZ	Factor 4/**C4**-C6-FAM-DEP
Factor 1/**RC2**-**SOD**-**RCd**-**LSE**-**DEP**-**WRK**-ANX-TRT-OBS-RC7	.97	.23	.43	.36	.53
Factor 2/**RC3**-**CYN**-ASP	.29	.94	.12	.40	.24
Factor 3/**HEA**-**RC1**-FRS	.33	.35	.91	.63	.31
Factor 4/**BIZ**-**RC6**-**RC8**	.25	.51	.23	.78	.63
Factor 5[a]/**RC4**-ANG-RC9-FAM	−.22	−.66	−.21	−.23	−.74

Note. Factor label scale names are presented in descending order based on mean packet loading. Scale names with mean loadings ≥ .40 are in plain text, means ≥ .50 are underlined, and means ≥ .60 are bolded. Scales with mean loadings < .40 are not reported. RC = Restructured Clinical; SOD = Social Discomfort; LSE = Low Self-esteem; DEP = Depression; C2 = Depression (D); WRK = Work Interference; C7 = Psychasthenia (Pt); TRT = Negative Treatment Indicators; ANX = Anxiety; CYN = Cynicism; ASP = Antisocial Practices; TPA = Type A Personality; ANG = Anger; C9 = Hypomania (Ma); C1 = Hypochondrias (Hs); HEA = Health Concerns; C3 = Hysteria (Hy); FRS = Fears; BIZ = Bizarre Mentation; C4 = Psychopathic Deviate (Pd); C6 = Paranoia (Pa); FAM = Family Problems; RC2 = Low Positive Emotion; RCd = Demoralization; OBS = Obsessiveness; RC7 = Dysfunctional Negative Emotions; RC3 = Cynicism; RC1 = Somatic Complaints; RC6 = Ideas of Persecution; RC8 = Aberrant Experiences; RC4 = Antisocial Behavior; RC9 = Hypomanic Activation.
[a] Sign of factor is reversed.

structure of the Clinical scales in that it is more able to identify specific psychological symptoms.

When the Clinical and RC scales were factored with the Content scales, the differences were dramatic for the Clinical scales but virtually unchanged for the RC scales. The Clinical and Content scales together generated a five-factor structure that included dimensions of depressive withdrawal, cynicism, somatic symptoms, resentment/suspiciousness, and fears. Relative to the global and more heterogeneous three-factor structure of the Clinical scales, adding the Content scales reorganizes the profile information and facilitates the ability to measure distinct and clinically useful facets of psychopathology. There was clear congruence for the dimension of somatic symptoms across analyses with and without the Content scales; however, the remaining dimensions exhibited only moderate congruence (see Table 8). For example, the general maladjustment and subjective distress dimension from the Clinical scales showed modest correlations with the Clinical and Content dimensions of depressive withdrawal (C-C Factor 1) and resentment/suspiciousness (C-C Factor 4). We believe this is the greatest advantage of considering the Clinical and Content scales together over the Clinical scales alone; the variance contained on a single, general, heterogeneous dimension now can be partitioned to produce two conceptually meaningful dimensions.

TABLE 11.—Correlations between RC scales with the first unrotated principal component defined by packets from each set of scales examined.

Scale	First Unrotated Principal Component Defined by:			
	Clinical Scales	Clinical and Content Scales	RC Scales	RC and Content Scales
RCd	.88	.91	.84	.87
RC1	.77	.69	.67	.65
RC2	.68	.64	.53	.59
RC3	.41	.58	.66	.65
RC4	.52	.58	.64	.61
RC6	.52	.58	.68	.62
RC7	.79	.90	.91	.92
RC8	.64	.69	.78	.72
RC9	.36	.52	.64	.59

Note. All correlations were significant at the .01 level (two-tailed). RC = Restructured Clinical; RCd = Demoralization; RC1 = Somatic Complaints; RC2 = Low Positive Emotions; RC3 = Cynicism; RC4 = Antisocial Behavior: RC6 = Ideas of Persecution; RC7 = Dysfunctional Negative Emotions; RC8 = Aberrant Experiences; RC9 = Hypomanic Activation.

Although the Clinical scales are clearly aided when analyzed in combination with the Content scales, we did not observe a similar advantage for the RC scales. The RC scales alone and in combination with the Content scales evaluated five dimensions that were highly similar across analyses (see Table 9). This finding implies that the variance contained within the RC scales and the RC and Content scales is partitioned along similar lines. Although this finding suggests notable redundancy between the RC and Content scales, it is also clear from Table 10 that two of the RC and Content scale factors are quite different from their Clinical and Content counterparts. This difference indicates that the RC scales contribute interpretive information that goes beyond what can be obtained from just the existing Clinical scales and Content scales.

In general, the RC and Content dimensions appeared clearer and more distinct than the Clinical and Content dimensions. For the RC and Content results, there were no instances when the average pattern coefficient from either a RC or Content scale was ≥ |.40| on more than one dimension (see Table 6). Further, TPA was the only scale that did not have an average coefficient ≥ |.40| on a specific RC and Content dimension. In combination, these results show the RC and Content factors have a fairly clear simple structure pattern of convergent and discriminant loadings. In contrast, with the Clinical and Content scales, DEP, Scale 2, and TRT had average packet coefficients ≥ |.40| on multiple dimensions (see Table 5); and BIZ nearly did, with average packet coefficients of .48 and .39 on two dimensions. Also, OBS and Scale 8 did not have average packet coefficients ≥ |.40| on any Clinical and Content dimensions. Collectively, these findings imply the Clinical and Content factors are more diffuse than the RC and Content factors and suggest that scores or clinical inferences derived from the Clinical and Content factors will have less precision (i.e., larger standard errors of estimate) than those from the RC and Content factors.

Despite the clearer pattern of RC and Content loadings, both sets of analyses assessed three dimensions with a high degree of congruence: depressive withdrawal, cynicism, and somatic symptoms (see Table 10). At the same time, however, there are some noticeable differences in the scales that provide salient

loadings on each set of dimensions. For example, the cynicism dimension in the RC and Content analysis (RC-C Factor 2) is defined by high pattern coefficients from RC3, CYN, and ASP (*M* coefficients = .85, .82, and .59, respectively), whereas this dimension in the Clinical and Content analysis (C-C Factor 2) includes high loadings from CYN and ASP (*M* coefficients = .78 and .72, respectively) and weaker secondary loadings from scales that are more tangential to the core construct including TPA, TRT, ANG, and Scale 9 (*M* coefficients ranged from .48–.44). This indicates that RC-C Factor 2 is a more cohesive and succinct dimension than C-C Factor 2.

A similar advantage is observed with the depressive withdrawal dimensions (C-C Factor 1; RC-C Factor 1). First, there is a clear difference in how the Clinical and RC scales contribute to each dimension. RC2 and RCd have large coefficients on the RC and Content dimension (*M* coefficients = .82 and .74, respectively), whereas Scales 2 and 7 have much weaker coefficients on the Clinical and Content dimension (*M*s = .53 and .48, respectively). Second, the RC and Content dimension includes greater contributions from a variety of conceptually related scales than the Clinical and Content dimension. The RC and Content dimension has average coefficients > .60 for RC2, SOD, RCd, LSE, DEP, and WRK. In contrast, the Clinical and Content dimension contains just two scales with comparably high coefficients (SOD $M = .80$; LSE $M = .64$), with the other conceptually relevant scales producing lower coefficients. Collectively, these observations suggest the RC and Content dimension is organized in a more concise manner than the Clinical and Content dimension.

For the somatic factor, both sets of scales provide clear markers for the dimension. The RC and Content dimension (RC-C Factor 3) is strongly defined by HEA and RC1 (*M* coefficients = .87 and .85, respectively), and the Clinical and Content dimension (C-C Factor 3) is strongly defined by Scale 1, HEA, and Scale 3 (*M*s = .83, .78, and .77, respectively). Interestingly, both factors had smaller secondary loading from less conceptually related scales. RC-C Factor 3 had low loadings from FRS ($M = .43$), although FRS made no substantive contribution to C-C Factor 3 ($M = .09$). In contrast, C-C Factor 3 had low loadings from Scale 2 ($M = .47$), although RC2 made no contribution to RC-C Factor 3 ($M = .06$). Given the unexpected contribution of FRS to RC-C Factor 3, it is difficult to consider this RC-based factor superior to its Clinical and Content counterpart.

The RC and Content dimension reflecting psychotic symptoms (RC-C Factor 4) is defined by BIZ, RC6, and RC8 (*M* coefficients = .80, .76, and .63, respectively), with no notable secondary loadings from other scales. A clear dimension of psychotic symptoms was not present in the Clinical and Content scale analyses; however, RC-C Factor 4 has substantial correlations with two Clinical and Content dimensions, one assessing fears (and unusual experiences to a lesser extent; C-C Factor 5) and the other externalized resentment and suspiciousness (C-C Factor 4). One of the most striking differences between the RC and Content and Clinical and Content factors is that RC8 is distinctly associated with the RC and Content psychotic symptoms dimension, but Scale 8 has small or trivial pattern coefficients across all of the Clinical and Content dimensions. Overall, the RC and Content dimension of psychotic symptoms appears to be a cohesive, clear, and clinically relevant dimension. Given that it can identify and isolate clinically important psychotic symptomatology, the RC and Content factor solution provides an advantage over the Clinical and Content factor solution when making diagnostic inferences regarding the presence of psychotic disorders or psychotic features associated with other disorders.

The RC and Content dimension reflecting externalizing antisocial behavior (RC-C Factor 5) and the Clinical and Content dimension reflecting resentment and suspiciousness (C-C Factor 4) were moderately correlated ($r = -.74$) and contain similar loadings from the same scales (i.e., Scale 4 and RC4). However, there are meaningful differences between these two factors. The Clinical and Content dimension had comparable loadings from Scale 4 ($M = .61$) and Scale 6 ($M = .59$), with lesser contributions from FAM ($M = .43$), DEP ($M = .40$), BIZ ($M = .39$), and Scale 8 ($M = .38$). The RC and Content dimension was defined by RC4 ($M = .62$) and to a lesser degree by ANG ($M = .53$), RC9 ($M = .48$), and FAM ($M = .43$). Although the RC and Content and Clinical and Content dimensions are similar in that they included secondary loadings from several scales, the RC and Content dimension is more conceptually coherent and unidimensional. In addition, having a dimension of externalizing antisocial behavior links the MMPI–2 more directly to the general structure of psychopathology and the recommendation for such a dimension to be included in the 5th edition of the *DSM (DSM–V;* Krueger, Markon, Patrick, & Iacono, 2005).

The observation that RC7 has no large pattern coefficients on any of the RC or RC and Content dimensions warrants elaboration. These findings do not mean that RC7 is uncorrelated with the factors, just that it is not uniquely associated with any particular dimension. To better understand the relationship between RC7 and the factors, it is necessary to review the structure coefficients, which reveal that RC7 was moderately to strongly correlated with each of the RC factors (*r*s from |.48|–|.62|) and each of the RC and Content dimensions (*r*s from |.49|–|.72|). This combination of findings indicates that RC7 has low pattern coefficients because it has salient associations with every factor, and its variance cannot be uniquely associated with any of them.

The communalities for RC7 also help illustrate this point. In the RC and Content analyses, RC7 had the third highest average communality after RCd and RC1 (average h^2values: RCd = .82, RC1 = .74, and RC7 = .73). In the RC analyses, RC7 communalities were comparable to RC3 and RC2 and again less than RCd and RC1 (average h^2values: RCd = .81, RC1 = .75, RC3 = .73, RC7 = .71, and RC2 = .70). The high RC7 communalities across analyses indicate a large degree of the scale's variance is accounted for by the extracted dimensions; however, no single factor uniquely or cohesively captures this variance.

Nichols (2006) argued that there was an underextraction of first-factor variance when Scale 7 was restructured. Our finding that RC7 was moderately associated with all extracted factors but not uniquely with any of them in both sets of analyses with the RC scales supports this position. In addition, the last three columns of Table 11 lend credence to this argument. Interestingly, however, when considering the Clinical scales alone, which were the central focus during the RC scale development process, the size of RC7's correlation with the first PC and the fact that RC1 was correlated at about the same level would not suggest a problem with underextraction. To the contrary, from the vantage point of the Clinical scales, RCd appears to be the best marker of the first PC and notably better than RC7.

Tellegen et al. (2003) reassigned the broad and rather nonspecific depressive item variance contained within the traditional Clinical scales to RCd. However, when considering the broader array of content scales on the MMPI–2, it appears that RC7 also still captures a broad component of the multifaceted, first-factor variance. This interpretation is supported by the wide range of constructs that correlate with RC7 (e.g., fear, hostility, general distress, thought disorder; see, e.g., Nichols, 2006; Tellegen et al., 2006). There are advantages for preferring the set of RC scales over the Clinical scales based on their factor structure when factored alone or in conjunction with the Content scales. When using either of the RC factor-based frameworks for making inferences about patients, it will be useful to recognize that RC7 is the most sensitive marker of the general maladjustment and subjective distress that is common across these scales, and the responses to RC7 items facilitates other scales rising and falling together.

It should be noted that clearer, more distinct RC and Content factors may be somewhat artifactual and due to a higher level of item redundancy between the RC and Content scales versus the Clinical and Content scales (e.g., RC3 contains 15 items, 12 of which are included in CYN). We considered taking steps to correct for item overlap between scales by removing items from one or more scales but decided against doing so because it would be challenging to fairly distribute items included on more than two scales, and correcting for item overlap would create a dramatically different set of scales from those regularly interpreted.

These difficulties can be illustrated with the Clinical and Content somatic dimension, which includes meaningful loadings from Scale 1, Scale 3, HEA, and Scale 2. Scale 1 includes 32 items, none of which are unique to just Scale 1 relative to Scale 3, HEA, and Scale 2. Fifteen items on Scale 1 are also on Scale 3, HEA, or Scale 2; 13 items are included on two of these other scales; and 4 items are included on each scale. Correcting for overlap just between these four scales would reduce the number of Scale 1 items to 12 or 13, thus restricting the number items per packet to approximately 4. The number of items available for this corrected scale would decrease further if one also accounted for item overlap with all the other Clinical and Content scales. Ultimately, assuming one devised complex principles for distributing items shared in disproportionate ratios across multiple scales, it would be problematic to interpret the results of a factor analysis based on the revised scales because the revisions would no longer reflect the scale-based information that is used in clinical settings.

Instead of creating revised scales, one could turn to formulas that have been derived to determine the degree of correlation expected by item overlap (see, e.g., Hsu, 1994). Unfortunately, different correction formulas exist, and they do not lead to converging results. In addition, using a matrix of correlations that have been corrected by formulas that adjust for item overlap has the same conceptual problem as using modified scales. The results of a factor analysis based on the adjusted correlations would not generalize to clinical practice where the scales one interprets have a pattern of associations and meanings that are based on overlapping items. Given these issues, a conservative position would view the more differentiated RC and Content factors as describing the structure of the test itself (and its pattern of overlapping items) rather than as a definite statement about the nature of personality and psychopathology more generally.

In summary, it appears that Tellegen et al. (2003) reorganized the Clinical scales in a manner that produces clearer and more differentiated markers of psychopathology in comparison to the Clinical scales. Further, when the RC scales are analyzed in conjunction with the Content scales, the general result also is clearer and more distinct markers of psychopathology than when the Clinical and Content scales are analyzed in combination. The relative value of these more differentiated, concise markers will be determined by future research investigating their clinical utility and behavioral correlates.

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