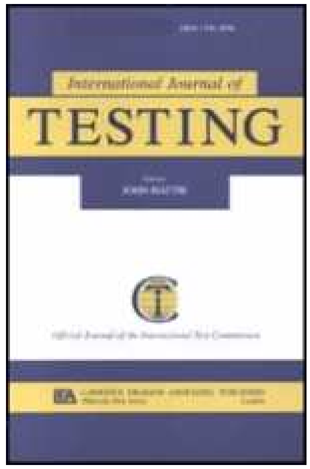

Revising the Rorschach Ego Impairment Index to Accommodate Recent Recommendations About Improving Rorschach Validity

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Abstract

We used multiple regression to calculate a new Ego Impairment Index (EII-3). The aim was to incorporate changes in the component variables and distribution of the number of response as found in the new Rorschach Performance Assessment System, while sustaining the validity and reliability of previous EIIs. The EII-3 formula was derived from a large, diverse, developmental sample (N = 411) and tested on an independent validation sample (N = 206) procured from psychiatric, forensic, research, and nonclinical control contexts. Additional analyses revealed high correlations with previous EIIs with similar reliability and validity but superior distributional qualities.

Revising the Rorschach Ego Impairment Index to Accommodate Recent Recommendations About Improving Rorschach Validity

The Rorschach Ego Impairment Index (Auslander, Perry, & Jeste; 2002; Dawes, 1999; Garb, 1999; Perry, Minassian, Cadenhead, Sprock, & Braff, 2003; Perry & Viglione, 1991; Viglione, Perry, Jansak, Meyer, & Exner, 2003) has demonstrated considerable validity as a measure of thought disorder and psychological disturbance with adults and also with children (Stokes et al. 2003). It contains five variables that load on a single factor (Perry & Viglione, 1991; Perry, Viglione, & Braff 1992): distorted form (FQ-), the weighted sum of cognitive processing errors (WSum6), problematic vs. adaptive representations of people and interactions (Good and Poor Human Representation Variables, HRV), crude and problematic imagery (Critical Contents, including aggressive movement, anatomy, blood, explosions, fire, food, morbid, sex, and x-ray contents), and distorted perceptions of human activity (M-). Since its initial development, an important part of the EII was its statistical control for the number of responses (R), which was done by regressing R out of the component scores before factor analyzing their residuals.

Since introduction, the EII has been calculated in slightly different ways. For example, the first study reporting on its validity omitted morbid (MOR) as a critical content because of concern that it would confound predictions of response to medications among individuals with vegetative depression (Perry & Viglione, 1991). This is because MOR was designed to be a correlate of depression (Exner, 2003). In 2003 Viglione, Perry, and Meyer produced the EII-2 to accommodate changes in the scoring algorithm for the HRV variable (Viglione, Perry, Jansak, Meyer, & Exner, 2003), which was originally called the Human Experience Variable within the original EII (Perry & Viglione, 1991). These authors used multiple regression to predict the original EII and to calculate coefficients for the five EII components and R. The EII-2 proved to be highly correlated with the original EII (r = .99) and recommendations were provided for interpretations to accompany EII-2 ranges. Before the EII-2 developmental paper was published, one of its components, the HRV, was adopted by the Comprehensive System (CS, Exner, 2001).

Since that time, research has supported the validity of the EII. A meta-analysis (Diener, Hilsenroth, Shaffer, & Sexton, 2010) encompassing 1402 participants in 12 independent samples revealed an effect size of r = .29 with indices of psychiatric disturbance severity. A large international nonpatient sample from 17 countries (N = 4704) produced an EII-2 mean of -.15, a score that corresponds to the middle of the typical range for non-patients[1]. Other recent studies (Elfhag, Rossner, Lindgren, Andersson, and Carlsson, 2004; Hilsenroth, Eudell-Simmons, DeFife, & Charnas, 2007; Tibon & Rothschild, 2009) have produced EII-2 data generally consistent with the interpretive ranges that were recommended by Viglione et al. (2003), although inpatient children produced a mean EII-2 (0.93) that was slightly lower than expected (Stokes, Pogge, Powell-Lunder, Ward, Bilginer, & DeLuca, 2003).

Despite the encouraging findings obtained from the research on the EII, the debate on the overall Rorschach validity is not yet settled and some concerns have been reported (e.g., Garb, Wood, Lilienfeld & Nezworski, 2005; Wood, Lilienfeld, Nezworski, Garb, Allen, & Wildermuth, 2010). In response to those criticisms, Meyer, Viglione, Mihura, Erdberg, and Erard (2010) have recently developed a new system, the Rorschach Performance Assessment System (R-PAS). Derived from the current evidence in the research literature, R-PAS includes only the Rorschach variables that have a sufficient evidence base and behavioral foundation. As a consequence, some of the variables included in the EII-2 are not present in R-PAS and will not longer be scored by all users. In addition, to conform with recent empirical findings (Meyer, Erdberg, & Shaffer, 2007; Viglione & Meyer, 2008), the R-PAS

[1] This sample contains the protocols used as the R-PAS normative sample for EII.

also includes a change in the administration procedure. For these reasons, neither the original EII nor the EII-2 could be used with the R-PAS, so that a revision to the EII formula is needed.

More specifically, the food response has been criticized for lacking of empirical support as a measure of dependency. Accordingly, in R-PAS the food response is being replaced by the Rorschach Oral Dependency Scale (ROD) because the ROD has demonstrated strong validity (Bornstein, 1996, 1999; Bornstein & Masling, 2005; Bornstein & O'Neill, 1997; Garb, 1999). Because food is one of the Critical Contents, omitting it would necessitate a revision to the EII formula. Indeed, similar changes in the underlying variables in the EII led to the first recalculation and the creation of the EII-2.

The administration in the R-PAS involves optimizing the number of responses (R) to the test, so as to improve Rorschach psychometrics. Research has revealed that R is much more variable than previously thought, and that there are far too many records with low R and hence less reliability (Meyer, Erdberg, & Shaffer, 2007; Viglione & Meyer, 2008). Accordingly, there is a need to restrict the variability in R to enhance reliability and validity. This has led to research and recommendations for a revision in administration procedures known as R-Optimized administration (Dean, Viglione, Perry, & Meyer, 2007; Viglione, Converse, McCullaugh, Evans, McDermott, Moore &, Meyer, 2010). The three essential differences relative to CS (Exner, 2001) for R-Optimized administration are (1) introducing the test with the advisement to “give two, or maybe three responses” to each card, (2) prompting for a second responses on all cards if only one is given, and (3) requesting the card back after four responses to a card accompanied by a reminder to give two or possibly three responses. In the CS, examinees are prompted for a second response only on the first card and also rarely on the fourth card. Because R is included as a control variable in the EII efforts to optimize R can change both the statistical relationships between EII subcomponents and R and also the distributions of the residuals of the EII subcomponents after regressing out R – another factor requiring that the EII be recalculated.

To sum up, the overall validity of the EII has been supported by several research data, but recent findings suggest modifications in the Rorschach administration and scoring that affect some individual components of the index – i.e., the food content and the number of responses. If such improvements were adopted without revising the formula of the EII, the resulting index would produce distorted values from those that would be obtained by a traditional administration and scoring of the test. As a consequence, the validity of the original EII would not be generalized to the records administered and scored according to the recent – empirically based – recommendations. In anticipation of these modifications, to generalize the validity of the original EII, revising the formula for the EII would be necessary. Accordingly, we sought to create a new EII, as much similar as possible to the original one, but without food content and using protocols with a modified distribution of R based on modeled R-Optimized administration. This new index should be highly correlated with previous EIIs. We also we sought to demonstrate initial reliability and validity of this new index.

Also, extreme outliers, excessive variability, and prominent positive skew in the previous EIIs created problems in research and practice. Such distributional problems create assumptions violations and thus produce errors and a potential for over-estimates of validity, when non-transformed values are manipulated statistically. Outliers and skew lead to greater standard deviations and impedes the specification of tighter interpretive bands and precision of interpretation in practice. Also, extreme high values when encountered in practice may distort clinicians expectations about clinically relevant EII levels, and lead to misinterpretation and clinical judgment errors. As is the practice in assessment with, for example, the MMPI, normally distributed variables are typically preferred and might be advantageous for the EII. Thus, for practical and precedent reasons we concluded that improving these distributional qualities was a worthwhile goal.

Method

To calculate new weights for the EII-3, we employed the multiple regression method used to produce the EII-2 (Viglione, Perry & Meyer, 2003). This procedure involves predicting the original EII (or EII-1) using the slightly altered components as regression equation predictors. The EII-1 was selected as the criterion since it was based on the original factor analysis, whereas the EII-2 might be subject to some drifting from this original target. The components are FQ-, WSum6, Critical Contents without food, M-, Poor HR, Good HR, and R. The original EII was the criterion variable. Although the original EII was derived using a score for the difference between Poor HR and Good HR (i.e., HRV), the components were entered independently as was done when creating the EII-2.

Developmental and Validation Samples

We used the same set of computerized Rorschach records that were used to develop the R-PAS Composite scores for Thought and Perception, Vigilance, and Suicide Concern (Viglione, Giromini et al., 2011). These records were derived from a much larger sample after modeling the original dataset (collected according to the CS) in order to mimic the patterns produced by R-Optimized administration. More specifically, the modeling procedure allowed one to select suitable records, collected using standard CS guidelines, and delete responses so as to exactly match the response level parameters observed in a sample of 123 target records collected by experienced examiners using R-Optimized guidelines. The biggest change in R-Optimized versus the CS procedure is that R-Optimized greatly limits the number of cards with only one response and thus nearly eliminates short records, i.e. those under 17 responses. The modeling procedure matches records on a card by card basis to the sample of 123 R-Optimized records, so that records with an insufficient number of responses are dropped. Also, all responses that occur after the fourth response to any card are deleted so as to mimic the "pull after four responses" procedure in R-Optimized. For these reasons, the modeling procedure entailed a reduction in the total number of records suitable to our analysis. On the other hand, even though these records were administered with the CS, the number of responses observed across entire protocols and across each of the individual cards almost exactly mimics the patterns produced by following an actual R-Optimized administration. The statistical impact of this procedure is to increase the normality of the R distribution by reducing the number of short and long records thereby reducing its standard deviation and positive skew.

Because the EII is primarily concerned with more disturbed conditions, particularly those with psychotic or schizophrenic spectrum conditions, we wanted to ensure that psychopathological records were well represented in our sample. Accordingly, the proportion of control or non-patient protocols was held to 5% of the sample, which left a sample of 617 records.

The new weights for the EII-3 were calculated on a randomly selected developmental subgroup consisting of two thirds of the original sample (N = 411) and tested with a validation sample (N = 206) constituting one third of that sample. We used a larger developmental sample to ensure stability of the derived coefficients. These adult Rorschach records came from eight non-overlapping subgroups, identified by either patient status, evaluation context, diagnosis, or presenting problem. Thus, 33.5% were from a mixed sample of inpatients and outpatients evaluated for psychiatric reasons, 32.1% were criminal offenders, 9.7% trauma patients, 4.9% control or non-patients, 4.5% schizophrenic or other psychotic patients, 3.9% with depression or substance abuse, 2.1% forensic psychiatric patients, and 9.2% patients with other conditions. To ensure that the developmental and validation samples contained the same proportions of these subgroups, first the initial dataset was sorted by these eight subgroups and arranged randomly in triplets or blocks of three. Two of the three were then assigned to the developmental sample and one to the validation sample.

Within the entire sample, 57.9% are males, the mean age is 35.1 (SD = 11.5)[2], and the mean R is 24. More than 50 examiners contributed protocols to the sample.

Results

As expected within the developmental sample, the EII-1, which served as the criterion variable for the analysis with the developmental sample, was highly skewed and non-normal (skew > 2 and kurtosis > 7, see Table 1). To ensure that assumptions of normality were met in the regression analysis and statistical outliers corrected, the upper 5% of the EII-1 was Winsorized: Given that within the developmental sample the 95th percentile for the EII-1 was equal to 3.58, all values greater than this were set equal to 3.58. As expected, the Winsorized EII-1 was sufficiently normally distributed for the regression analysis with not univariate outliers, so it was used as the criterion in the regression analyses. A similar tactic was used to transform non-normal predictors, namely WSum6, M-, Critical Contents and PoorHR (see the lower portion of Table 2). After transformation all included predictors had absolute skew and kurtosis values < 1.

The multiple regression model predicting the Winsorized EII-1 was highly significant, $F(7,403) = 606.73$, $p < .001$, with a multiple R of .96. Each component variable was significant and contributed uniquely to the prediction of the dependent variable. Table 2 includes descriptive statistics for the predictors along with their standardized and unstandardized coefficients. The prediction equation calculated using the unstandardized B values was then used to calculate the new EII-3 index in the derivation sample and in the independent validation sample. Given the prominent skew of the EII-1 and EII-2 (see Table 2 for details) both Pearson and Spearman correlations were computed to examine correlations

[2] These are valid percentages. Missing data are 6 cases for gender and 34 cases for age.

among the three versions of the index. Within the validation sample the EII-3 rank order correlations with the EII-1 and EII-2 are .95 and .98, respectively, indicating that the EII-3 is nearly identical to the two previous versions (Table 3).

Descriptive data for the three versions of the indices are presented in Table 1.

Reliability

To evaluate the reliability of the EII-3, we re-analyzed previously published data. In 2003, Viglione and Taylor reported strong interrater reliabilities for CS variables in a mixed clinical and non-patient sample of 84 individuals. Using this dataset, two-way mixed model single measures intraclass correlation coefficients (ICCs) demonstrated that the new EII-3 has excellent inter-rater reliability. The ICC for the original EII is .89, for EII-2 is .90 and for EII-3 is .87 (Table 4). Both the EII-1 and the EII-2 were positively skewed so that Spearman rank order correlations were calculated as well, yielding similar results (Spearman rho values of.88 for EII-1, .87 for EII-2, and .86 for EII-3).

To more extensively examine the reliability of the EII-3, we also analyzed archival records coded by students and by clinicians (see Meyer, Hilsenroth, Baxter, et al., 2002). This sample was large enough to select a subset of records using the R-Optimized modeling procedure, so we computed analyses both within the original sample and within the R-Optimized modeled sample. Again, similarly to the old EIIs, the new EII-3 has excellent inter-rater reliability. Both within the full sample of records with 14 or more responses (N = 208) and within the modeled sample (N = 93) the ICC for the original EII is .94, for EII-2 is .93 and for EII-3 is .92. ICC's for data collected by students and clinicians were examined separately too. Overall, ICC's within samples scored by clinicians look nearly identical across the various EIIs (see Table 4 for details).

Taken together, these results confirm that, especially when data are scored by clinicians, the new EII-3 has excellent inter-rater reliability, at a level essentially identical to the old EIIs. Unlike the previous versions, the EII-3 does not benefit from the slightly inflated ICC values that could be associated with agreement on protocols falling at the tail of the positively skewed distribution.

A sample of 50 R-Optimized administered records were available from a study being completed on R-PAS inter-rater reliability (Viglione, Blume-Marcovici, Miller, Giromini, & Meyer, 2011). Protocols were collected from diverse groups including children and adult non-patients, adolescent sex offenders, well-controlled older schizophrenics, and inpatients and outpatients. Examiners and the two independent coders who did the great majority of the scoring were students supervised by an experienced Rorschach researcher who were blind to any previous coding of the record. The inter-rater ICC is .944.

Validity

To evaluate the validity of EII-3, we re-analyzed data previously published in a number of studies. In 2007, Dean, Viglione, Perry, and Meyer tested the EII-2, the SCZI, and the PTI among 61 residential care respondents, 31 of whom had psychotic disorders. Half of these Rorschach were administered according to Comprehensive System standards and half with an alternative administration, similar to R-Optimized, that was designed to restrain the number of responses. A synthetic measure of thought disorder based on semi-structured interview and self-report (the Thought Disorder Summary Scale) was the criterion variable. It correlated .50, .47, and .46 with the EII-1, EII-2, and EII-3, respectively (all $p < .001$). Given that the EII-3 is intended to be used with the R-OPT administration procedure, the same correlations were re-calculated using only the alternative administered records. The thought disorder criterion correlated .57 ($p < .005$) with the EII-1, .56 ($p < .005$) with the EII-2, and .62 ($p < .001$) with the EII-3. Taken together these results suggest that the EII versions have very similar validity.

Additional validity analyses were derived from a sample of 432 consecutive evaluations in a hospital-based assessment service at the University of Chicago (Meyer, 2002). Two criterion measures were suitable to the EII and both were based on diagnoses obtained from billing records generated before the psychological testing was initiated. The first contrasted patients with and without a psychotic disorder. The second measured severity of psychological disturbance on a 5-point scale of the most severe diagnosis assigned (see Dawes, 1999; Meyer, 2002; Meyer & Resnick, 1996; Viglione & Hilsenroth, 2001). Table 5 contains the correlations of these two criterion measures with the EII scales using R-Optimized modelled records. Given that the EII-1 and EII-2 were highly skewed, both Pearson and Spearman correlations were examined. Results again reveal essentially equal validity for the three indices.

To compare EII-3 mean values in relation to different degrees of psychological impairment, these psychotic and non psychotic patients were compared with a group of non patients or control samples derived from our large scale development sample (Viglione, Giromini, et al. 2011). As stated before, in the current study we randomly reduced the percentage of non-patients and controls to less then 5% to develop the weights of the EII-3. The 73 non-patient records previously excluded were utilized for this analysis; 33 are from males (age: M = 37.2, SD = 14.0), 40 from females (age: M = 32.9, SD = 9.5). We expected the mean EII-3 score to increase in a stepwise fashion across these three groups so examined the data using a focused contrast analysis (i.e., non-psychotic patient higher than non-patient, and psychotic patient higher than non-psychotic patient). A significant and large main effect was found, t (222) = 8.997, $p < .0001$, r = .52, with all post-hoc comparisons highly significant (p < .001) and displaying the expected linear trend, with the psychotic group showing the highest EII-3 value (M = 1.67, SD = 1.44), followed by the non-psychotic group (M =.73, SD = 1.11), with the control group presenting the lowest EII-3 (M = -.04, SD = .83).

The focused contrast effect size for the EII-1 and EII-2 were both r = .49. Descriptive statistics for all three EII versions are presented in Table 6. Again, it is clear that the statistical procedures used to develop EII-3 resulted in an index that is much more normally distributed with a greatly reduced standard deviation and skew, although the non-psychotic group the EII-3 had skew greater than 1 and kurtosis greater than 4.

Additional data are available from previous studies using the MMPI-2 as a criterion. Meyer (1997, 1999; Meyer, Riethmiller, Brooks, Benoit, & Handler, 2000) included 87 clients selected on the basis of concordant response style on the Rorschach and MMPI. When test-taking response styles on the two tests was similar, as measured by each test's first factor, pathology measures substantially correlated between the two tests. Table 7 presents the correlations between MMPI scales and EIIs calculated on Meyer's 1999 data. Again, the EII-3 produces correlations with the MMPI scales similar to the correlations for the EII-1 and EII-2. Readers should keep in mind that these are artificially inflated coefficients using just a subset of the original data after aligning method variance.

Discussion

Recently, research findings have led to recommendations to optimize the variability of R and to use the Rorschach Oral Dependency Scale rather than the food response as an indicator of dependency (Meyer et al., 2010). Such changes are designed to improve the reliability and validity of the Rorschach. Implementing them would affect the Ego Impairment Index, a scale that has demonstrated effectiveness as a measure of thought disorder and severity of psychopathology. Accordingly, the aim of this study was to create a new formula for calculating the EII incorporating these changes. To do so, we used the EII components in multiple regression to create a more normally distributed and thus a psychometrically superior version of the original EII. The large developmental sample (N = 411) ensured accurate and generalizable findings. The correlation between the EII-3 and the old EIIs in the validation sample (N = 206) revealed a high degree of similarity between the three indices. Accordingly, one should expect similar reliability and validity coefficients for the new EII-3. Various analyses of reliability and validity indicate that the normally distributed EII-3, which is adaptable to the R-optimized administration, is as reliable and valid as are the EII-1 and EII-2. Like the original EII and the EII2, the EII-3 has an excellent inter-rater reliability. Skew for the EII-3 was also reduced.

Interpretatively, given the great similarity of the EII-3 with the EII-1 and EII-2, the previous description of the EII-2 should apply to the EII-3: "Interpretively, high EII–2 [EII-3] values suggest problem-solving failures or ineffective and idiosyncratic thinking in complex and demanding life situations. One would expect that individuals with high EII–2 [EII-3] scores would evidence behavioral dysfunction and failures in adaptation" (Viglione, Perry & Meyer, 2003, p. 154). Based on the previous research and the findings presented earlier in this paper, we propose that the EII-3 can be best characterized as an index of ideational impairment. Thus, it is related to the spectrum of psychological disturbance to the extent that thinking oddities or a thought disturbance mediate that disturbance (Perry, Minassian, Cadenhead, Sprock, & Braff, 2003). Again consistent with previous research, we also recommend that the EII can be interpreted according to the updated ranges reported in Table 8. The EII-3 interpretive cutoffs reflect some small changes from the EII-2 values, largely based on the reduction in variability associated with the elimination of extreme values on the high end and its incumbent reduction in skew. Although it will present less of an obstacle to statistical manipulations, the EII-3 skew of about one in the validation sample is by no means small and most likely is a reflection of the distribution of thought disorder and impairment in the clinical population at large.

As a measure of impairment, low scores may merely signal a lack of impairment and not automatically suggest positive coping resources. Thus, protocol complexity may need to be taken into consideration (Viglione, 1999) so that healthy or optimal records would be both low on the EII-3 and high on Complexity. An example of a low EII with low complexity signaling less than optimal processing was produced by individuals with alexithymia, a condition marked by concrete thinking, poor mentalization and fantasy capacities, as well as psychosomatic problems (Tibon, Porcelli, & Weinberger, 2005).

A limitation of this study derives from the way the records were collected and then stored in our computerized datasets. As a result, it was not possible to identify the type of psychopathology and the patient status for all records. For example, among our forensic psychiatric patient group, it is not possible to identify a diagnosis for each patient. Thus, it is not possible to investigate whether the reliability and validity of the EII-3 remains similar among different diagnoses. Future research should identify the diagnostic and status variables better so that one can be more certain of generalizability to different clinical and forensic subgroups.

As suggested in the EII–2 developmental paper (Viglione et al, 2003), future research using R-Optimized administration should investigate the association of the EII-3 with behavioral measures of thought processes, information processing, decision making, and adaptive functioning, particularly with measures derived from real-life behavior as criteria to maximize the generalization to everyday functioning. Like all Rorschach variables, the EII-3 might yield information that is not readily available in self-report or interview. Secondly, longitudinal outcome research, like Perry's original work (Perry & Viglione, 1991), would test the hypotheses that the EII-3 measures internal capacities which in turn influence coping and ultimate outcomes. Alternatively, research investigating situations in which a single component score (for example, Critical Contents) contributes heavily to an EII–3 elevation might be illuminating. More research with children would also be informative.

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Table 1

Descriptive Data for three versions of the EII

		Developmental Sample (N = 411)			Validation Sample (N = 206)		
		EII_1	EII_2	EII3	EII_1	EII_2	EII3
M		.60	.60	.51	.80	.75	.63
SD		1.58	1.57	1.21	1.72	1.72	1.19
Skew		2.13	2.04	.73	2.84	2.79	.96
Kurtosis		8.10	7.07	.93	13.29	12.69	2.49
Minimum		-2.51	-2.22	-2.40	-2.20	-1.90	-1.73
Maximum		11.72	11.16	5.77	11.59	11.29	5.61
Percentiles	5	-1.18	-1.18	-1.27	-.96	-1.06	-1.07
	25	-.34	-.39	-.29	-.28	-.29	-.22
	Median	.27	.26	.37	.52	.41	.55
	75	1.09	1.11	1.15	1.26	1.31	1.29
	95	3.58	3.64	2.67	3.80	3.77	2.66

Table 2

Unstandardized B Coefficients for Predicting the EII-1 through Multiple Regression (N = 411)

Component	M	SD	Skew	Kurtosis	Unstandardized B	Standardized[a] Beta
FQ-	6.16	3.31	.72	.55	.138	.360
√WSum6	3.13	2.06	.60	.59	.302	.490
√Critical Contents	2.15	.89	.16	.51	.265	.1.87
√MQ-	.68	.73	.54	-.70	.321	.184
√Poor HR	1.75	.83	.05	.58	.287	.188
Good HR	3.53	2.07	.61	.43	-.101	-.165
R	24.36	4.79	.57	-.34	-.052	-.196
Constant					-.955	
Untransformed Variables						
WSum6	14.02	16.62	2.46	7.76	NA	
Critical Contents	5.40	4.15	1.54	3.44	NA	
MQ-	.99	1.38	2.39	9.41	NA	
Poor HR	3.76	3.14	1.87	6.18	NA	

EII-3 = -.955 + .138 * (FQ-) + .302 * (√WSum6) + .265 * (√Critical Contents) + .321 * (√MQ-) + .287 * (√Poor HR) - .101 * (Good HR) - .052 * (R)

Note: All components significant at $p < .001$.

[a]The unstandardized B weights are used as the coefficients to calculate the EII-3.

Table 3

Correlations among the EII-1, EII-2, and EII-3 within developmental and validation samples

	Developmental Sample (N = 411)		Validation Sample (N = 206)	
	EII-1	EII-2	EII-1	EII-2
Pearson correlations				
EII-2	.99		.99	
EII-3	.94	.96	.93	.95
Spearman correlations				
EII-2	.97		.96	
EII-3	.96	.98	.95	.98

Note: All correlations significant at $p < .001$.

Table 4

Inter-rater reliability coefficients for the three EIIs across different modeled and non modeled samples

ICCs	Original Data				Data Modeled for R-Optimized Administration		
	Viglione & Taylor (2003) (N = 84)	Meyer et al. (2002) Students (N = 66)	Meyer et al. (2002) Clinicians (N = 142)	Meyer et al. (2002) Entire sample (N = 208)	Meyer et al. (2002) Students (N = 32)	Meyer et al. (2002) Clinicians (N = 61)	Meyer et al. (2002) Entire sample (N = 93)
EII1	.89	.89	.95	.94	.90	.94	.94
EII2	.90	.87	.94	.93	.86	.94	.93
EII3	.87	.84	.94	.92	.83	.94	.92

Note: All ICCs significant at p < .001.

Table 5

Correlations with Psychotic Diagnoses and Diagnostic Severity Indices (Meyer et al., 2002)

	EII-1	EII-2	EII-3
Pearson correlations			
Psychotic Dx (N = 153)	.34	.35	.35
Diagnostic Severity (N = 153)	.36	.36	.34
Spearman correlations			
Psychotic Dx (N = 152)	.39	.39	.37
Diagnostic Severity (N = 152)	.35	.36	.34

Note: All correlations significant at $p < .001$.

Table 6

Descriptive data for the EII versions in Non-Patient and Patient Samples

		Control (Non-Patient) (N=73)			No psychosis Patient (N=77)			Psychosis Patient (N=75)			R-PAS Normative (N=641)
Index		EII 1	EII 2	EII 3	EII 1	EII 2	EII 3	EII 1	EII 2	EII 3	EII 3
M		-.13	-.14	-.04	.83	.81	.73	2.34	2.34	1.67	-.12
SD		.91	.87	.83	1.72	1.69	1.11	2.44	2.44	1.44	.93
Skew		1.06	1.14	.25	3.82	3.44	1.27	1.42	1.34	.36	.43
Kurtosis		1.26	1.61	.80	21.28	18.40	4.67	3.23	2.96	.47	.50
Minimum		-1.72	-1.70	-2.15	-1.36	-1.29	-1.64	-1.08	-1.44	-1.08	-2.35
Maximum		2.76	2.50	2.31	11.72	11.16	5.77	11.59	11.29	5.61	3.40
Percentiles	5	-1.37	-1.38	-1.42	-.83	-1.02	-1.00	-.72	-.85	-.72	-1.56
	25	-.73	-.72	-.47	-.13	-.22	-.04	.53	.48	.69	-.77
	Median	-.25	-.29	-.10	.48	.50	.55	2.32	2.16	1.88	-.12
	75	.33	.20	.38	1.49	1.49	1.51	3.51	3.61	2.49	.47
	95	1.81	2.01	1.63	2.81	2.80	2.41	7.66	7.68	4.48	1.54

Table 7

Correlations of the EII versions with MMPI Criteria (N = 85, Meyer et al., 1997)

MMPI-2 Scales	*EII-1*	*EII-2*	*EII-3*
Scale 8	.56	.57	.62
BIZ	.51	.52	.52
PSY-5-Psy	.53	.55	.56

Note: All correlations significant at $p < .001$. Also two records with fewer than 14 responses were excluded from the analyses.

Table 8:

Proposed EII-3 Interpretation for Ideational Impairment

Range	Proposed EII-3 Interpretation
< -0.2	Optimal range. Likely logical and accurate thinking and processing.
-0.2 to +0.5	Typical range for nonpatients and patients without ideational impairment.
+0.5 to +0.7	Minimum ideational impairment.
+0.7 to +1.2	Mild to moderate ideational impairment.
+1.2 to +1.6	Moderate ideational impairment.
+ 1.6 to +2.2	Significant ideational impairment..
> +2.2	Severe ideational ideational impairment.