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Three Factors of the Comprehensive System for the Rorschach and Their Relationship to Wechsler IQ Scores in an Adolescent Sample

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Principal axis factor analyses of the Rorschach Comprehensive System (CS) in a clinical sample of 152 adolescents yielded three clearly defined factors: Synthesized Complexity (defined by Zf, DQ+, and F%), Productivity (defined by R, D, and Dd), and Form Quality (defined by X+%, F+%, and X-%). Variables on the Synthesized Complexity and Form Quality factors were generally correlated with Wechsler Full Scale IQ, Verbal IQ, and Performance IQ scores. Overall, the factors in this adolescent sample replicated factors identified in earlier studies with adults. Implications for clinical practice are discussed.

Keywords: Comprehensive System; Rorschach; factor analysis; IQ; Holtzman Inkblot Test

Factor analyses of the Rorschach Inkblot Test, including the Comprehensive System for the Rorschach (CS) (Exner, 1993), have often identified a large factor defined by response frequency (R) and the number of common details (D) (Fitzgerald, 1990/1991; Lotsof, 1953; Lotsof, Comrey, Bogartz, & Arnsfield, 1958; Mason, Cohen, & Exner, 1985; Meyer, 1992; Wittenborn, 1950). In studies of the CS, a second factor has also often emerged, defined by responses that involve synthesis (DQ+, Zf, W) and non-Form determinants (F%, Lambda) (Anderson & Dixon, 1993; Fitzgerald, 1990/1991; Mason et al., 1985; Meyer, 1992; Zillmer & Perry, 1996; Zillmer & Vuz, 1995). This second factor has sometimes been found to correlate with measures of IQ or cognitive ability (Zillmer & Perry, 1996; see also a review by Meyer, 1992). A third factor of the CS, defined by indexes of Form Quality (F+%, X+%, X–%) has also been identified in studies of adults (Fitzgerald, 1990/1991; Zillmer & Perry, 1996; Zillmer & Vuz, 1995).

The present study set out to replicate and extend these findings. It was hypothesized that all three factors, which have repeatedly been identified in adult samples, would also be found in the present adolescent sample and that one or more of these factors would be correlated with IQ scores.

METHOD

Participants were 152 adolescents (96 boys and 56 girls), ages 13 through 18 years, who were referred for psychological evaluation in inpatient, outpatient, residential, and day treatment settings. This sample had previ-

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ously been studied in research evaluating Rorschach and Minnesota Multiphasic Personality Inventory–Adolescent (MMPI-A) interrelationships (Krishnamurthy, Archer, & House, 1996). Participants were selected according to three inclusion criteria: (a) psychiatric diagnosis rendered independently of psychological test data, (b) seventh-grade reading level or above, (c) valid MMPI-A and Rorschach records. More details regarding these criteria are provided by Krishnamurthy et al. (1996).

Rorschachs were administered using standard CS procedures. Scoring reliability was in a range adequate for research purposes. Specifically, kappa-corrected values for nine scoring categories ranged from .66 to .98. Further details are provided by Krishnamurthy et al. (1996). Scores on the Wechsler Scales (Wechsler Intelligence Scale for Children–Revised [WISC-R], Wechsler Intelligence Scale for Children–Third Edition [WISC-III], or Wechsler Adult Intelligence Scale–Revised [WAIS-R]) were also available for a subset of participants (Full Scale IQ, $n = 117$; Verbal IQ, $n = 99$; Performance IQ, $n = 98$).

We examined the data in a two-step process. In the first step, we sought to replicate the findings of earlier published studies by factor analyzing 14 Rorschach variables. Results from these prior studies indicated that the 14 variables might serve as markers for important Rorschach factors (R, D, Dd, F%, Zf, DQ+, X+%, F+%, X-%) or have substantial loadings on these factors (Afr, W, M, Blends/R, Populars). In the second step, which was exploratory, we factor analyzed the same 14 variables and added 5 new variables (Sum Movement [Human Movement + Animal Movement + Inanimate Movement], Sum Human [Whole Human + Human Detail + Human, Fictional or Mythological + Human Detail, Fictional or Mythological]. Active Movement, Pairs, Sum Y), that empirically exhibited a moderate or high correlation in the present sample with the three factors identified in the first factor analysis. Our intention was to examine the relationship of these 5 new variables to the factors identified in the first factor analysis.

RESULTS

Table 1 presents means, standard deviations, and other descriptive statistics for all Rorschach and WAIS scores in the present study.

Table 2 presents the results of the first factor analysis, which sought to replicate the findings of prior published factor analyses of the CS. Squared multiple correlations were used to estimate communalities in the initial factor pattern, and solutions were iterated five times. Although four eigenvalues of the unreduced correlation matrix were greater than 1 (3.90, 2.80, 2.56, 1.07), only three factors were extracted, because (a) a scree plot of the eigenvalues indicated a clear break after three factors, and (b) when four or five factors were extracted, the results indicated the presence of only three intelligible factors.

Orthogonal rotation was performed using Varimax. As can be seen in Table 2, three clearly defined factors emerged from the 14 variables. The first factor, defined by Zf, DQ+, and F%, we have named Synthesized Complexity. The second factor, defined by R, D, and Dd, we have named Productivity. The third, defined by X+%, F+%, and X-%, we have named Form Quality. These factors accounted for 23%, 19%, and 17% of the total variance, respectively.

Table 3 presents a second factor analysis of the Rorschach variables. This analysis was exploratory in purpose and followed the same procedures as did the first factor analysis. The second analysis included the 14 variables from the first analysis, plus the five additional Rorschach variables (Sum Movement, Sum Human, Active Movement, Pairs, Sum Y) that we selected for examination because they exhibited substantial correlations with the factors in the first factor analysis. As expected, all 19 variables in Table 3 loaded on the same three factors identified in the first factor analysis. These factors accounted for 23%, 18%, and 13% of the total variance, respectively.

Table 3 also presents Spearman correlations of all Rorschach variables with Wechsler Full Scale IQ, Verbal IQ, and Performance IQ. As can be seen, most variables loading on the Synthesized Complexity and Form Quality factors were significantly correlated with IQ scores, but variables loading on the Productivity factor were not. A correlation matrix for all Rorschach and WAIS variables in the present study is provided in the appendix.

DISCUSSION

Three findings of the present study seem especially notable. First, three factors of the CS identified in the present adolescent sample resembled factors found in prior analyses of adult samples. Second, Rorschach scores that loaded on two of these factors—Synthesized Complexity and Form Quality—tended to correlate significantly with Wechsler IQ scores. Third, exploratory analyses indicated that several additional Rorschach scores may be related to the factors identified in the present study. Each of these findings will be discussed in turn.

Three Factors of the Comprehensive System

The present results confirm the presence in an adolescent sample of at least three well-defined factors in the Rorschach CS—Synthesized Complexity, Productivity, and Form Quality. These factors strikingly resemble fac-

TABLE 1
Descriptive Statistics for Rorschach and Wechsler Scores

Score	M	SD	*Median*	*Maximum*	*Minimum*	*Skew*	*Kurtosis*
DQ+	5.97	3.27	6.00	16.00	0.00	0.40	0.24
Zf	13.64	4.24	14.00	25.00	3.00	–0.02	0.22
F%	0.52	0.18	0.50	0.95	0.05	0.18	–0.09
Blends/R	0.27	0.25	0.22	1.38	0.00	1.53	3.29
W	10.68	4.08	11.00	23.00	1.00	0.04	–0.24
M	2.52	1.90	2.00	10.00	0.00	0.84	0.74
R	22.39	5.75	21.00	50.00	14.00	1.89	4.99
D	8.66	5.64	8.00	29.00	1.00	1.37	2.19
Dd	3.05	3.14	2.00	19.00	0.00	2.24	6.52
Pairs	6.49	3.77	6.00	21.00	0.00	1.12	2.35
Afr	0.50	0.16	0.45	1.16	0.21	0.95	1.36
X+%	0.43	0.14	0.42	0.80	0.08	0.09	–0.17
F+%	0.45	0.19	0.43	1.00	0.00	0.36	–0.06
X–%	0.30	0.13	0.29	0.75	0.06	0.51	0.34
Active Movement	4.45	2.78	4.00	14.00	0.00	0.53	0.11
Sum Movement	4.76	2.52	5.00	12.00	0.00	0.36	–0.05
Sum Human	6.30	3.26	6.00	16.00	0.00	0.74	0.65
Sum Y	0.38	0.90	0.00	7.00	0.00	4.16	23.55
Populars	4.22	1.75	4.00	8.00	0.00	–0.08	–0.59
FSIQ	97.15	10.78	97.00	124.00	75.00	0.08	–0.34
VIQ	95.05	10.87	94.00	123.00	72.00	0.21	–0.34
PIQ	98.95	12.74	99.00	128.00	69.00	0.14	–0.49

NOTE: See Appendix I for definitions of abbreviations.

TABLE 2
Principal Axis Factor Analysis of 14 Scores From the Comprehensive System for the Rorschach

Score	*Factor*		
	1	*2*	*3*
Zf	87	–26	–13
DQ+	83	–2	16
F%	–76	13	–18
W	65	–46	–28
Blends/R	59	16	2
M	46	8	15
R	16	91	–13
D	–21	88	21
Dd	–21	62	–19
Afr	8	54	2
X+%	–13	–9	94
F+%	6	–12	71
X–%	–11	–2	–75
Populars	16	10	45

NOTE: See Appendix I for definitions of abbreviations.

tors that have been identified in prior factor analyses of adult Rorschachs using the CS (e.g., Fitzgerald, 1990/1991; Mason et al., 1985; Meyer, 1992; Zillmer & Perry, 1996; Zillmer & Vuz, 1995). Future researchers may wish to explore whether these same three factors can also be found in samples of preadolescent children.

The first Rorschach factor identified in the present study—Synthesized Complexity—is of particular interest. In the present adolescent sample, this factor is defined largely by organizing activity (Zf, DQ+) and a tendency to use non-Form determinants (strong negative loading of F%). Other variables with substantial loadings on this factor include Blends/R, W, and M, suggesting that it involves conceptualization, psychological complexity, and representational capacity.

The Synthesized Complexity factor in Tables 2 and 3 resembles the Perceptual Organization factor identified by Anderson and Dixon (1993, p. 327) and the Response Process Factor of Zillmer and Perry (1996, p. 217), which exhibited high loadings on Zf , W, and W% (indexes of synthesizing activity). The Synthesized Complexity factor also shares some characteristics with the Cognitive and Affective Investment factor identified by Meyer (1992, p. 129), which had high loadings on W and Lambda (a transformed version of F%).

In addition, the synthesized complexity of this factor bears some resemblance to the Rorschach complexity described by Viglione (1999, p. 259). For example, both types of complexity involve synthesis, integration, organizational activity, and blends. However, Viglione's complexity explicitly includes R (p. 259), whereas the

TABLE 3
Exploratory Principal Axis Factor Analysis of 14 Scores From Table 2 and Five Additional Rorschach Variables, Plus Spearman Correlations of All Rorschach Variables With Wechsler Full Scale IQ, Verbal IQ, and Performance IQ

	Factor			*Correlations With IQ*		
Score	*1*	*2*	*3*	*FSIQ*	*VIQ*	*PIQ*
DQ+	85	–7	12	.37*	.43*	.26*
Zf	78	–33	–17	.25*	.26*	.22*
F%	–77	17	–14	–.29*	–.41*	–.17
Active Movement	71	4	10	.30*	.38*	.21*
M	64	14	16	.21*	.30*	.15
Sum Movement	63	14	11	.13	.19	.08
W	55	–53	–30	.08	.04	.08
Sum Human	54	32	5	.31*	.34*	.37*
Blends/R	53	7	–2	.33*	.37*	.22*
D	–13	88	19	–.05	–.02	–.05
R	17	85	–17	–.07	–.11	.01
Dd	–17	66	–21	–.13	–.14	–.06
Pairs	31	58	22	.09	.12	.15
Afr	9	54	0	–.05	–.08	–.02
Sum Y	0	52	–4	.11	.13	.09
X+%	–10	–6	95	.24*	.23*	.31*
F+%	5	–13	70	.25*	.19	.23*
X–%	–11	–2	–72	–.29*	–.32*	–.31*
Populars	21	12	45	.14	.20	.13

NOTE: See Appendix I for definitions of abbreviations.
*$p < .05$.

Synthesized Complexity factor in the present study bears only a negligible correlation with R.

Correlations With Wechsler IQ

Most Rorschach scores loading on the Synthesized Complexity and Form Quality factors correlated significantly with Wechsler IQ scores. As can be seen in Table 3, the nine Rorschach scores with the highest loading on the Synthesized Complexity factor generally exhibited significant Spearman correlations with Full Scale IQ (median r = .29), Verbal IQ (median r = .34), and Performance IQ (median r = .21). These correlations support the interpretation of this factor as an indicator of mental complexity, especially as this complexity is expressed in verbal behavior (but see Wagner, Young, & Wagner, 1992, for a cautionary view regarding the relationship of Blends to IQ).

Interestingly, W loaded substantially on the Synthesized Complexity factor but did *not* exhibit significant correlations with IQ scores. This finding is consistent with earlier studies, which have generally reported that well-articulated and synthesized W responses are related to cognitive ability but that other kinds of W responses are not (Acklin & Fechner-Bates, 1989; Allison & Blatt, 1964; Blatt & Allison, 1963; Marsden, 1970). For example, W responses that are vague or lacking in good form quality do not seem to be related to cognitive ability. In the present sample, the mean number of vague W responses was 0.48 (SD = 0.92). Because we did not record how many W responses were both well articulated and had adequate form quality, we could not determine whether such responses were significantly correlated with IQ in the present sample.

As can also be seen in Table 3, the three variables with the highest loadings on the Form Quality factor generally exhibited significant correlations with Full Scale IQ (median r = .25), Verbal IQ (median r = .23), and Performance IQ (median r = .31). These correlations provide support for the long-standing view, first espoused by Hermann Rorschach (1921/1964, p. 56), that Form Quality is related to intelligence. However, it is worth noting that the correlation between Rorschach Form Quality and cognitive ability may be modest (r = .20 to .25), so that it does not always attain statistical significance in individual samples (see Armitage, Greenberg, Pearl, Berger, & Daston, 1955; Hauser, 1963; Wysocki, 1957; Zillmer & Perry, 1996).

The significant correlations between Rorschach scores and IQ scores in the present study cannot be considered spurious, due to "data dredging" and multiple statistical tests. Although 57 correlations were computed between Rorschach variables and IQ scores, one would expect only 3 (5%) of these correlations to be spuriously significant at the .05 level. Instead, as Table 3 shows, 27 (47%) of the correlations were statistically significant. Thus, it is safe to conclude that the large majority of the correlations in Table 3 are *not* spurious and that data dredging is not a problem. However, it should be noted that the IQ scores in the present study were not all based on the same versions of the Wechsler tests and that different results might have been obtained if all participants were given precisely the same IQ test.

Exploratory Analyses Involving Other CS Variables

In the exploratory factor analysis shown in Table 3, we introduced five new variables (Pairs, Sum Movement, Sum Human, Active Movement, Sum Y) that exhibited substantial correlations with the three factors already identified in this sample. Because the addition of these variables was purely exploratory, the results should be regarded as suggestive only.

First, it is worth noting that the loading of Pairs and R on the Productivity factor replicates an earlier finding by Costello (1998) that these two variables are moderately correlated. Second, it is interesting that the first factor in Table 3—Synthesized Complexity—bears a striking resemblance to the first factor of the Holtzman Inkblot Test

(HIT), which is defined by Integration (resembling Zf), Movement responses, and Human responses (Holtzman, Thorpe, Swartz, & Herron, 1961, pp. 151-154). Holtzman et al. states that the first factor of the HIT "deals mainly with perceptual maturity, integrated ideational activity, and awareness of conventional percepts" (p. 151). Future researchers may wish to explore this apparent relationship between the first factors of the HIT and CS.

Clinical Implications

Two implications of the present study seem especially relevant to clinical practice. First, because several important Rorschach variables are highly correlated with each other, they probably should be interpreted as slightly different expressions of the same underlying construct. For example, Zf, DQ+, and F% (or Lambda) appear to be closely related measures of cognitive complexity. R, D, and Dd are closely related indexes of Productivity. Similarly, X+%, F+%, and X–% are overlapping measures of perceptual accuracy. Because the variables within each cluster appear to be largely redundant, clinicians should probably interpret the variables in each cluster as a unified "package" rather than separately. The situation is similar with the MMPI-2: Many scores overlap and therefore should be interpreted together in clusters (Greene, 2000). Indeed, on the basis of the observation that the 69 scales of the MMPI-A share large components of common variance, Archer and Krishnamurthy (1994) have placed these MMPI-A scales into eight factor clusters in their MMPI-A Structural Summary approach to test interpretation.

A second possible clinical implication concerns the three strongest measures of Synthesized Complexity—Zf, DQ+, and F%. The present results suggest that the interpretation of these Rorschach scores may vary depending on a patient's performance on standard IQ tests. Specifically, if a patient's Rorschach and IQ scores are congruent (i.e., low measured IQ combined with low Zf, low DQ+, and high F%; or high measured IQ combined with high Zf, high DQ+, and low F%), the Rorschach results can be interpreted as clearly consistent with the IQ test results. However, if a patient's Rorschach and IQ scores are incongruent for these variables, the inconsistencies between IQ and Rorschach results may merit additional reflection. Further research is needed to clarify the meaning of such incongruencies when they occur.

APPENDIX I
Definitions of Variables

Afr = Affective Ratio
Blends/R = Blends/Response Frequency
D = Common Details
Dd = Unusual Details
DQ+ = Developmental Quality Synthesized
F% = Percentage Pure Form Responses
F+% = Percentage of Pure F Responses with Ordinary or Plus Form Quality
FSIQ = Wechsler Full Scale IQ
M = Human Movement
PIQ = Wechsler Performance IQ
R = Response Frequency
Sum Y = Sum of Diffuse Shading Responses
VIQ = Wechsler Verbal IQ
W = Whole Reponses
X+% = Conventional Form
X-% = Distorted Form
Zf = Organizational Activity (Z) Frequency

APPENDIX II
Pearson Correlations of Rorschach and IQ Variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*
1. DQ+	—	.72	−.67	.66	.51	.47	.42	.43	.54	−.14	.04	−.20	.28	.04	−.05	.06	.15	−.18	.15	.42	.46	.28
2. Zf			−.58	.44	.36	.36	.84	.32	.42	−.43	.00	−.33	−.03	−.09	−.10	−.16	−.02	.00	.09	.27	.27	.22
3. F%				−.56	−.45	−.56	−.44	−.31	−.57	.27	.09	.24	−.09	.02	−.09	−.03	−.19	.25	−.18	−.37	−.43	−.22
4. Active Movement					.45	.54	.29	.29	.52	.02	.14	−.16	.29	.05	−.08	.02	.07	−.11	.17	.34	.39	.23
5. M						.76	.15	.60	.10	.03	.10	−.05	.40	.06	−.04	.08	.05	−.09	.29	.20	.26	.14
6. Sum Movement							.18	.39	.07	.06	.17	-.01	.29	.00	.06	.03	.01	-.09	.22	.14	.16	.10
7. W								.11	.28	−.63	−.16	−.45	−.24	−.20	−.23	−.28	−.11	.12	−.02	.11	.06	.09
8. Sum Human									.30	.18	.31	.12	.41	.26	.12	−.04	.06	−.06	.19	.27	.30	.24
9. Blends/R										.03	.21	−.04	.16	.21	.06	−.14	.17	−.08	.00	.22	.27	.10
10. D											.77	.44	.52	.50	.43	.15	.04	−.11	.12	−.05	−.06	.00
11. R												.65	.46	.48	.53	-.18	-.18	.04	.08	.00	-.04	.06
12. Dd													.23	.24	.50	−.23	−.25	.12	−.05	−.05	−.05	−.01
13. Pairs														.43	.19	.12	.08	−.17	.24	.10	.10	.15
14. Afr															.27	−.07	−.08	−.06	.12	−.08	−.12	−.06
15. Sum Y																−.04	−.10	−.06	.05	.05	.07	.06
16. X+%																	.70	−.68	.44	.22	.21	.30
17. F+%																		−.55	.22	.26	.20	.26
18. X-%																			−.43	−.32	−.31	−.35
19. Populars																				.14	.16	.13
20. FSIQ																					.87	.88
21. VIQ																						.53
22. PIQ																						—

NOTE: See Appendix I for definitions of abbreviations.

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