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The Validity of Individual Rorschach Variables: Systematic Reviews and Meta-Analyses of the Comprehensive System

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We systematically evaluated the peer-reviewed Rorschach validity literature for the 65 main variables in the popular Comprehensive System (CS). Across 53 meta-analyses examining variables against externally assessed criteria (e.g., observer ratings, psychiatric diagnosis), the mean validity was $r = .27$ ($k = 770$) as compared to $r = .08$ ($k = 386$) across 42 meta-analyses examining variables against introspectively assessed criteria (e.g., self-report). Using Hemphill's (2003) data-driven guidelines for interpreting the magnitude of assessment effect sizes with only externally assessed criteria, we found 13 variables had excellent support ($r \geq .33$, $p < .001$; $\therefore$ *FSN* > 50), 17 had good support ($r \geq .21$, $p < .05$, *FSN* ≥ 10), 10 had modest support ($p < .05$ and either $r \geq .21$, *FSN* < 10, or $r = .15$–$.20$, *FSN* ≥ 10), 13 had little ($p < .05$ and either $r = < .15$ or *FSN* < 10) or no support ($p > .05$), and 12 had no construct-relevant validity studies. The variables with the strongest support were largely those that assess cognitive and perceptual processes (e.g., *Perceptual-Thinking Index*, *Synthesized Response*); those with the least support tended to be very rare (e.g., *Color Projection*) or some of the more recently developed scales (e.g., *Egocentricity Index*, *Isolation Index*). Our findings are less positive, more nuanced, and more inclusive than those reported in the CS test manual. We discuss study limitations and the implications for research and clinical practice, including the importance of using different methods in order to improve our understanding of people.

Keywords: Rorschach, meta-analysis, personality assessment, test validity, measurement

> The Rorschach has the dubious distinction of being, simultaneously, the most cherished and the most reviled of all psychological assessment tools. (Hunsley & Bailey, 1999, p. 266)

Only a few years after Hermann Rorschach's *Psychodiagnostik* (1921) was translated from German to English in 1942, the Rorschach Inkblot Test ranked as one of the top two most frequently used personality tests in the United States (Louttit & Browne, 1947), a ranking that endured for over half a century (Camara, Nathan, & Puente, 2000). Nonetheless, the validity of this test has been debated for decades (Cronbach, 1949; Jensen, 1965; Lilienfeld, Wood, & Garb, 2000; Society for Personality Assessment, 2005). As early as 1965, *The Sixth Mental Measurement Yearbook* stated, "The rate of scientific progress in clinical psychology might well be measured by the speed and thoroughness with which it gets over the Rorschach" (Jensen, 1965, p. 509). More recently, Dawes (1996) used the Rorschach as his prime example of myth, in contrast to science, in his well-known book *House of Cards,* which critically evaluated the state of science in clinical psychology.

However, such dramatic negative critiques of the Rorschach are not consistent with the evidence base. Similar to Hans Eysenck's (1952) classic negative review of psychotherapy's effectiveness, proven inaccurate by Smith and Glass's (1977) meta-analysis, such extreme negative conclusions about the Rorschach are not borne out by the research evidence, nor are they consistent with the

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The original version of this study was presented at the annual meeting of the Society for Personality Assessment, New Orleans, Louisiana, March 27, 2008, and the IXth Congress of the European Rorschach Association, Prague, Czech Republic, August 27, 2009. Joni L. Mihura and Gregory J. Meyer were co-developers of a test manual (Meyer, Viglione, Mihura, Erard, & Erdberg, 2011) and scoring program that build on the preliminary results of the analyses reported here. As such, they share copyright and ownership in those products and in a company that supports them. We thank our colleagues who provided feedback on earlier versions of this document (Robert F. Bornstein, Alexander M. Czopp, Robert E. Erard, Andrew L. Geers, Robert E. McGrath, Thomas W. Shaffer, and Donald J. Viglione) and on our construct labels (see footnote 15 in the text), as well as the many researchers who provided clarifications or corrections for their studies and the students who provided assistance (Robert Graceffo, Ariana Rebesco, Sean Walsh, Joshua Eblin, and Scott Brown).

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conclusions of the test's staunchest critics. As Garb, Wood, Lilienfeld, and Nezworski (2005) stated, "Even psychologists who are critical of the test generally agree that some scores from various Rorschach systems can be helpful for detecting thought disorder, diagnosing mental disorders characterized by thought disorder, measuring dependency, and predicting treatment outcome" (p. 105).

Rorschach Comprehensive System

Although the Rorschach is typically referred to as simply *the Rorschach*, several different formal Rorschach systems provide guidelines for test administration, coding, and interpretation. Prior to the early 1980s, no single Rorschach system was universally favored. This situation changed following the publication of the Rorschach Comprehensive System (CS; Exner, 1974), which was designed to draw together many test components used by earlier systems (see Exner, 1969b). A recent international survey found that, among clinicians who use the Rorschach, 96% code and interpret the test using the CS as their primary system (Meyer, Hsiao, Viglione, Mihura, & Abraham, in press).

Test Administration

All Rorschach systems use the same set of 10 inkblot stimuli originally designed, pilot tested, and refined by Hermann Rorschach (1921/1942). Examinees look at each inkblot and say what it looks like or what it might be. Five inkblots are shades of black and gray. Two inkblots are black and red. The last three inkblots are entirely colorful. The ink is mottled or uneven, a characteristic that some examinees use to describe blot characteristics like texture and depth. Examinees can give one or more responses per inkblot. However, the CS requires at least one response per blot and a minimum of 14 responses across the entire set of 10 inkblots to ensure an adequately large behavior sample and because brief records are associated with low test–retest reliability (Exner, 1988). The CS test manual reports an average of about 22 responses per protocol (Exner, 2003).

Coding

Following the test administration, the examiner codes the Rorschach responses and tallies them to form the main scales or variables. Table 1 contains descriptions of the main CS variables and examples of how they are coded and interpreted. The table is organized in conceptually based sections thought to assess different types of constructs. The *Controls*[1] *and Situational Stress* variables assess coping style and mental ability, such as cognitive and emotional resources to cope with stress (e.g., planning, imagination), as well as the type of internal and external stresses that one needs to cope with (e.g., distracting, disruptive, or distressing internal experiences). *Affective Features* variables assess affective style (e.g., emotional impulsivity or reactivity). *Interpersonal Perception* variables assess one's representations of other people and expectations for interpersonal relationships (e.g., cooperative or aggressive). *Self-Perception* variables assess how a person views himself/herself (e.g., narcissistic tendencies). *Information Processing* variables assess the complexity and sophistication of the mental operations involved when taking in information (e.g., ability to sustain cognitive effort). *Cognitive Mediation* variables assess the conventionality of perception, which can extend to the problems with reality testing seen in psychosis. Finally, *Ideation* variables assess the quality, organization, coherence, and style of one's thinking (e.g., thought disturbance, passive vs. active).

Six indices are derived from various combinations of these Rorschach scores. The indices and the individual variables that comprise them are described in the last section of Table 1. The six indices are (a) *Perceptual-Thinking Index,* (b) *Depression Index,* (c) *Coping Deficit Index,* (d) *Suicide Constellation,* (e) *Hypervigilance Index,* and (f) *Obsessive Style Index*. CS test scores are reported on what is called a Structural Summary (see Figure 1). The main scores are reported in the lower portion labeled *RATIOS, PERCENTAGES, AND DERIVATIONS.*

Interpretation

The labels for most Rorschach variables are not psychological constructs; instead, they reflect the processes that take place when the examinee produces the response. For example, as noted in Table 1, *Diffuse Shading* is coded when the examinee uses the mottled colors to describe a characteristic of his or her response. *White Space* is coded when the examinee uses the white background instead of, or in addition to, the inkblot proper to give a response. Similar labeling procedures are used with many cognitive tests that also use a performance-based assessment method.[2] For example, the Wechsler Adult Intelligence Scale (4th ed. [WAIS-IV]; Wechsler, 2008) contains subscales labeled *Block Design* and *Digit Span,* which describe the task or activity performed rather than the targeted psychological constructs thought to be measured by the task.[3] In contrast, almost all self-report questionnaires and other verbally based rating scales have a name that is tied directly to the construct being assessed, which in turn is transparently connected to the language used in the test items. For example, a depression scale using a self-report method may contain test items such as "I am worthless" or "I feel sad most of the time." The test items contain words that are part of the definition of the word *depression,* and the scale name indicates the targeted psychological constructs thought to be measured by the items. For the purposes of this article, we developed meaningful verbal con-

[1] Exner (2003) defined *controls* as "the capacity to form decisions and implement deliberate behaviors that are designed to contend with the demands of a situation" (p. 231).

[2] Consistent with Exner's (1989) views on the nature of CS data, our goal is not to test the validity of the Rorschach as a projective method. Similar to other personality researchers (Bornstein, 2007; McClelland et al., 1989; McGrath, 2008; Schultheiss, 2007), we take a more differentiated and contemporary view of the psychological processes tapped by different test methods and so do not use the terminology *projective* to describe Rorschach scores or *objective* to describe self-rated scales and, in fact, actively discourage use of these antiquated terms to describe test methods (Meyer & Kurtz, 2006).

[3] Thus, with *Block Design,* for example, from the task behavior measuring the ability to quickly arrange colored blocks to accurately match a target design, one makes inferences about the target constructs, which include the ability to analyze and synthesize abstract visual information, the ability to form nonverbal concepts and reason with them, the degree of visual and fluid intelligence, skills in visual perception and organization, and visual-motor coordination.

Table 1
Key Comprehensive System Variables: Definition, Example Responses, and Interpretation

Variable name	Variable definition	Example response	Interpretation
		Controls and Situational Stress	
Number of Responses	Number of responses given to the question "What might this be?"	"It looks like a bat."	The ability or tendency to respond with many ideas
Lambda	The simplicity (vs. complexity) of the responses, based on descriptions of movement, color, shading, depth, and symmetry[a]	Simple: "A butterfly." Complex: "A red butterfly. It's flying in front of these two people who are trying to catch it."	Avoidance vs. attentiveness to complexity, subtlety, or nuance
Human Movement	Images of human activity	"Two people setting a table."	Mental abilities, including planning, imagination, and empathy
Weighted Sum of Color	Overall degree to which responses are based on the colorfulness of the blot: (*FC* [Form-Color] × 0.5) + *CF* [Color-Form] + (*C* [Pure Color] × 1.5)	*FC*: "Man with a red hat." *CF*: "Many nice colors, maybe flowers in a field." *C*: "Bright red blood."	Emotions influence thoughts and experiences
Experience Actual	*Human Movement* + *Weighted Sum of Color*		Cognitive and emotional resources
Animal Movement	Images of animals engaged in species-appropriate activity	"A panther stalking something."	Pressing primary needs
Inanimate Movement	Images of nonliving objects in motion	"A spinning top."	Mental distraction or agitation, often as a reaction to a moderate to severe stressor
Nonhuman Movement	*Animal Movement* + *Inanimate Movement*		Need-driven mental distractions
Diffuse Shading	Subtle gradations of dark and light ink	"It's shadowy."	Distress or helplessness, often as a reaction to a moderate to severe stressor
Texture	Subtle gradations of dark and light to indicate tactile qualities	"A soft, furry rug. The ink blotches make it look furry."	Desire for interpersonal closeness, either emotional or tactile
Vista	Subtle gradations of dark and light to indicate depth	"A deep valley. The dark parts are further away."	Emotionally negative self-evaluation
Achromatic Color	Black, grey, or white ink	"Grey clouds."	Irritating, negative emotion
Sum of Shading[b]	*Diffuse Shading* + *Texture* + *Vista* + *Achromatic Color*		Distressing or irritating internal stimuli
Experienced Stimulation	*Nonhuman Movement* + *Sum of Shading*		Distracting, distressing, or irritating internal experiences
Difference Score	*Experience Actual* − *Experienced Stimulation*		Current level of coping abilities
Adjusted Difference Score	*Difference Score* minus most situational stress scores (i.e., *Inanimate Movement* and *Diffuse Shading*)		Level of coping abilities regardless of current stressors
Coping Style			
Introversive	*Human Movement* > *Weighted Sum Color*		Internally directed and ideational
Extratensive	*Human Movement* < *Weighted Sum Color*		Externally responsive and emotional
Ambitent	*Human Movement* ≈ *Weighted Sum Color*		Poorly defined or inconsistent coping style
Pervasive	*Pervasively Human Movement* or *Weighted Sum Color*		Pervasively internally or externally oriented
		Affective Features	
White Space	Background (white area) of the card used in the response	"Four ghosts" (white spots inside the inked area).	Oppositionality, either the behavior or the emotion (anger)
Color Projection	Colorful images seen in achromatic blot areas	A red glowing sunset is seen in a black blot.	Activating emotions or ideas replace depressive ones
Achromatic Color	Black, grey, or white ink	"Grey clouds."	Irritating, negative emotion
Form-Color Ratio	Overall degree to which responses are based on the colorfulness of the blot: (*FC* × 0.5) + *CF* + (*C* × 1.5)	*FC*: "Man with a red hat." *CF*: "Many nice colors, maybe flowers in a field." *C*: "Bright red blood."	Emotional impulsivity or reactivity

Table 1 (*continued*)

Variable name	Variable definition	Example response	Interpretation
Pure Color	The image is based purely on the colorfulness of the blot	"Bright red blood."	Extreme emotional impulsivity or reactivity
Affective Ratio	Ratio of responses given to cards that are entirely colorful vs. primarily achromatic		Engaging in activating affective situations
Complexity Ratio	Many blot qualities (e.g., color, shading) are used[a]		Psychological complexity
Constriction Ratio	Ratio of *Achromatic Color* to *Weighted Sum of Color*		Emotional suppression or constriction
	Interpersonal Perception		
Aggressive Movement	Images of aggression	"A tiger attacking its prey."	Aggression or anger, either expressed or experienced
Cooperative Movement	Images of cooperative interactions	"Two people trying to lift a basket together."	Tendency to perceive positive interpersonal interactions
Food	Images of food	"Mmm. Fried shrimp."	Dependency needs
Isolation Index	Images of nature	"A barren landscape."	Social isolation, either the behavior or the psychological experience
Personal	Justifying one's responses by appealing to personal experience	"A galleon. A name for an ancient war vessel. I know a great deal about ships."	Justification of views based on personal experience
Active:Passive Ratio	The degree to which movement is passive vs. active	"A man running a race" vs. "A reclining man."	Passive vs. action-oriented
Texture	Subtle gradations of dark and light to indicate tactile qualities	"A soft, furry rug. The ink blotches make it look furry."	Desire for interpersonal closeness, either emotional or tactile
Whole, Realistic Humans	Images of whole, realistic human figures vs. fantasy images or human details	"A man" vs. "Batman" or "A leg."	Self and others viewed as whole people
Interpersonal Interest	The sum of all human images, including real or fantasy humans and the whole person or only a part		Interest in people
Good Human Representations	Human or quasi-human images that are logical, benign, and undamaged	"Two kids playing patty-cake with each other."	Healthy and adaptive understanding of others
Poor Human Representations	Human or quasi-human images that are illogical, aggressive, damaged, or poorly formed	"A rabbit dragging a human corpse up a hill."	Disturbed and maladaptive understanding of others
	Self-Perception		
Morbid	Damage or dysphoria	"A bear that's been shot" or "A sad man."	Morbid thoughts, images, or feelings
Anatomy and X-ray[c]	Internal body parts	"A pair of lungs."	Preoccupations with body vulnerability or its functioning
Vista	Subtle gradations of dark and light to indicate depth	"A deep valley. The dark parts are further away."	Emotionally negative self-evaluation
Form Dimension	The shape or form is perceived as indicating depth	"A giant. It gets smaller at the top, so it looks tall."	Introspective capacity
Whole, Realistic Humans	Images of whole, realistic human figures vs. fantasy images or human details	"A man" vs. "Batman" or "A leg"	Self and others viewed as whole people
Reflections	Mirror images or reflections	"A man looking at himself in the mirror."	Narcissistic tendencies
Egocentricity Index	Index based on the number of *Reflections* and pairs of objects		Egocentricity, either narcissistic or distress-related (high) or negative self-image (below low cut point)
	Information Processing		
Synthesized Response	Two or more objects described in relation to each other	"Two people setting the table together."	Ability to synthesize concepts
Vague Response	Images of formless objects	"Smoke" or "Clouds."	Vague or unsophisticated thinking

(*table continues*)

Table 1 (*continued*)

Variable name	Variable definition	Example response	Interpretation
Perseveration	Repeating the same type of response	"A butterfly. And it also could be a moth."	Difficulty shifting a cognitive set
Organizational Activity	Using the whole blot or seeing relations between blot details	"It's a bat" (using the whole blot) or "Two people conversing" (using two blot details in relation to each other).	
Organizational Frequency	Frequency of these responses		Ability to sustain cognitive effort
Processing Efficiency	Amount of perceptual information accounted for in these responses		Propensity to process or account for information
Aspirational Ratio	Ratio of responses using the *Whole* blot to *Human Movement*		Match between achievement goals and cognitive ability
Economy Index	Ratio of responses using the whole blot, a common detail, or an uncommon detail		Relative focus on the big picture, obvious facts, or idiosyncratic detail
	Cognitive Mediation		
Form Quality Scores	Degree to which the reported objects are common and fit the blot area. Commonness is determined by consulting tables of responses gathered from thousands of examinees		
Conventional			Tendency to perceive the world as others do
Appropriate			Reasonably appropriate perceptions
Unusual			Uncommon or creative views that are not simply misperceptions
Distorted			Distorted perceptions
White Space Distortion	The *White Space* is used in a response that has *Distorted Form Quality*		Strong anger leads to distorted perceptions
Popular	The 13 most popular (statistically common) objects reported by at least one third of examinees		Popular or socially common perceptions
	Ideation		
Human Movement, Distorted Form	*Human Movement* is coded in a response that has *Distorted Form Quality*		Distorted perceptions of others, including psychotic perceptions
Human Movement, Formless	Nebulous sensory or emotional contents	"A loud sound" or "Rage."	Impaired ideational control
Intellectualization Index	Abstract, artistic, and cultural/historical content	"An abstract painting that represents the human struggle between good and evil."	Minimizing emotional experiences by intellectualizing
Critical Special Scores	Responses that include inappropriate words (*DV*), circumstantial phrases (*DR*), strained logic (*ALOG*), or perceptions of objects with illogical attributes (*INC*) or illogical relationships between objects (*FAB*), or one object illogically superimposed on the other (*CONTAM*). Four codes are also distinguished by level of severity (see below)	*DV*: "A pair of two lungs." *DR*: "A frog . . . . my mother hated green things." *ALOG*: "A mouse . . . . it must be dead because it's horizontal." *INC*: "A bug with antlers." *FAB*: "A cat, juggling." *CONTAM*: "Bloody fire."	Thought disturbance
Critical Special Scores, Severe	The most severely bizarre or thought disordered *Critical Special Scores*	"A rabbit with smoke coming out of its eyes" but not "Two rabbits dancing together."	Thought disturbance, severe
Active:Passive Ratio	The degree to which movement is passive vs. active	"A man running a race" vs. "A reclining man"	Passive vs. action-oriented
Morbid	Damage or dysphoria	"A bear that's been shot" or "A sad man."	Morbid thoughts, images, or feelings

Table 1 (*continued*)

Index name	Rorschach variables included in index	Interpretation
	Indices	
Perceptual-Thinking Index[d]	*Critical Special Scores* and *Form Quality Scores*	Disturbed thinking and distorted perceptions
Depression Index	Mainly Affect and Self-Perception variables with some variables from other sections (e.g., *Isolation Index)*	Depressive tendencies
Coping Deficit Index	Mainly Interpersonal variables with a few Affect and Controls and Situational Stress variables	Interpersonal and/or emotional deficits
Suicide Constellation	Thirteen variables ranging across sections	Suicide risk
Hypervigilance Index	Absence of *Texture,* presence of *White Space,* variables with a focus on details, and various human and animal contents	Interpersonal vigilance
Obsessive Style Index	Mainly Information Processing and Mediation variables	Obsessive information processing

Note. Clinicians who use the Rorschach typically abbreviate the variable names with codes. The Comprehensive System codes that correspond to the variable names in the first column are *Number of Responses* (*R*); *Lambda* (*L*); *Human Movement* (*M*); *Weighted Sum of Color* (*WSumC*); *Experience Actual* (*EA*); *Animal Movement* (*FM*); *Inanimate Movement* (*m*); *Nonhuman Movement* (*FM + m*); *Diffuse Shading* (*SumY*); *Texture* (*SumT*); *Vista* (*SumV*); *Achromatic Color* (*SumC′*); *Sum of Shading* (*SumShd*); *Experienced Stimulation* (*es*); *Difference Score* (*D Score*); *Adjusted Difference Scale* (*AdjD*); *Coping Style* (*Erlebnistypus, EB*); *White Space* (*S*); *Color Projection* (*CP*); *Form-Color Ratio* (*CF + C > FC*); *Pure Color* (*Pure C*); *Affective Ratio* (*Afr*); *Complexity Ratio* (*Blends:R*); *Constriction Ratio* (*SumC′:WSumC*); *Aggressive Movement* (*AG*); *Cooperative Movement* (*COP*); *Food* (*Fd*); *Personal* (*PER*); *Active:Passive Ratio* (*a:p* or *Ma:Mp*); *Whole, Realistic Humans* (*Pure H* or *H*: (*H*) + *Hd* + (*Hd*)); *Interpersonal Interest* (*SumH = H + (H) + Hd + (Hd)*); *Good and Poor Human Representations* (*GHR* and *PHR*); *Morbid* (*MOR*); *Anatomy and X-ray* (*An + Xy*); *Reflections* (*Fr + rF*); *Form Dimension* (*FD*); *Synthesized Response* (*DQ+*); *Vague Response* (*DQv*); *Perseveration* (*PSV*); *Organizational Frequency* (*Zf*); *Processing Efficiency* (*Zd*); *Aspiration Ratio* (*W:M*); *Economy Index* (*W:D:Dd*); *Form Quality Scores: Conventional* (*X+%*), *Appropriate* (*WDA%*), *Unusual* (*Xu%*), *Distorted* (*X−%*); *White Space Distortion* (*S−*); *Popular* (*P*); *Human Movement With Distorted Form* (*M−*); *Human Movement, Formless* (*Mnone*); *Critical Special Scores* (*Sum6* or *WSum6*); and *Critical Special Scores, Severe* (*Level 2*).

[a] These characteristics are assessed by *Determinants,* blot characteristics that help determine why the inkblot looks the way it does to the respondent. The Determinants, described in subsequent sections, are *Human Movement, Animal Movement, Inanimate Movement, Chromatic* and *Achromatic Color, Diffuse Shading, Texture, Vista, Form Dimension,* and *Reflections*. If the response is based only on the shape (if none of these Determinants are coded), pure *Form* is coded. [b] Occasionally, research excludes *Achromatic Color* from *Sum of Shading.* [c] *X-ray* or medical imaging responses are infrequent and are often not included in *Anatomy and X-ray* research. [d] Originally labeled the *Schizophrenia Index,* the index was renamed because it assesses a range of perceptual and thinking disturbances (e.g., psychosis that is associated with some mood disorders and the less severe variants seen in schizotypal or borderline personality disorder). The *Schizophrenia Index* and the *Perceptual-Thinking Index* are highly correlated (e.g., $r = .96$; Hilsenroth, Eudell-Simmons, DeFife, & Charnas, 2007).

struct labels for all the Rorschach variables (shown in the last column of Table 1)[4] so that the reader can quickly grasp their expected interpretive meaning.

The CS interpretation for each Rorschach variable is guided by interpretive paragraphs that are sequentially arranged in the test manual (Exner, 2003). The Rorschach variables are given a cutoff score or range of scores that indicates which interpretive paragraph to choose. To determine the degree to which the results statistically deviate from the norm, the examiner must compare each of the 70 or so variables[5] to the relevant descriptive statistics that are reported in large normative tables.

The Rorschach as a Psychological Assessment Method

Clinicians typically use more than one assessment method to make a determination about a patient. The clinical interview is the most common assessment component (Norcross & Karpiak, 2012) and can contain at least two methods: (a) self-report, or information that the patient verbally reports (e.g., "I feel depressed"), and (b) information that the clinician obtains from behavioral observations (e.g., psychomotor retardation, a sign of depression that requires an outside observer to document behavioral slowness). The clinician may also request medical or legal records to inform the assessment. If the patient is a child, the parent or guardian also provides information through an interview.

To achieve a comprehensive assessment of complex psychological problems, psychological tests that assess a broad range of psychological characteristics are often used; these are referred to as *broadband* or *multiscale* tests. The comprehensive assessment is likely to rely on more than one test method, a strategy called *multimethod assessment*. Common test methods are based on self-report or introspection (e.g., the Minnesota Multiphasic Personality Inventory–2nd Edition [MMPI-2]; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989), observations based on an external source of information (e.g., parent, teacher, or spouse ratings), and behavioral or performance tasks (e.g., intelligence tests like the WAIS-IV and personality tests like the Rorschach; Camara et al., 2000).

The assessment of thought disturbance, such as that seen in psychosis, can be used to illustrate different test methods. On the Rorschach, a person with thought disturbance might give the

[4] The approach used to derive these labels is described in the Method section, as these construct labels are also used in our meta-analytic methodology.

[5] The number 70 is approximate because there are different ways one could count some of the scores that are the focus of interpretation (e.g., the Coping Styles variable can be counted as one composite variable, though each of its subcomponents, *Human Movement* and *Weighted Sum of Color,* can also be counted separately because they are interpreted on their own).

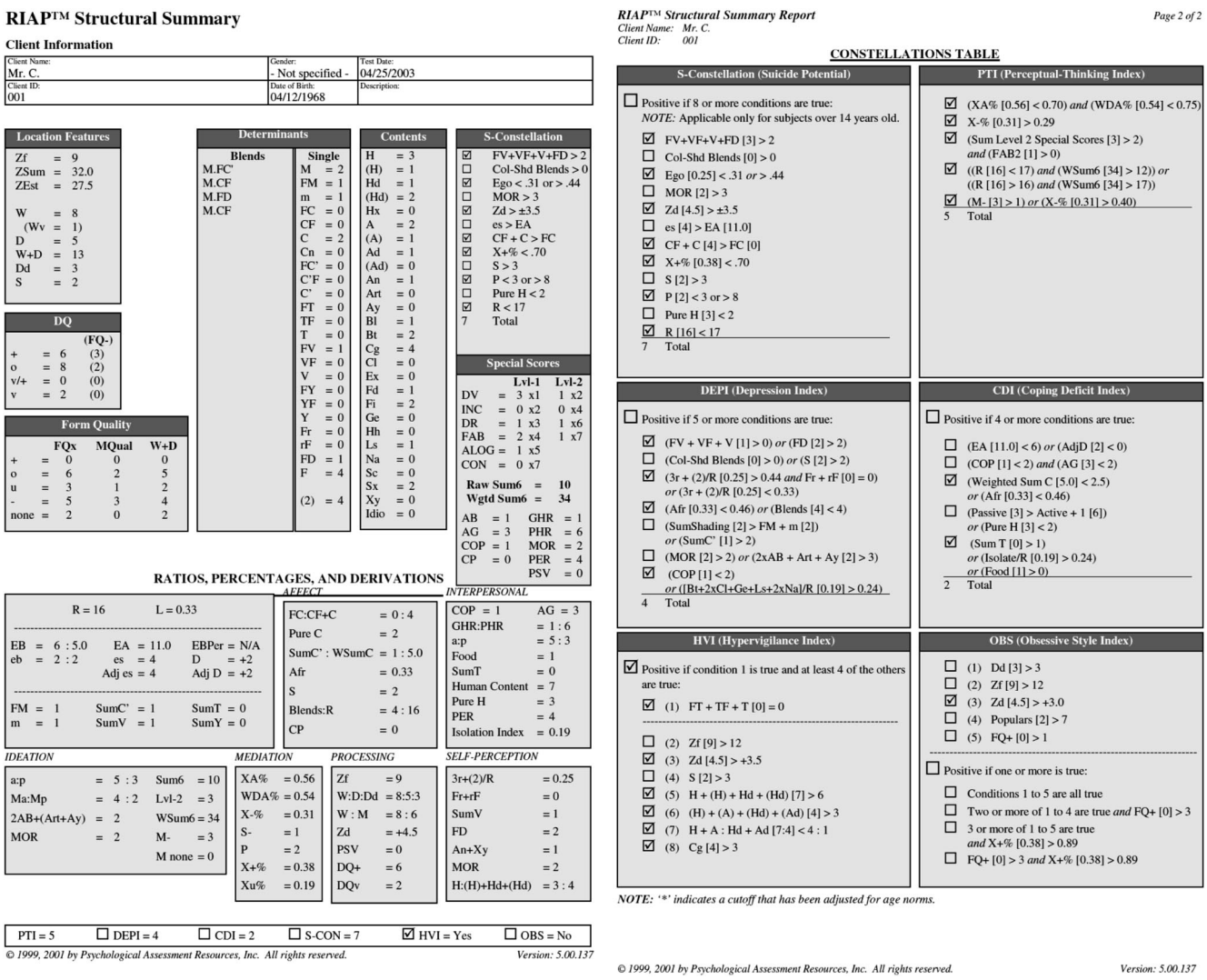

Figure 1. Rorschach Comprehensive System Structural Summary and Constellation Indices. Reproduced by special permission of the publisher, Psychological Assessment Resources, Inc., 16204 North Florida Avenue, Lutz, Florida 33549, from the Rorschach Interpretation Assistance Program: Version 5, by John E. Exner, Jr., PhD, Irving B. Weiner, PhD, and the PAR Staff, Copyright 1976, 1985, 1990, 1994, 1995, 1999, 2001, 2003 by Psychological Assessment Reources, Inc. (PAR). Further reproduction is prohibited without permission of PAR.

response "It's a Jesus head with smoke coming out of the eyes. The smoke is a sign that he's judging me. It's scary." This response would be coded for the use of odd or unrealistic combinations of ideas or images (see the *Critical Special Scores* in Table 1), as well as the extent to which the objects perceptually fit the inkblot locations used in the response (see the *Form Quality Scores* in Table 1). In contrast, on a self-report questionnaire, the same examinee might be instructed to rate the following sentence on a scale from 1 (*not at all true*) to 4 (*very true*): "My thoughts often blend into each other so that I can't tell one from the other." Therefore, as an introspective process, self-report questionnaires ask the examinee to report on mental events and past experiences, and performance tests assess psychological characteristics by evaluating the examinee's behavior in the context of the task (McGrath, 2008; Meyer, 1996b, 1997).

The Rorschach Comprehensive System: An Attempt to Improve the Scientific Status of the Rorschach

During the 1980s, the CS (Exner, 1974, 1978) markedly improved the scientific status of the Rorschach. As indicated in the sixth edition of Anastasi's (1988) classic book *Psychological Testing,* "The availability of this system, together with the research completed thus far, has injected new life into the Rorschach as a potential psychometric instrument" (p. 599). As previously noted, the CS drew together many of the test scores and procedures used by previous Rorschach systems. Until that time, the existence of different systems created a problem because they often varied in their test administration and coding procedures (see Exner, 1969b). For example, across different systems, variables with the same name could be coded differently, and variables with the same coding might be given a

different name. It became difficult to understand and synthesize the results of the empirical literature, even though hundreds of empirical studies on the Rorschach's reliability and validity had been published.

As a solution, Exner (1974) compiled what he believed were the best test variables across the main Rorschach systems, based on his review of the existing research literature and a survey he conducted to determine which variables clinicians used in practice (Exner & Exner, 1972). In addition to focusing on variables with the most research support, the new unifying system provided a much-needed systematic approach to administration and coding, as well as normative samples for children and adults (Exner, 1978). Somewhat akin to the third revision of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM–III*; American Psychiatric Association, 1980), the CS used an atheoretical approach so that clinicians from a variety of theoretical orientations could use the test.

Overwhelmingly, the CS became the most commonly taught system in the United States (Ritzler & Alter, 1986). The CS also gained popularity in forensic assessment as the preferred Rorschach system because the documentation of its empirical support and its acceptance in the professional community helped it meet legal standards for admissibility (McCann & Evans, 2007).

Criticisms of the Rorschach Comprehensive System

Although the CS was a significant accomplishment for the Rorschach test, serious criticisms of it have been raised. Among the issues debated are the applicability of the CS norms and the empirical support for the interpretation of its test variables (Lilienfeld et al., 2000; Meyer & Archer, 2001; Wood, Nezworski, & Stejskal, 1996). For example, for some variables, evidence began to accumulate that the descriptive statistics for the large CS normative samples were notably different than those of other nonpatient samples (Shaffer, Erdberg, & Haroian, 1999; Wood, Nezworski, Garb, & Lilienfeld, 2001). Appeals were made to address this problem (Hunsley & Di Giulio, 2001; Viglione & Hilsenroth, 2001), though it was not clear whether the norms were truly aberrant or if the discrepancy was due to some other cause, such as (a) genuine changes in people over time (e.g., a Flynn effect), (b) changes in the nature of the reference samples under consideration, (c) revised scoring guidelines, and/or (d) differences in the quality of data collection efforts (Meyer, 2001).

More recently, many researchers participated in a large-scale project to collect and compile CS norms from the United States and many other countries (Meyer, Erdberg, & Shaffer, 2007). These efforts resulted in an aggregated reference sample of contemporary descriptive values. These descriptive values were generally consistent across the many adult nonpatient samples that contributed data and also consistent with the other non-CS reference samples. However, they were different from the existing CS normative values, especially for variables that assess perceptual distortions like those that occur in psychosis. Although this international composite sample helps address the problems associated with the CS norms, the debate over the test's validity is far from resolved.

Global Meta-Analyses of Rorschach Test Validity

A significant challenge in determining the validity of a multiscale test like the Rorschach is the sheer number of variables[6] to be validated. As noted above, in the most recent CS test manual (Exner, 2003), the main interpretive section contains about 70 test variables. The MMPI-2 is the most commonly used multiscale self-report measure of personality across clinical, forensic, and neuropsychological settings (Archer, Buffington-Vollum, Stredny, & Handel, 2006; Camara et al., 2000). The MMPI-2 has even more variables than the Rorschach, with over 100 test variables to consider if one counts subscales.

Historically, the validity of multiscale personality tests has been evaluated either by narrative reviews or by global meta-analyses in which the goal is to obtain an overall estimate of the test's validity. In a global meta-analysis, findings for individual test variables are typically aggregated first within a study and then across studies into one effect size to represent the overall validity of the test. Using this approach, three different teams of researchers reported that the Rorschach's global validity is acceptable and on par with the MMPI (Atkinson, 1986; Hiller, Rosenthal, Bornstein, Berry, & Brunell-Neuleib, 1999; Parker, Hanson, & Hunsley, 1988). Meyer and Archer (2001) summarized the effects for these global meta-analyses and provided a substantially expanded reanalysis of the widely cited Parker et al. (1988) data set to rectify criticisms of it (Garb, Florio, & Grove, 1998; Hiller et al., 1999). Global validity for the Rorschach was $r = .32$ across 523 hypothesized relationships and $r = .29$ across 73 samples ($N = 6{,}520$); global validity for the MMPI was $r = .32$ across 533 hypothesized relationships and $r = .29$ across 85 samples ($N = 15{,}985$).

Using J. Cohen's (1988) benchmarks of $r = .10$, .30, and .50 to indicate small, medium, and large effect sizes,[7] these global validity coefficients for the Rorschach and MMPI are in the medium range. As another broad standard for comparison, Hemphill (2003) reported that the middle third of effect sizes for the validity of psychological assessment variables ranges from $r = .21$ to .33.

[6] In psychological assessment, many terms exist for measures to assess a psychological construct (e.g., index, scale, score, subscale, variable). In an attempt to reduce confusion, we use the overarching generic research term *variable* to describe Rorschach measures, unless a more specific term is needed to make a point.

[7] Although it is not uncommon to see J. Cohen's (1988, 1992) benchmarks described as values that mark the lower boundary for the verbal label, he described them as the values at which the label applies. Thus, he defined a *medium-sized effect* as one that is "likely to be visible to the naked eye of a careful observer" (J. Cohen, 1992, p. 156). He described a *small effect* as one that "is noticeably smaller than medium but not so small as to be trivial" and said that he set large to be the "same distance above medium as small was below it" (J. Cohen, 1992, p. 156). Cohen opposed reification of these benchmarks and never expressed the opinion that all values less than $r = .30$ (e.g., .29) should be considered small. To the contrary, when describing his decision to make $r = .30$ the dimensional benchmark for medium, he noted that it is "a value at the midpoint of the range of correlations between discriminably different psychological variables" (J. Cohen, 1988, p. 80). We follow his conventions and thus consider coefficients in the range around $r = .30$ to be medium for two dimensional variables.

Asking the Right Question: Test Validity Versus Scale Validity

While global meta-analyses can estimate the overall validity of a multiscale test, they do not address the validity of the individual scales (Hunsley & Bailey, 1999, 2001; Lilienfeld et al., 2000; Meyer & Archer, 2001). Instead, their results are based on a sampling of the literature so that only some scales are represented. For example, although they collected and coded considerably more data, Parker and colleagues' (1988) *Psychological Bulletin* meta-analysis of MMPI, Rorschach, and WAIS reliability and validity ultimately used only nine Rorschach variables drawn from five studies for their primary convergent validity analyses. As previously noted, Meyer and Archer (2001) conducted an expanded analysis of Parker et al.'s database (286 effects from 44 samples), which addressed the problem of relying on a small and limited subset of the literature. However, meta-analytic effect sizes were not reported for individual scales. Hiller et al.'s (1999) meta-analysis of MMPI and Rorschach validity included 30 studies for each test. However, only about a quarter of the main CS variables were included, and some did not have strong empirical support. For example, the effect sizes for three CS variables (*Egocentricity Index, White Space,* and *Reflections*) ranged from $r = -.05$ to .06 (although each was based on only study). For both the Rorschach and MMPI, we cannot be confident that their global validity estimate applies to all of their scales since Hiller et al. found a significant degree of variability among the effect sizes for each test.

In the past decade or so, the literature has contained repeated appeals to evaluate the validity of *individual* Rorschach variables (Garb et al., 2005; Hunsley & Bailey, 2001). As noted by Wood and colleagues (1996), "Strictly speaking, it is imprecise to ask if the Comprehensive System for the Rorschach is valid . . . . the validity of each [variable] must be established separately" (p. 5). Conceptually, this would require a shift in focus and a dramatic increase in complexity, as it would entail testing the scientific support for the individual components of the Rorschach, not the overall validity of the test.

Previous Reviews and Meta-Analyses of the Validity of Individual Rorschach Comprehensive System Variables

Broad Reviews

The CS test manual (Exner, 2003) is the primary professional resource for the psychometric properties of the CS approach to the Rorschach, as required by the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council of Measurement in Education, 1999). As is typical for a test manual, it provides a traditional narrative review of its variables' validity, which, in contrast to a documented systematic approach, is almost impossible to evaluate for potential bias (Oxman, 1994). The test manual reports results from about 40 published research articles that assessed the validity of its variables. The CS test developer was first author on about 25% of these studies. The test manual also cites about 150 published studies that address the validity of the Rorschach variables that were precursors to the CS variables because the CS variables are largely derived from other Rorschach systems (Exner, 1969b). The remaining validity evidence for its variables is based on unpublished studies coordinated by the test author (consisting of about 100 studies with citations and numerous other findings reported without citations). The fact that the empirical foundation of the CS rests on a substantial number of unpublished studies has been cited as a challenge to the test's integrity (Lilienfeld et al., 2000; Wood et al., 1996).[8]

Due to the organization of the manual and the large number of variables to consider, it is difficult to summarize the CS test manual's review of specific Rorschach variables. For some variables, no validity research is cited. For a few other variables, only unpublished studies coordinated by the test author are cited. Typically, effect sizes are not reported. Of the Rorschach variables for which research is reported, empirical support is described as solid, with two exceptions: The test manual cautions about drawing diagnostic inferences with the *Depression Index* (Exner, 2003, p. 312) and recommends a better alternative for assessing dependent characteristics than the *Food* response (Exner, 2003, pp. 509–510), referring readers instead to the *Rorschach Oral Dependency* scale (Bornstein & Masling, 2005; Masling, Rabie, & Blondheim, 1967).

Like Exner's (2003) review of Rorschach validity, Wood, Lilienfeld, Garb, and Nezworksi (2000) conducted a validity review that used traditional narrative methods. Its major focus was on *DSM* diagnoses (depression, dissociation, conduct disorder, schizophrenia, and various anxiety and personality disorders [PDs]) and psychopathy. The review concluded that CS variables, at best, showed weak associations to *DSM* diagnoses and psychopathy, with one exception: support for the relationship between the diagnosis of schizophrenia and Rorschach perception and thought disturbance variables, such as the *Schizophrenia Index* (now called the *Perceptual-Thinking Index*). However, because Wood et al. did not define their study's inclusion criteria, it is not possible to evaluate the basis on which studies were included or excluded.

Viglione (1999) conducted a systematic review of Rorschach validity that was largely organized around psychological constructs, not Rorschach variables. In the instances in which his review did focus on specific CS variables, he concluded that (a) the *Schizophrenia Index* had adequate validity for detecting schizophrenia and other psychotic disorders in adults but not when used with children; (b) the *Depression Index* should not be used to diagnose depression, although it might predict a depressogenic reaction to life events; (c) the *Suicide Constellation* is a valid predictor of self-destructive behavior; and (d) the validity of the two situational stress variables (*Inanimate Movement* and *Diffuse Shading*) is supported in the literature.

Focused Reviews and Meta-Analyses

Nezworski and Wood (1995) conducted a systematic review of the *Egocentricity Index* and its two subcomponents (*Reflections*

[8] At the same time, as noted by Meyer and Archer (2001), it is fairly common for test manuals to report research conducted explicitly for the manual without citations to findings published elsewhere. Meyer and Archer counted at least 68 such studies described in the WAIS-III and Wechsler Memory Scale–Third Edition manuals (Wechsler, 1997a, 1997b).

and *Pairs*). Their review of these individual CS variables contained 59 studies, which included the results of unpublished studies by the test author as described in two CS test manuals (Exner, 1991, 1993). They concluded that the research did not support the construct validity of the *Egocentricity Index* and *Pairs* and that the *Reflections* variable was only weakly supported. They stated that the test manual's review of these variables is unbalanced and omits negative findings.

A meta-analysis conducted by Jørgensen, Andersen, and Dam (2000, 2001) found that the *Schizophrenia Index* differentiated psychotic samples from controls, but the *Depression Index*'s ability to differentiate mood disorders from controls was highly variable. Similar to Nezworski and Wood (1995), the authors concluded that Exner's data resulted in stronger findings than those reported by other researchers. Excluding Exner's (1995) samples reduced their effect size (r) for the *Schizophrenia Index* from .71 (N = 2,552) to .44 (N = 994) and for the *Depression Index* from .48 (N = 2,824) to .14 (N = 717).

Most recently, Wood et al. (2010) conducted a meta-analysis of Rorschach variables believed to detect psychopathy based on the forensic work of Gacono and Meloy (2009). Most Rorschach variables (15 of 20[9]) were not significantly related to psychopathy, with an overall median effect size of r = .06 (N = 780). The Rorschach variable with the strongest relationship to psychopathy (r = .23) was *Aggressive Potential,* a non-CS variable developed by Meloy and Gacono (1992). *Aggressive Potential* is coded when a response indicates that aggression is potentially going to occur (e.g., "a tiger that's going to attack its prey") versus aggression that is currently occurring (e.g., "a tiger attacking its prey") as is coded in the CS's *Aggressive Movement* variable (see Table 1). The CS variable with the strongest relationship to psychopathy (r = −.16) was one that is believed to assess interpersonal closeness needs (*Texture*).

Summary

Based on its ability to detect psychosis, the *Schizophrenia Index* (currently called the *Perceptual-Thinking Index*) has received the most consistently positive reviews in the Rorschach validity literature. In contrast, the *Depression Index* has received the most consistently critical reviews regarding its ability to detect a depressive diagnosis. Some reviews concluded that the CS test manual may provide an overly positive impression of its variables' validity.

Moderators Related to the Validity of Rorschach Variables

Validity Criterion Method

Consistent with Campbell and Fiske's (1959) classic article on the multitrait–multimethod matrix and construct validity, many researchers have stressed the importance of the Rorschach's distinct method of assessment for understanding its patterns of convergent and discriminant validity (McGrath, 2008; Meyer & Archer, 2001). Consequently, many reviews of the Rorschach validity literature have either completely or largely excluded studies using criterion data derived from introspective self-report (Exner, 2003; Viglione, 1999). Yet other researchers (Hunsley & Bailey, 2001; Lilienfeld et al., 2000) have argued that it is premature to conclude that personality characteristics assessed by self-report should be excluded as reasonable external validity criteria for the Rorschach.

Two meta-analyses evaluated the degree to which Rorschach variables align with validity criterion measures based on introspection versus other methods. In Hiller et al.'s (1999) Rorschach validity meta-analysis, the overall weighted effect size across different validity criterion methods was r = .29. However, the weighted effect size drops to r = .10 when criterion variables are limited to introspective methods.[10] Likewise, Diener, Hilsenroth, Shaffer, and Sexton (2011) conducted a meta-analysis on the validity of the Ego Impairment Index (EII; Perry & Viglione, 1991; Viglione, Perry, & Meyer, 2003, 2007), a Rorschach measure comprised of CS variables but not officially included in the system. The overall weighted effect size of the EII's relationship with other measures of psychiatric severity was r = .29. However, its association with psychiatric severity dropped to .10 when only introspective self-report criterion measures were used in the analyses.

Our primary interest was to evaluate the Rorschach as a performance-based test, not its ability to assess a patient's introspectively reported characteristics. To the extent that there is redundancy in the correlation of a Rorschach variable with a self-report measure, it would suggest that the underlying construct could be assessed more cost-effectively by self-report measures, which take less time to administer, score, and interpret (Camara et al., 2000). Thus, the more critical issue concerns the extent to which Rorschach variables evaluate their intended constructs as determined by criteria that use methods other than introspection. To address this, we conducted analyses using the validity criterion's method as a moderator. We labeled these two categories of criterion methods *introspectively assessed* (i.e., self-report questionnaires and fully structured interviews) and *externally assessed* (e.g., *DSM* diagnoses, observer ratings, performance-based cognitive tests).

Target Psychiatric Diagnosis Compared to Other Psychiatric Patients or to Nonpatients

We also aimed to determine the degree to which Rorschach variables differ in their ability to detect a target psychiatric disorder when the comparison sample is comprised of other psychiatric patients versus when the comparison sample is comprised of nonpatients. If the Rorschach variables are valid measures of their construct, they should more strongly differentiate patients with the target disorder (e.g., depression) from nonpatients than from patients with other psychiatric disorders. That is, most nonpatients should not have symptoms similar to patients with the target diagnosis (e.g., depression), but many other psychiatric patients

[9] Wood et al. (2010) reported that they examined 37 Rorschach variables in their meta-analysis on psychopathy, but this is because they counted dichotomous and nondichotomous use of the Rorschach variables as separate variables. The two Rorschach variables that they reported as having the strongest relationship to psychopathy (*Aggressive Potential* and *Texture*) were used as nondichotomous measures.

[10] Hiller et al. (1999) had errors in their report of study effect sizes, so we calculated these values based on the original sources reported in their Table 2.

should share some degree of symptomatology (Markon, Chmielewski, & Miller, 2011). We focused these analyses on two diagnostic conditions that have been frequently studied with the Rorschach: psychosis and depression.

Unpublished Studies by the Test Author

As previously noted, a large number of unpublished studies coordinated by the test author are cited in the CS test manual as validity support. In addition to reviewing the published literature, we also reviewed these unpublished validity studies cited in the most recent CS test manual (Exner, 2003).[11] We report the overall validity effect size for these studies and compare it to our meta-analytic findings obtained from the peer-reviewed published literature.

Method

General Approach

The review followed recommended guidelines for meta-analyses. In particular, we made use of the Meta-Analysis Reporting Standards developed by the APA Publications and Communications Board Working Group on Journal Article Reporting Standards (2008) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009).[12]

Literature Search

To identify studies for the meta-analyses, we searched the PsycINFO and MEDLINE databases using the keyword *Rorschach,* autosearching for plurals. This search was limited to articles written in English that were published from 1974 (when the first CS manual was published) to November 2011. The first CS manual (Exner, 1974) was also searched to determine if it cited any articles published before 1974 that were used in the development of the system. Finally, we searched the references in the eight Rorschach validity reviews described in the Introduction (Exner, 2003; Hiller et al., 1999; Jørgensen et al., 2000, 2001; Meyer & Archer, 2001; Nezworski & Wood, 1995; Viglione, 1999; Wood et al., 2000, 2010). After we deleted duplicates, 2,467 citations remained.

Predictor Variables From the Rorschach CS

Our review included the 68 Rorschach CS variables described in Table 1, which are a major focus of the CS interpretive strategy (Exner, 2003). These Rorschach variables are located in the lower portion of the CS Structural Summary in the section labeled *RATIOS, PERCENTAGES, AND DERIVATIONS,* which compiles and organizes the data to be used in interpretation (see Figure 1). In three cases, we combined two variables for their meta-analyses due to their conceptual and empirical overlap.[13] Therefore, in all, 65 independent predictor variables were considered for these meta-analyses.

For Rorschach CS variables that have been revised since the original test manual (Exner, 1974), we included any version except in one case. Only the revised version of the *Depression Index* (Exner, 1990) was used because it was developed to correct validity problems with the original. If a study used more than one version of the same Rorschach variable, we included only the most recent version.

Selection Procedures

A major methodological challenge for researchers who systematically review the psychological test validity literature is to determine which coefficients should be considered construct-relevant validity coefficients (e.g., Hiller et al., 1999; McGrath & Ingersoll, 1999b). In general, there are two types of studies that contain potentially relevant validity coefficients. The first type is specifically designed to validate a psychological test variable, and in this type of study an external criterion measure is purposefully chosen to match the test variable's construct. The second type is designed to understand a condition and uses the psychological test variable as the external validity criterion. Often, the goal of this type of study is to describe psychological characteristics that differ between groups. For example, the research question might be "How do patients with borderline personality differ from patients with schizotypal personality?" or "How do sex offenders differ from other types of offenders?" In these cases, a multiscale test like the Rorschach is used as an assessment tool to understand the target conditions with the assumption that its scores provide valid measures of many different psychological constructs. This second type of study can contain a substantial number of coefficients that are not intended to be a probative evaluation of the test variable's construct validity, as well as some coefficients that may qualify as core validation criteria.[14]

Another methodological challenge was due to the fact that many scale names on performance-based psychological tests do not reflect the construct they are intended to measure, but instead, are labeled according to the task behavior they require or embody. For example, the names of subtests on the WAIS-IV do not refer to the psychological construct they are designed to assess but rather to the task activity they require (e.g., *Digit Span, Block Design,*

[11] These analyses were requested by the action editor.

[12] A copy of our review protocol is available from the first author.

[13] The combined Rorschach variables and their intercorrelations are as follows: (a) *Distorted Form* (*X−%* and *XA%*, $r = -.95$), (b) *Whole, Realistic Humans* (*Pure H* and *H*:(*H*) + *Hd* + (*Hd*), $r = -.74$), and (c) *Active to Passive Ratio* (*a*:*p* and *Ma*:*Mp*, $r = .79$). The correlations are derived from the internationally collected CS reference sample of 1,396 protocols described by Meyer, Viglione, Mihura, Erard, and Erdberg (2011).

[14] For example, in a study comparing patients with schizophrenia, borderline personality, and schizotypal personality, Exner (1986) reported the means and standard deviations for all three groups on 70 CS variables, as well as results for the schizophrenic group at admission and discharge. Two options for the meta-analytic researcher are to report the results for all 420 possible combinations of group comparisons or to make judgments about which Rorschach variables might be expected to show significant differences across groups and in what direction these differences would be. Meta-analytic researchers for multiscale psychological tests have not used the first alternative of including all predictor–criterion combinations because many of these associations would not be expected to target construct validity. Instead, they have used a procedure to judge which predictor–criterion associations should be relevant.

Coding, Symbol Search). As discussed in the Introduction, for performance-based tasks, it is assumed that the psychological operations or behaviors that take place during the task capture the relevant constructs that are inferred from it. Accordingly, most Rorschach variable names reflect what is coded (e.g., *Human Movement, Diffuse Shading*) rather than the underlying psychological construct inferred by that coded behavior. This makes it more challenging to classify external validity criteria that could validate the Rorschach variable's construct.

In response to these methodological challenges, previous Rorschach and MMPI validity meta-analyses have used two approaches to choose appropriate predictor–criterion associations as validity coefficients. One approach has been to focus on author-hypothesized findings (Atkinson, 1986; Parker et al., 1988). However, as Hiller et al. (1999) noted,

> This strategy runs the risk of excluding relevant validity evidence, simply because an author failed to make a reasonable prediction; conversely, it runs the risk of including irrelevant or misleading evidence when study authors falsely claim to have made a priori predictions concerning post hoc discoveries. (p. 280)

Instead, Hiller et al. used expert judges to rate predictor–criterion associations as to whether they "could reasonably be expected to be 'significant,' given the nature of the test, the sample, and the criterion variable" (Hiller et al., 1999, p. 281). Although this approach is reasonable, their judgments resulted in lower than optimal interjudge reliability for both the Rorschach and MMPI (Φ = .35 and .39, respectively). McGrath and Ingersoll (1999b) also used expert judgments (theirs) to determine the conceptual fit between MMPI code types and validity criteria, but they did not report interjudge reliability.

We used a combination of these two previously used methods to choose validity coefficients, followed by additional procedures designed to address potential study bias. As is explained more fully in what follows, we (a) identified all the author-hypothesized associations in the literature, (b) then identified all instances when any other author had evaluated the same predictor–criterion relation but had not hypothesized it, and (c) judged the fit of all these previously hypothesized criteria to the target scale's intended core construct, retaining only those that fell in the conceptual bull's-eye.

Hypothesized associations. The first author reviewed each of the 2,467 articles in the initial data set to determine if they contained Rorschach predictor–criterion associations that had been hypothesized by the study author(s) for any of the 65 relevant variables. This procedure located 2,468 hypothesized Rorschach predictor–criterion associations, each of which was entered into a database. Subsequently, the first three authors rereviewed the entire pool of 2,467 articles to search for additional predictor–criterion associations for each of the 65 variables that were not hypothesized by the study authors but that other researchers had hypothesized (i.e., that were in our database of hypothesized predictor–criterion associations). If an author hypothesized differences between a target group (e.g., veterans with posttraumatic stress disorder [PTSD]) and normative data, we also computed that difference in instances when another author had only provided descriptive statistics for the target group. For these comparisons we used the international reference sample described in detail by Meyer et al. (2007) as the normative expectations. As a result of these steps, for any effect that was hypothesized by at least one author, we ensured that we included that effect every time it was studied by any author. This second pass through the literature resulted in 606 additional predictor–criterion associations, for a grand total of 3,074 potentially relevant validity coefficients.

Developing construct labels for Rorschach variables. Traditionally, the interpretive meaning of Rorschach variables is described in narratives that can be one paragraph to several pages long (see Exner, 1969b, 2003). For the purposes of the present study, we developed shorthand construct labels for each of the 65 variables in our meta-analyses. The first two authors developed these labels based on their own Rorschach expertise, a careful review of the CS test manual interpretive sections (Exner, 2003), and the feedback of many other Rorschach experts who were chosen to provide broad representation—for example, clinicians, academics, and non-U.S. experts.[15] The main purpose for these construct labels was to guide our classification of the hypothesized findings regarding the fit between the Rorschach variable's construct and the criterion variable's construct. By doing so, we aimed to improve upon the interrater reliability found in the Hiller et al. (1999) meta-analysis of Rorschach and MMPI validity. Therefore, instead of judging whether the relationship between a Rorschach variable and a criterion variable could reasonably be expected to be significant, the task was to determine if the criterion variable (e.g., terminally ill cancer patients) provided a good proxy for the construct label that we had assigned to the Rorschach variable (e.g., Preoccupations With Body Vulnerability or Its Functioning, which is the construct label for *Anatomy and X-ray*).

Selecting validity coefficients: Matching predictor–criterion constructs. For a few CS variables, existing constructs and related criterion measures adequately target the bull's-eye of their construct, such as the *Perceptual-Thinking Index* and *Depression Index,* whose constructs are targeted by the psychiatric diagnoses indicating psychosis and depression, respectively. In these cases, matching the predictor–criterion construct is fairly straightforward. For other variables whose constructs are more unique to the Rorschach, the task was to find relevant nonisomorphic criteria that matched the target construct sufficiently to be considered in the conceptual bull's-eye. This is a more stringent standard than used in previous Rorschach, MMPI, and WAIS IQ validity meta-analyses (Hiller et al., 1999; McGrath & Ingersoll, 1999b; Meyer & Archer, 2001; Parker et al., 1988).

To select validity coefficients, the first author reviewed the database of 3,074 hypothesized findings to decide whether the criterion variable's construct fit the relevant Rorschach construct label. The goal was ultimately to select validity criteria that hit the bull's-eye of the Rorschach construct. For example, two criteria judged as matching the *Form-Color Ratio* construct label Emo-

[15] Before John Exner passed away, the first two authors each served on his Rorschach Research Council, a group that met semiannually for 8 years to review and plan research. They have published many articles on the Rorschach, including articles focused on interpretive descriptions of Rorschach variables (Meyer, Bates, & Gacono, 1999; Mihura, Meyer, Bel-Bahar, & Gunderson, 2003). We thank the Rorschach experts who reviewed and provided feedback on our Rorschach construct labels at various stages of their development: Marvin W. Acklin, Robert E. Erard, Cato Grønnerød (Norway), Radhika Krishnamurthy, Piero Porcelli (Italy), Bruce L. Smith, and Donald J. Viglione.

tional Impulsivity or Reactivity were (a) violent offenders versus college students and (b) inpatients who had attempted suicide versus other inpatients. Two criteria judged as not fitting this construct were (a) passing versus failing Navy Seal training and (b) depressed patients versus a control group. Although emotional reactivity could lead to any one person failing Navy Seal training, we were not aware of any research indicating that emotional impulsivity and reactivity are a significant component of success in training so it was deemed outside the conceptual bull's-eye.

Another criterion in selecting validity coefficients was the validity of the criterion variable itself as a measure of its intended construct. When in doubt, we consulted the relevant research regarding the criterion variable's relationship to the general construct.[16] Additionally, we excluded the validity coefficient if research did not support the criterion as a measure of its intended construct (e.g., graphology, a drawing completion test), which led to the exclusion of five studies that had otherwise met all of our study's inclusion criteria.

Other data considerations. At times researchers compared CS scores in their criterion sample to Exner's existing nonpatient norms instead of collecting their own nonpatient control group sample. However, Exner's norms have been challenged as being biased in the direction of making all alternative samples look unhealthy on at least some key variables (Wood et al., 2001). To contend with this, when researchers other than Exner compared an adult target group to his normative samples, the effect sizes were recomputed using as the comparison a large compilation of recently collected international reference protocols known to generalize across adult nonpatients (Meyer et al., 2007). If it was not possible to recompute effect sizes, the data were excluded. The issues are more complicated for children than for adults. Recent internationally collected samples of children's Rorschach protocols show important differences when compared to Exner's existing child norms, as well as variability across the contemporary samples (Meyer et al., 2007). As a result, we excluded all analyses that compared criterion samples of children (under age 12) to Exner's child norms. This procedure resulted in the exclusion of seven articles.

Finally, for studies that compared their adolescent samples (age 12 and older) to Exner's norms, we recalculated the results using the adult international reference sample as the comparison sample. We drew this distinction between child and adolescent criterion samples because the recent internationally collected adolescent CS data are more similar to the adult CS data (see the two samples of adolescent data in Meyer et al., 2007) and because adolescents are more similar developmentally to adults than children are to adults (Caspi, Roberts, & Shiner, 2005; McAdams & Olson, 2010).

Regarding other exclusionary criteria, we excluded results derived from studies employing Rorschach test administration procedures that markedly deviated from standard procedures.[17] We also excluded studies that selectively reported only significant findings if it was not possible to determine whether relevant variables had also been examined. We omitted results that deliberately aligned method variance across introspective- and Rorschach-based scales, as these lead to artificially large coefficients that do not generalize to applied contexts (e.g., Lindgren & Carlsson, 2002; Meyer, Riethmiller, Brooks, Benoit, & Handler, 2000). When errors were discovered (e.g., findings reported in the text contradicted those in a table), the data were included only if the study's author(s) corrected the discrepancies when contacted. The three preceding criteria excluded a total of seven articles.

Sometimes, Rorschach scores for a target sample were used in more than one study. If the target sample was compared to two or more conceptually different comparison samples (e.g., a depressed target sample was compared to nonpatients in one study and to psychiatric patients in another), each of the analyses was retained. In such cases, the effects were averaged and assigned a sample size corresponding to the number of independent participants across all groups. If, however, the duplicate target sample was compared to a conceptually equivalent sample (e.g., a psychotic sample was compared to two different nonpatient samples), then the effect size with the largest sample size was retained.

For studies that hypothesized a linear relationship across three or more groups (e.g., high, medium, and low psychopathy ratings; Loving & Russell, 2000), we computed an effect size using the focused contrast procedures described by Meyer, McGrath, and Rosenthal (2003) and Rosenthal, Rosnow, and Rubin (2000), when the data permitted. When the article lacked sufficient information to compute an effect size and was based on a dissertation, the dissertation was obtained, when possible, to determine if it contained the relevant data from which the effect could be computed.

When the *Number of Responses* in a Rorschach protocol increases, the frequency-based test variables (i.e., variables based on the raw number of scores such as *Texture* or *Vista*) increase as well, which can have a confounding effect on the data (Cronbach, 1949; Meyer, 1992; Viglione & Meyer, 2008). For example, if psychopaths report fewer Rorschach responses than a control group, it is possible that their lower scores on *Texture* or *Vista* are an artifact that results from fewer responses in general. Therefore, for all frequency-based Rorschach variables except those whose interpretation relates to psychological complexity (i.e., *Synthesized Response, Organizational Frequency, Blends, Experience Actual, Human Movement,* and *Weighted Sum of Color*), when *Number of Responses* was significantly related to the criterion variable, we reported the semipartial correlation between the Rorschach variable and the criterion variable, controlling for *Number of Re-*

[16] As an example of an instance in which we consulted the research literature to further understand the criterion variable's construct, euthymic bipolar disorder was judged to be a suitable fit for the *Organizational Frequency* variable's construct Ability to Sustain Cognitive Effort based on a recent meta-analysis showing impaired neuropsychological functioning across many domains in euthymic bipolar disorder (Mann-Wrobel, Carreno, & Dickinson, 2011). As a second example, children of divorced parents (as compared to children of nondivorced parents) were judged to be a suitable criterion for the *Aggressive Movement* variable's construct Aggression or Anger, Either Expressed or Experienced, based on a meta-analysis on parental divorce showing its strongest negative effects on child conduct (misbehavior, aggression, delinquency) compared to other characteristics like psychological adjustment (depression, anxiety, or happiness; Amato & Keith, 1991). A significantly higher rate of aggression, including physical aggression, is also found for divorced versus nondivorced couples (Lawrence & Bradbury, 2001; Rogge & Bradbury, 1999), suggesting that children of divorced families are more likely to have witnessed aggression between their parents.

[17] Of the two studies excluded on this basis, one used very brief (200-ms, 400-ms, and 600-ms) tachistoscopic presentations of the inkblots and the other instructed participants to look at each inkblot for 60 s and report as many things as they could find.

sponses, using Equation 3.3.8 from J. Cohen, Cohen, West, and Aiken (2003). For this equation, it is necessary to have the correlation between *Number of Responses* and the relevant Rorschach variable. Because this information was typically not reported in the article, we computed correlations using a general clinical sample that had a mix of psychiatric patients ($n = 736$) and medical and correctional patients ($n = 65$) and is described more fully in Meyer et al. (2000).

Moderator Coding

Source of criterion information: Introspectively or externally assessed. Criterion measures were coded for the method used to assess the construct, either by introspection or an external source of measurement. Introspectively assessed criteria were limited to self-report questionnaires or fully structured interviews that do not permit clinician judgments to influence the results. The different types of externally assessed criteria included variables such as *DSM* diagnosis, observer or chart ratings, other performance-based personality or cognitive measures, and more objectively assessed measures such as years of education or age. We focused our primary analyses on the Rorschach validity coefficients that used externally assessed criteria.

Psychotic or depressive diagnoses: Patient versus nonpatient comparison sample. To qualify for inclusion, diagnoses must have been made using either *DSM* or *International Classification of Diseases* (*ICD*) diagnostic criteria, and study results must have been available from at least three samples in each cell (target disorder, clinical comparison, nonpatient comparison) in order to have some degree of stability in the meta-analytic results. In addition, when conducting archival assessment research, it is common that information from all sources is available to the clinicians involved in diagnosis and treatment planning.[18] This has led to concerns about criterion contamination artificially inflating the relationship between predictor variables and target diagnosis in archival studies (e.g., Wood et al., 2000). It is important to note, however, that the Rorschach is only one piece of clinical information available to diagnosticians and that it is typically included in a large array of data. Moreover, diagnostic decisions are based on specific *DSM* or *ICD* criteria, many of which are not assessed with the Rorschach (e.g., insomnia; weight loss; hallucinations; intense fear, helplessness, or horror in response to a trauma; required duration of symptoms). So although this concern is understandable, there is no evidence to date that it actually leads to artificially inflated results. Nonetheless, for our focused diagnostic analyses, consistent with the Standards for Reporting of Diagnostic Accuracy (Bossuyt et al., 2003), if the article stated that Rorschach results were available to the diagnosticians, the study results were excluded.

Psychotic diagnoses included any psychotic disorder or a mood disorder with psychotic features. Depressive diagnoses were limited to major depressive disorder and dysthymia (not bipolar disorders or adjustment disorder with depressed mood). Moderator analyses were conducted to assess the degree to which Rorschach variables differed in their ability to detect these psychiatric disorders when the comparison sample was an alternative patient sample versus a nonpatient sample. Based on the inclusion criteria, there were enough samples to examine psychotic disorders as the target diagnosis for *Perceptual-Thinking Index; Critical Special Scores; Critical Special Scores, Severe; Distorted Form; Appropriate Form; Conventional Form; Popular;* and *Human Movement with Distorted Form*; and to examine depressive disorders as the target diagnosis for the *Depression Index*.

Unpublished studies by the test author. We estimated the overall effect size for the unpublished research coordinated by the CS test author and cited as validity support in the most recent CS test manual (Exner, 2003). Our goals were to provide a more inclusive review of the CS validity literature and to determine the degree of fit between the validity coefficients derived from these unpublished studies and those derived from the published literature. To complete this task, the first and third authors located all of the target studies in the CS test manuals. Then, they calculated the validity effect sizes for these unpublished studies by using either the data found in the test manuals or, if the data were insufficient, by tracing the citations back to earlier editions of the test manuals or to Rorschach Workshops newsletters, which were often used as a medium for communicating new empirical findings.[19]

Meta-Analytic Procedures

Effect sizes. All original findings were converted to the *r* metric. If a finding was reported as nonsignificant, it was assigned a value of zero. If it was reported as significant but an exact *r* value could not be computed, the minimum value of *r* that would be statistically significant for that sample size was used as the estimate. Regardless of the original direction of the correlation, effects were given a positive sign when the relationship was in the predicted direction and a negative sign when it was not.

When a study examined more than one relevant criterion variable for a given CS predictor score, all the relevant results were averaged. Effects were averaged on a per sample or per line of investigation basis, not a per article basis. This linking across published studies was done to ensure the same participants were not counted twice. For the primary analyses, effect sizes from introspectively assessed and externally assessed validity criteria were averaged separately. For the diagnostic comparisons, aggregation levels were determined by the contrast for the target diagnosis (i.e., target vs. nonpatient or target vs. clinical control). At each level of analysis, sample overlap was differentially identified, and all findings from the same participants were averaged. When effect sizes were averaged per sample and level, *N* was typically constant. However, as noted previously, if a subsample was evaluated against two different and independent comparison groups, total *N* was appropriately increased to reflect the combined number of independent participants. At other times, if analyses were com-

[18] As an example from Archer and Gordon's (1988) method section, "*DSM–III* discharge diagnoses were available for all patients based on the clinical judgments of treatment team members who were instructed to employ standard *DSM–III* criteria in evaluating the patients' behaviors and characteristics. Although psychological test results were frequently available and potentially involved in the diagnostic decisions, major diagnostic emphasis was directed to the adolescent's social history, the clinical judgments by the child's individual and family psychotherapists based on therapy observations, and the judgments of the staff psychiatrist based on direct observation of the child across the inpatient treatment process" (pp. 278–279).

[19] We thank Philip Erdberg for supplying these newsletters.

pleted on the full sample and also on a distinct subsample, the final *N* was smaller and computed as the average of the two sample sizes. For the latter, we computed a sample weighted effect size for inclusion in the meta-analyses.

Aggregation models. We followed the steps and equations outlined by Borenstein, Hedges, Higgins, and Rothstein (2009) to complete fixed-effect and random-effects analyses of the data for each variable using SPSS 19. All analyses took place on Fisher's *Zr* transformed values, which were converted back to the original *r* metric in the final step of the analyses. In the fixed-effect model, all effects are assumed to be targeting a common population parameter, and sample size is the only factor that influences the standard error of the individual and composite effect sizes. On the other hand, a random-effects model assumes the effects are a random sample from a larger universe of effect sizes that vary in the size of the underlying population parameter. The standard error of the effect sizes under this model is a function of sample size and also genuine (nonerror) variability in the size of the observed effects, which results in more conservative estimates of significance (see also Schmidt, Oh, & Hayes, 2009).

To quantify heterogeneity in the summary effect sizes, we computed the *Q* statistic and its significance under the assumptions of a fixed-effects model. A small and nonsignificant value indicates the observed effect sizes for a particular variable are not notably discrepant from each other (and thus could permit a fixed-effects analysis); a larger and significant value indicates the effects are not targeting a common population parameter (and speak to the value of a random-effects model). We recognize that some of our estimation procedures could in themselves contribute to large *Q* values (e.g., by assigning nonsignificant but unspecified coefficients a value of zero, by conservatively estimating a significant but unspecified coefficient as the smallest coefficient possible for that sample size).

Given the nature of our data, the random-effects model is clearly more appropriate than the fixed-effects model. Therefore, we do not provide fixed-effects results. However, we also present the effect size estimates from unweighted (i.e., equally weighted) analyses, which are reasonable to consider when all component predictor–criterion constructs are deemed equally important, regardless of the size of the sample used to study them. Although we present the latter, all statistical significance levels and 95% confidence intervals (CIs) are from a random-effects model.

When aggregating effect sizes on a per sample basis for each CS predictor variable, we tracked the number of results that were averaged at each level of analysis. However, we did not use this information to adjust the standard error of the effect size for that sample. This approach is conservative (see Borenstein et al., 2009); to the extent that criteria are independent of each other and uncorrelated, the standard error is reduced as a function of the averaging (i.e., per the central limit theorem, the standard error of a mean is reduced by $1/\sqrt{n}$, with n being the number of independent objects averaged). We took the more conservative approach of not reducing the standard error for the average effects because it was generally not possible to determine the correlation among the criterion variables. Thus, in the results, we present a column to indicate the number of effects (*k*) that contributed to the final results and a column to indicate the number of independent samples or lines of investigation that contributed. When the number of effects is larger than the number of samples, both the standard error and the *p* value that we report for that meta-analytic result are slightly larger than they should be.

Moderator analyses. To test for the differences between summary effect sizes, we used standard formulas (Hunter & Schmidt, 2004; Rosenthal, 1991), whereby the difference in the two Fisher *Zr*s computed by the random-effects model was divided by the standard error of the difference. The resulting standard normal *z* was evaluated for significance using a two-tailed test.

Tests of Publication and Selection Bias

Interrater reliability. To determine the reproducibility of the results, we assessed interrater reliability for the two main stages of our review. For initial study inclusion based on hypothesized relevant findings, the second author blindly rated a randomly selected subset of 100 of the 2,467 citations using the same criteria as the first author. For selection of the final effects based on the construct alignment across Rorschach variable and criterion measure, the second author blindly rated a randomly selected subset of 10 of the 65 Rorschach variables for predictor–criterion construct fit using the same criteria as the first author. The variables chosen for this task contained 417 of the 3,067 total predictor–criterion associations initially rated by the first author. After completing these interrater reliability ratings, the second author returned to the full database to classify the criteria for the 55 remaining predictor variables.[20] Once his classifications were complete, he reviewed disagreements with the initial rater and identified those where he accepted her judgment. The remaining disagreements were then reviewed by the first author, and any lingering disagreements about what constituted an appropriate validity coefficient were discussed and resolved before the final decision was made about whether to include the coefficient in the meta-analyses.

Funnel plot, tau, and Egger's regression test. We relied on several strategies to assess whether the literature suffered from publication bias or the propensity for an effect to be published when it is statistically significant but to remain unpublished when it is not. When present, this kind of bias would produce artificially large meta-analytic results, suggesting that test scales are more valid than is warranted. Particularly because we examined many effects that were not of focal interest to the original authors, we did not anticipate salient publication bias in the meta-analytic findings.

As a first step, we generated a funnel plot (Sterne & Egger, 2001) to assess asymmetry in the graph of effect size magnitude (plotting Fisher's *Zr* on the *x*-axis) relative to the precision of the study to detect an effect (using the standard error of *Zr* on the *y*-axis). For these analyses, we relied on a fixed-effect model, as sample size would be the only factor influencing the significance and, thus, the publishability of observed results in the original study. We also only examined the effects of primary interest, which were the externally assessed effects. When there is no publication bias, the plot should assume a funnel shape because the smaller and less precise studies produce more random variation about the population mean than the larger and more precise studies. Bias is evident in a funnel plot when the distribution of effects is asymmetrical and there is a gap or hole where the smaller effects

[20] For this task, the second author focused on criterion constructs that were externally assessed, given this method was the primary focus of our meta-analyses.

from the less precise studies should be (which is the upper left in the figure we present). Such a hole implies effects that are missing from the published literature and indicate the meta-analytic data set is populated by an overrepresentation of the small-study results that produce larger and statistically significant effect sizes.

Although the visual display of a funnel plot is useful, we followed this with two statistical analyses to quantify the degree to which bias was present. Begg and Mazumdar (1994) recommend using Kendall's tau to assess the rank order correlation between the two variables included in the funnel plot: the standardized effect size (*Zr*) and its standard error. Significant positive correlations would imply asymmetry in the effect sizes that may be due to publication bias, with the larger standard errors from small studies being correlated with larger effect sizes. The second measure of bias was Egger's regression test (Egger, Smith, Schneider, & Minder, 1997), which regresses the standard normal deviate (z) for each effect on the inverse of its standard error. The intercept in the resulting regression model should be zero in the absence of publication bias, with departures from zero indicating asymmetry in the funnel plot. Given that we assigned all effects a positive sign when they were in the direction that supported scale validity, if the intercept is positive and significant it would suggest bias, with effects that are more likely to be published from small studies when they are statistically significant.

Fail-safe *N* (FSN). Finally, following Rosenthal (1991), we computed the fail-safe *N* (FSN) to determine the number of unpublished file-drawer studies containing null results ($r = .00$) needed to bring the observed level of statistical significance down to a nonsignificant level (i.e., to a p value $> .05$). For these computations, we used the standard normal z corresponding to the significance level of the total set of studies (z_c) to estimate the mean z across studies ($\bar{z}_k = z_c/\sqrt{k}$; Hunter & Schmidt, 2004; Rosenthal, 1991). However, for z_c, we used the z for the overall significance of the summary effect size under the random-effects model to estimate $\bar{z}_k$, which was then used to determine the number of null studies required to make the results nonsignificant using the standard fail-safe *N* formula, $FSN = k[k(\bar{z}_k)^2 - 2.706]/2.706$. Approaching the task this way allowed us to circumvent the historical difficulty of only being able to apply a fixed-effects model to the file-drawer problem (Hunter & Schmidt, 2004).

Researcher hindsight bias. Evidence suggests that some researchers formulate hypotheses after seeing the results of their studies. In a recent survey of questionable research practices, about a third of the psychologists admitted that they had reported unexpected findings as expected, although clinical psychologists had the lowest rates of the nine subdisciplines included in the study (John, Loewenstein, & Prelec, 2012). Because we had already reviewed the literature to include all predictor–criterion associations that any researcher had hypothesized, we were able to determine if the overall effect size was larger for predictor–criterion associations that were hypothesized by the article's author compared to studies that reported the same predictor–criterion association but did not hypothesize a statistically significant association.

Cherry-picking or confirmation bias. Cherry-picking is a confirmation bias in which cases are selected that confirm one's position and other evidence is ignored or dismissed. In the context of a meta-analysis, this form of bias could emerge if there were a motivation to differentially favor large effects (the cherries) over the true effects. One test of this potential selection bias is to evaluate how close the final meta-analytic effect size is to the maximum effect size that could have been obtained from the pool of all effects. If we were cherry-picking large effects rather than accurate results from the findings, we would expect that our obtained estimates of validity would be close to the maximum effect sizes possible. Of course, to the extent that Rorschach variables are valid measures of their target constructs, our efforts to choose results for the most accurate validity criteria should result in higher overall effect sizes than if results were computed using the full data set of all hypothesized associations, which includes those with tangentially relevant criterion variables.

Journal impact factor. Although not necessarily indicative of bias per se, the general quality of the peer-reviewed journals where the review findings were published could speak to the quality of the peer review process identifying and correcting methodological complications. Thus, as a final step to explore potential bias, we evaluated the average impact factor (IF) for the journals that contributed data to the meta-analyses relative to the average IF of the 2,695 journals cataloged in the 2010 Social Science version of the *Journal Citation Reports* (*JCR*; Thomson Reuters, 2011). Journals that are not tracked in the *JCR* were assigned an IF value of zero.

Results

Meta-Analytic Sample

A total of 3,074 Rorschach validity coefficients were tabulated for the multiple meta-analyses of individual scores. From this initial pool, 1,156 were judged to appropriately target the core construct of the score, of which 770 were externally assessed and 386 were introspectively assessed. In 87 instances, an effect was reported as nonsignificant and assigned a value of zero. The effects were obtained across 215 independent samples, with a combined independent sample size of 25,795 participants. Most samples were adults (152), though there were also a substantial number of child (10), adolescent (31), and various combinations of child, adolescent, and adult samples (22). Per Rorschach variable, there was a wide range of effects (range 0 to 53), samples or lines of investigation (0 to 39), and participants (0 to 10,259) contributing data. For the 55 variables with some data, on average there were 21.0 effects, 14.2 samples, and 2,073 participants contributing to the results (the medians were 18, 13, and 1,075, respectively).

Tests of Publication and Selection Bias

Interrater reliability. For decisions regarding whether or not an article contained (a) a relevant Rorschach variable and (b) an author-hypothesized association with a criterion variable, the percent agreement was 98%, and kappa (κ) was .90 ($N = 100$). For decisions regarding whether or not the predictor–criterion associations qualified as validity coefficients that targeted the Rorschach variable's core construct, the percent agreement was 89% and $\kappa = .78$ ($N = 417$). These values represent excellent levels of agreement (Cicchetti, 1994), and the latter is particularly noteworthy because it occurs in the context of range restriction, with the judges differentiating among a pool of effects that other researchers had hypothesized to show statistically significant associations.

Funnel plot, tau, and Egger's regression test. For these analyses, the 770 externally assessed effects were averaged on a per variable and per sample basis to produce 617 independent effects targeting a total of 53 of the CS scores. Figure 2 displays the funnel plot examining the distribution of the effect sizes as a function of their standard error. The figure has a modest funnel shape, narrower at its base than at its top. However, it is a relatively boxy graph, with data points that are fairly widely dispersed about the unweighted mean *Zr* of .28 (designated by the solid vertical line). This boxiness is particularly noteworthy at the base of the graph where precision is greatest (and the standard error the smallest). The graph thus has a blunter nose at its base than would be expected with a fixed-effect model. Indirectly, the dispersion about the mean in the lower section of the graph speaks to the merits of using a random-effects model rather than a fixed-effects model for the data analysis.

With respect to publication bias, however, the figure reveals no notable gaps or asymmetries in the upper left quadrant. Consistent with this visual impression, the rank correlation between the size of each effect and its standard error was nonsignificant ($tau_b = -.001$, $p = .963$, $N = 617$). Finally, Egger's regression test did not produce an intercept that was significantly different from zero (intercept $= -0.261$, $SE = .169$, $t = -1.546$, $p = .123$), and the coefficient itself was negative—opposite the direction that would be expected if publication bias were a concern. Overall, the full distribution of effects shows no evidence of artificial inflation as a result of a bias towards publishing small studies with significant but nonreplicable results.

These analyses were extended by individually examining the results for each of the 53 variables with externally assessed criteria. One of the scores (*Organizational Frequency*) produced a statistically significant tau_b using a conventional level of significance ($tau_b = .59$, $p = .0025$, $N = 15$), though this effect would not remain if we corrected for the number of exploratory analyses that were run to obtain it (where the critical Bonferroni adjusted p is .00094). Applying Egger's regression test to each variable individually revealed four with intercepts significantly different from zero (*Conventional Form, Human Movement*, *Popular,* and *Diffuse Shading,* with p values from .026 to .046). However, in each case, the intercept was negative and in the direction opposite of that which would suggest publication bias. Thus, neither the overall pool of effects nor the effects for each specific score show evidence of publication bias.[21]

Fail-safe *N* (FSN). The FSN values were quite variable, depending on the score under consideration. Values ranged from 0 for the meta-analytic results that were not statistically significant to values of 200 or more for the often studied and robustly valid meta-analytic results. These findings are addressed in more detail when the primary results are described, though as a protection against bias, we note that the FSN values play an influential role when we classify and summarize the evidence for each variable.

Researcher hindsight bias. Of the 770 primary meta-analytic findings, 573 effects were from author-hypothesized findings. These hypothesized findings comprise the pool of effects that are potentially prone to hindsight bias. To these effects, we added 197 parallel findings that had not been hypothesized by the original authors (but had been hypothesized by an author in another study) and, thus, should not be prone to hindsight bias. The unweighted effect size for author-hypothesized findings was $r = .26$ and for non-author-hypothesized findings was $r = .29$. These results do not support the hypothesis that researcher hindsight bias contributed to artificial inflation of the meta-analytic effect sizes.

Cherry-picking or confirmation bias. The 770 primary meta-analytic effects were chosen from an initial database of 2,154 externally assessed effects. If we were operating under extreme bias and chose the highest 770 effect sizes from this initial database, the average unweighted effect size would be $r = .41$, whereas our actual average unweighted effect size was $r = .27$. To model a less extreme form of cherry-picking bias, we eliminated the top 100 effect sizes from consideration. The average unweighted effect size for the next highest 770 effects was $r = .35$, which is again notably higher than $r = .27$. In fact, we would have to eliminate 299 of the top effect sizes to result in our overall average unweighted effect size of $r = .27$. These analyses do not rule out a confirmation bias. However, they do not support it and they are consistent with what could be observed if effects were being classified as relevant based on logical criteria rather than on effect size.

Journal impact factor. Across the 170 articles that contributed externally assessed data, the average of the journal IFs was 1.48 ($SD = 1.09$). This value is higher than the average IF across all social science journals ($M = 1.16$, $SD = 1.22$; $t = 3.29$, $p = .001$, $d = .26$). Thus, on average, the research we summarize was published in outlets that have an above-average impact.

Orientation to Primary Analyses

Table 2 reports our primary meta-analytic results, with findings organized in rows by Rorschach variable and then further differentiated by the method used to assess the validity criterion constructs (i.e., introspection vs. external assessment). Each row of results contains the (a) overall sample size (N), (b) number of effects (k), (c) number of samples or independent lines of investigation (S), and (d) the average weighted r using a random-effects model (r RE) and its associated p value. Following this is the FSN based on the random-effects model and the 95% CI around the point estimate. Next are the unweighted average r and the Q statistic of heterogeneity among the sample-level effect sizes with its associated p value. When possible, the final column contains the p value for the test of method differences comparing the average effect for introspective and externally assessed results for that variable.

Source of Information: Introspectively Assessed or Externally Assessed

Table 2 provides a considerable amount of information. As a preliminary step to simplify the subsequent presentation of data, we examined the source of criterion data as a moderator. For this analysis, we averaged all the primary effect sizes for each Rorschach variable by criterion measure type. When weighted by the inverse of the sampling error variance in a random-effects model, the average of the meta-analytic effect sizes across 42 scores validated by introspectively assessed criteria (Fisher's $Zr = .08$,

[21] The inferences are no different when the introspective effects are also included.

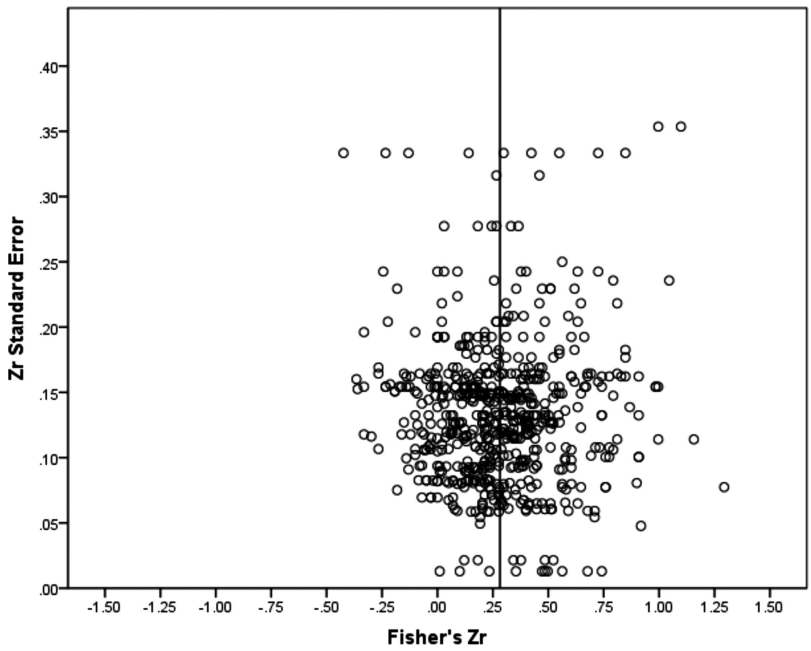

Figure 2. Funnel plot to assess publication bias in effect sizes for Rorschach Comprehensive System variables in relation to externally assessed criterion variables, showing effect size magnitude (Fisher's *Zr*) relative to the precision of the study to detect an effect (standard error of *Zr*).

r = .08; 386 total findings) was less than a third of the size of average meta-analytic value obtained across the 53 scores that were validated using externally assessed criteria (Zr = .28, r = .27; 770 total findings). On a per variable basis, many of the comparisons of differential validity as a function of criterion method were nonsignificant. However, out of the 40 instances when they could be compared, there were no instances when findings using introspective criteria were significantly larger ($p <$ .05) than findings based on externally assessed criteria. In contrast, there were 15 instances when the effects for externally assessed criteria were larger than for introspective criteria. These results support our decision to focus the subsequent presentation on findings obtained from externally assessed criteria.

Meta-Analytic Findings for Specific Rorschach Variables

Before turning to the meta-analytic results for individual Rorschach variables detailed in Table 2, note that Table 3 provides a simplified summary of the strength of the validity evidence for each variable. To categorize the strength of the evidence, we used Hemphill's (2003) findings that the middle third of the psychological test validity effect sizes range from r = .21 to .33 to represent an average range of expected validity coefficients. As the lowest acceptable validity effect size magnitude, we use Hemphill's finding that r less than .15 represents the lower quartile of effect sizes in the psychological assessment and treatment literature.[22]

Based on these guidelines, the following sequentially applied criteria were used: *Excellent support* was defined as $r > .33$, $p <$ .001 (which always resulted in FSNs greater than 50); *good support* was defined as $r > .21$, $p < .05$, $FSN \geq 10$; *modest support* was defined as $p < .05$ and either $r > .21$, $FSN < 10$, or r = .15–.20, $FSN \geq 10$; *little support* was defined as $p < .05$ and either $r < .15$ or $FSN < 10$; *no support* was defined as $p > .05$; and an absence of evidence was defined as variables with no construct-relevant validity studies. In the sections that follow, for variables with statistically significant meta-analytic findings, we provide examples of validity criteria with an effect size (r) of at least .21 (consistent with our definition of good support). Inverse associations are indicated with [−] or a verbal description. For Rorschach variables with no meta-analytic validity support ($p > .05$), we provide examples of validity criteria with an effect size less than .21. When the same type of validity criterion was used more than once for a variable (e.g., three studies investigating IQ as a validity criterion for variable *X*), the weighted average of the effects was used to determine whether it would be listed in the examples. See the Appendix for the complete list of validity criteria per Rorschach variable.

[22] Eighty percent of the validity coefficients for externally assessed criteria were derived from a biserial design with two dichotomous variables, or a point biserial design using a dimensional predictor and a dichotomous criterion. For the latter, J. Cohen's (1988) benchmark values of small, medium, and large (r = .10, .24, and .37, respectively) are more in line with Hemphill's (2003) empirical observations. Benchmarks for a biserial design would be even lower.

Table 2
Primary Meta-Analytic Summary Effect Sizes of Validity Coefficients for Rorschach Comprehensive System Variables

Rorschach variable and criterion method	*N*	*k*	Samples	*r* RE	*p r*	FSN	95% CI	*r* UW	*Q*	*p Q*	*p* Meth
					Controls and Situational Stress						
Number of Responses: The Ability or Tendency to Respond With Many Ideas											
Introspective											
External	949	18	15	.24	<.001	187	[.16, .32]	.25	26.0	.074	
Lambda: Avoidance vs. Attentiveness to Complexity, Subtlety, or Nuance											
Introspective	1,590	19	12	.28	.004	39	[.09, .44]	.24	155.7	<.001	
External	746	14	12	.30	<.001	259	[.22, .37]	.30	15.0	.306	.805
Human Movement: Mental Abilities, Including Planning, Imagination, and Empathy											
Introspective	126	2	2	.15	.314	0	[−.14, .42]	.15	2.7	.102	
External	9,576	23	17	.33	<.001	614	[.26, .40]	.33	97.7	<.001	.213
Weighted Sum of Color: Emotions Influence Thoughts and Experiences											
Introspective	259	3	3	.30	.076	0	[−.03, .57]	.27	13.7	.001	
External	462	5	5	.38	.005	10	[.12, .59]	.34	30.6	<.001	.697
Experience Actual: Cognitive and Emotional Resources											
Introspective	198	3	3	.17	.327	0	[−.17, .48]	.15	11.1	.004	
External	1,035	17	11	.34	<.001	247	[.24, .43]	.33	30.7	.015	.341
Experienced Stimulation: Distracting, Distressing, or Irritating Internal Experiences											
Introspective	383	10	4	.17	.001	32	[.07, .27]	.19	4.2	.899	
External	350	6	6	.32	.010	9	[.08, .52]	.28	25.8	<.001	.265
Sum of Shading: Distressing or Irritating Internal Stimuli											
Introspective	602	10	7	.09	.089	0	[−.01, .19]	.09	11.5	.245	
External	423	5	5	.37	<.001	52	[.24, .48]	.35	7.3	.122	.001
Diffuse Shading: Distress or Helplessness, Often as a Reaction to a Moderate to Severe Stressor											
Introspective	737	15	8	.08	.072	0	[−.01, .17]	.08	16.6	.276	
External	1,606	29	24	.23	<.001	143	[.12, .33]	.21	109.6	<.001	.042
Texture—see *Self-Perception* section											
Vista—see *Self-Perception* section											
Achromatic Color—see *Affective Features* section											
Inanimate Movement: Mental Distraction or Agitation, Often as a Reaction to a Moderate to Severe Stressor											
Introspective	1,052	19	13	.14	<.001	113	[.07, .20]	.15	18.0	.457	
External	739	16	15	.33	<.001	96	[.18, .45]	.32	53.8	<.001	.016
Animal Movement: Pressing Primary Needs											
Introspective											
External	281	6	4	.14	.020	6	[.02, .26]	.15	0.0	1.000	
Nonhuman Movement: Need-Driven Mental Distractions (no data)											
Difference Score: Current Level of Coping Abilities											
Introspective	662	27	8	.11	.004	58	[.04, .19]	.11	16.1	.934	
External	1,070	20	19	.31	<.001	216	[.20, .40]	.29	52.9	<.001	.003
Adjusted Difference Score: Level of Coping Abilities Regardless of Current Stressors											
Introspective											
External	294	6	6	.19	.127	0	[−.06, .42]	.16	20.7	.001	
Coping Style*: Extratensive vs. Introversive*: Externally Responsive and Emotional vs. Internally Directed and Ideational											
Introspective	570	9	8	.15	.102	0	[−.03, .32]	.14	32.5	<.001	
External	132	4	3	−.06	.699	0	[−.32, .22]	−.04	5.8	.122	.224
Coping Style: *Ambitent:* Poorly Defined or Inconsistent Coping Style (no data)											
Coping Style: *Pervasive:* Pervasively Internally or Externally Oriented (no data)											
					Affective Features						
White Space: Oppositionality, Either the Behavior or the Emotion (Anger)											
Introspective	512	11	6	.03	.489	0	[−.06, .12]	.04	1.3	.999	
External	790	13	10	.01	.882	0	[−.07, .09]	.02	13.7	.320	.682
Color Projection: Activating Emotions or Ideas Replace Depressive Ones (no data)											
Achromatic Color: Irritating, Negative Emotion											
Introspective	454	8	5	.08	.084	0	[−.01, .17]	.11	4.9	.672	
External	1,408	19	15	.24	<.001	123	[.14, .34]	.22	54.8	<.001	.026
Form-Color Ratio: Emotional Impulsivity or Reactivity											
Introspective	149	4	2	.07	.762	0	[−.35, .46]	.07	9.0	.029	
External	689	14	12	.32	<.001	111	[.19, .43]	.31	30.6	.004	.262
Pure Color: Extreme Emotional Impulsivity or Reactivity											
Introspective											
External	247	7	5	−.06	.617	0	[−.31, .19]	−.05	16.8	.010	

Table 2 (*continued*)

Rorschach variable and criterion method	*N*	*k*	Samples	*r* RE	*p r*	FSN	95% CI	*r* UW	*Q*	*p Q*	*p* Meth
Affective Ratio: Engaging in Activating Affective Situations											
Introspective	754	17	9	.08	.030	12	[.01, .16]	.08	16.6	.411	
External	1,406	15	13	.21	.013	19	[.04, .36]	.19	109.5	<.001	.176
Complexity Ratio: Psychological Complexity											
Introspective	312	5	4	.37	.022	5	[.06, .61]	.32	24.0	<.001	
External	881	10	8	.31	<.001	190	[.23, .39]	.34	12.1	.208	.739
Constriction Ratio: Emotional Suppression or Constriction (no data)											
Interpersonal Perception											
Aggressive Movement: Aggression or Anger, Either Expressed or Experienced											
Introspective	711	11	9	.06	.135	0	[−.02, .13]	.03	10.1	.433	
External	1,236	17	17	.10	.022	16	[.01, .18]	.12	31.8	.011	.467
Cooperative Movement: Tendency to Perceive Positive Interpersonal Interactions											
Introspective	423	14	5	−.04	.460	0	[−.13, .06]	−.02	3.6	.994	
External	471	17	7	.31	<.001	272	[.22, .39]	.30	14.6	.558	<.001
Food: Dependency Needs											
Introspective	216	4	4	.17	.221	0	[−.10, .41]	.17	10.6	.014	
External	211	3	3	.15	.030	2	[.01, .28]	.20	1.4	.487	.915
Isolation Index: Social Isolation, Either the Behavior or the Psychological Experience											
Introspective	530	12	7	.05	.301	0	[−.04, .13]	.09	6.1	.869	
External	241	6	4	.12	.287	0	[−.10, .34]	.04	7.5	.185	.531
Personal: Justification of Views Based on Personal Experience											
Introspective	57	2	1	.24	.072	0	[−.02, .47]	.24			
External	123	3	2	.26	.004	6	[.09, .42]	.23	1.4	.488	.885
Active to Passive Ratio: Passive vs. Action-Oriented											
Introspective	127	3	3	.17	.067	0	[−.01, .34]	.18	1.9	.381	
External	69	5	2	.24	.159	0	[−.09, .52]	.29	4.6	.332	.710
Texture: Desire for Interpersonal Closeness, Either Emotional or Tactile											
Introspective	723	21	10	.08	.028	16	[.01, .16]	.09	13.7	.845	
External	1,648	28	20	.24	<.001	522	[.17, .30]	.24	37.8	.081	.002
Whole, Realistic Humans: Self and Others Viewed as Whole People											
Introspective	62	2	1	.03	.818	0	[−.22, .28]	.03			
External	1,331	24	16	.24	<.001	179	[.14, .33]	.23	48.8	.001	.131
Interpersonal Interest: Interest in People											
Introspective	79	1	1	.15	.188	0	[−.07, .36]	.15			
External											
Good Human Representations: Healthy and Adaptive Understanding of Others											
Introspective											
External	630	9	6	.23	<.001	37	[.11, .35]	.24	13.5	.096	
Poor Human Representations: Disturbed and Maladaptive Understanding of Others											
Introspective											
External	721	10	7	.19	<.001	38	[.09, .29]	.20	13.6	.138	
Self-Perception											
Morbid: Morbid Thoughts, Images, or Feelings											
Introspective	789	16	10	.17	.001	52	[.07, .26]	.19	21.3	.128	
External	2,515	36	33	.29	<.001	631	[.21, .36]	.28	129.4	<.001	.048
Anatomy and X-ray: Preoccupations With Body Vulnerability or Its Functioning											
Introspective	343	4	3	.01	.899	0	[−.10, .11]	.01	0.1	.997	
External	423	7	7	.33	<.001	103	[.23, .42]	.30	6.5	.369	<.001
Vista: Emotionally Negative Self-Evaluation											
Introspective	369	6	4	−.06	.248	0	[−.16, .04]	−.01	3.1	.680	
External	1,660	19	18	.19	.004	38	[.06, .32]	.18	116.6	<.001	.003
Form Dimension: Introspective Capacity											
Introspective	522	7	5	.19	.133	0	[−.06, .41]	.17	30.6	<.001	
External	220	6	4	.13	.054	0	[.00, .26]	.15	.7	.985	.704
Whole, Realistic Humans—see *Interpersonal Perception* section											
Reflections: Narcissistic Tendencies											
Introspective	352	8	5	.08	.137	0	[−.03, .19]	.08	2.0	.958	
External	809	16	12	.23	<.001	56	[.10, .36]	.20	41.2	<.001	.072
Egocentricity Index: Egocentricity, Either Narcissistic or Distress-Related (High) or Negative Self-Image (Below Low Cutpoint)											
Introspective	650	17	8	.05	.184	0	[−.03, .13]	.05	4.5	.998	
External	425	10	8	.12	.144	0	[−.04, .26]	.10	18.9	.026	.480

(*table continues*)

Table 2 (*continued*)

Rorschach variable and criterion method	*N*	*k*	Samples	*r* RE	*p r*	FSN	95% CI	*r* UW	*Q*	*p Q*	*p* Meth
					Information Processing						
Synthesized Response: Ability to Synthesize Concepts											
Introspective											
External	9,300	20	13	.37	<.001	682	[.30, .44]	.37	72.8	<.001	
Vague Response: Vague or Unsophisticated Thinking											
Introspective											
External	8,266	3	3	.22	.049	1	[.00, .42]	.21	121.9	<.001	
Perseveration: Difficulty Shifting a Cognitive Set											
Introspective											
External	110	3	3	.29	.012	4	[.07, .49]	.30	2.9	.237	
Organizational Frequency: Ability to Sustain Cognitive Effort											
Introspective											
External	9,339	16	15	.28	<.001	356	[.22, .35]	.34	61.2	<.001	
Processing Efficiency: Propensity to Process or Account for Information											
Introspective	189	3	3	−.07	.337	0	[−.21, .07]	−.06	1.3	.525	
External	8,327	9	7	.12	.066	0	[−.01, .25]	.08	63.1	<.001	.053
Aspiration Ratio: Match Between Achievement Goals and Ability (no data)											
Economy Index: Relative Focus on the Big Picture, Obvious Facts, or Idiosyncratic Detail (no data)											
					Cognitive Mediation						
Conventional Form: Tendency to Perceive the World as Others Do											
Introspective	263	6	2	.00	<.001	0	[−.12, .12]	.00	0.0	1.000	
External	1,958	29	20	.48	<.001	409	[.35, .60]	.45	221.7	<.001	<.001
Distorted Form: Distorted Perceptions											
Introspective	178	4	3	.03	.675	0	[−.12, .18]	.05	0.4	.947	
External	2,283	34	24	.49	<.001	1,521	[.42, .56]	.47	109.2	<.001	<.001
Appropriate Form: Reasonably Appropriate Perceptions											
Introspective											
External	475	7	4	.46	<.001	287	[.38, .53]	.49	2.4	.884	
Unusual Form: Uncommon but Creative Views That Are Not Simply Misperceptions											
Introspective											
External	40	7	1	.32	.044	4	[.01, .57]	.32			
Popular: Popular or Socially Common Perceptions											
Introspective	325	8	3	.03	.582	0	[−.08, .14]	.05	0.5	1.000	
External	9,934	27	20	.31	<.001	386	[.22, .39]	.30	218.0	<.001	<.001
White Space Distortion: Strong Anger Leads to Distorted Perceptions (no data)											
					Ideation						
Human Movement, Distorted Form: Distorted Perceptions of Others, Including Psychotic Perceptions											
Introspective	296	5	3	.09	.335	0	[−.10, .28]	.15	6.0	.200	
External	2,004	25	17	.20	<.001	189	[.12, .28]	.20	60.3	<.001	.286
Human Movement, Formless: Impaired Ideational Control (no data)											
Intellectualization Index: Minimizing Emotional Experiences by Intellectualizing (no data)											
Critical Special Scores: Thought Disturbance											
Introspective	368	10	4	.13	.017	11	[.02, .23]	.14	1.9	.993	
External	2,478	35	27	.38	<.001	1,477	[.32, .44]	.37	81.0	<.001	<.001
Critical Special Scores, Severe: Thought Disturbance, Severe											
Introspective											
External	1,052	14	8	.35	<.001	683	[.29, .40]	.37	8.3	.824	
Active: Passive Ratio—see *Interpersonal Perception* section											
Morbid—see *Self-Perception* section											
					Indices						
Perceptual-Thinking Index: Disturbed Thinking and Distorted Perceptions											
Introspective	1,484	23	10	.10	<.001	97	[.05, .15]	.16	9.8	.988	
External	2,281	30	17	.39	<.001	520	[.28, .48]	.34	114.9	<.001	<.001
Depression Index: Depressive Tendencies											
Introspective	911	24	11	.07	.180	0	[−.03, .18]	.07	35.4	.048	
External	1,789	26	19	.19	.007	45	[.05, .31]	.15	146.6	<.001	.190
Coping Deficit Index: Interpersonal and/or Emotional Deficits											
Introspective	285	3	3	.36	.024	3	[.05, .61]	.34	15.0	.001	
External	637	15	12	.20	.002	36	[.07, .32]	.19	29.6	.009	.317

Table 2 (*continued*)

Rorschach variable and criterion method	*N*	*k*	Samples	*r* RE	*p r*	FSN	95% CI	*r* UW	*Q*	*p Q*	*p* Meth
Suicide Constellation: Suicide Risk											
Introspective	30	1	1	.30	.108	0	[−.07, .60]	.30			
External	411	4	4	.41	<.001	84	[.32, .50]	.38	3.4	.330	.512
Hypervigilance Index: Interpersonal Vigilance											
Introspective	292	7	3	.01	.926	0	[−.11, .12]	.02	0.1	<.001	
External	301	3	3	−.14	.019	3	[−.25, −.02]	−.11	0.9	.631	.086
Obsessive Style Index: Obsessive Information Processing											
Introspective	95	2	2	.07	.538	0	[−.14, .27]	.11	0.9	.337	
External											

Note. *N* = number of independent observations; *k* = number of effect sizes contributing; Samples = number of samples contributing; *r* RE = summary effect size correlation according to a random-effects model; *p r* = significance of the *r* RE; FSN = fail-safe *N,* the number of comparable effect sizes with null results required to bring the observed significance of *r* RE down to a level above *p* = .05; 95% CI = the 95% confidence interval about *r* RE; *r* UW = summary unweighted mean effect size correlation across all samples; *Q* = chi-square index of variability in effect sizes according to the fixed-effect model; *p Q* = the significance level associated with *Q*, where values below .05 indicate the need for a random-effects model; *p* Meth = the significance of the difference between the effect reported in the External row and the effect reported in the Introspective row for this variable.

Controls and situational stress.[23] The *Number of Responses* given to the Rorschach was significantly related to criterion variables indicating the Ability or Tendency to Respond With Many Ideas (*r* = .24, *S* = 15; [−]Alzheimer's disease, [−]closed head injury, creativity, [−]failure to complete other tests or components of an assessment, and patients with positive vs. negative/withdrawn psychotic symptoms). The complexity with which these responses were reported (i.e., lower *Lambda*) was significantly related to criterion variables that indicate Avoidance vs. Attentiveness to Complexity, Subtlety, or Nuance (*r* = .30, *S* = 12; [−]Alzheimer's, [−]closed head injury, education, IQ, and ratings of suitability for psychodynamic therapy and ego strength). *Human Movement* was significantly related to criterion measures assessing Mental Abilities, Including Planning, Imagination, and Empathy (*r* = .33, *S* = 17; [−]attention-deficit/hyperactivity disorder [ADHD], age-based developmental progression in children,[24] [−]Alzheimer's, [−]Asperger's, [−]closed head injury, education, IQ, and mirror neuron activity by electroencephalograph [EEG]). *Weighted Sum of Color* was significantly related to criteria indicating the degree to which Emotions Influence Thoughts and Experiences (*r* = .38, *S* = 5; bipolar disorder, borderline personality). *Experience Actual* was significantly related to criteria indicating Cognitive and Emotional Resources (*r* = .34, *S* = 11; [−]ADHD, [−]closed head injury, education, IQ, psychological resiliency in burn patients [hospital staff ratings], ratings of suitability for dynamic therapy and ego strength, and [−]violent offense).

Experienced Stimulation was significantly related to criteria that indicate Distracting, Distressing, or Irritating Internal Experiences (*r* = .32, *S* = 6; acute stress disorder, physical illness deterioration and related distress, and sexual abuse in children). Most of this variable's subcomponents were also significantly related to their validity criteria. That is, *Sum of Shading* was significantly related to criteria indicating Distressing or Irritating Internal Stimuli (*r* = .37, *S* = 5; borderline personality, chronic pain, major depression, and sexual abuse in children). The situational stress variables *Diffuse Shading* and *Inanimate Movement* were significantly related to criteria that indicate, respectively, experiences of Distress or Helplessness (*r* = .23, *S* = 24; acute stress reaction, age of sexual abuse onset [early vs. late childhood], amphetamine ingestion vs. placebo, chronic pain, laboratory-induced uncontrollable stress, major depression, physical illness deterioration and related distress, psychological effects of parental cancer, and rape victims) and Mental Distraction or Agitation (*r* = .33, *S* = 15; trauma [e.g., acute stress reaction, rape victims, veterans with PTSD] and other stressors [amphetamine ingestion vs. placebo, laboratory-induced stress, psychological effects of parental cancer]). The measure of Pressing Primary Needs (*Animal Movement*) showed a small but significant relationship to its criteria (*r* = .14, *S* = 4; obese patients' eating rate, sexual homicide perpetrator vs. psychopath). No studies investigated the construct validity of *Nonhuman Movement,* where *Inanimate* and *Animal Movement* are combined.

Regarding the Rorschach coping measures, the *Difference Score* was significantly related to criteria indicating one's Current Level of Coping Abilities (*r* = .31, *S* = 19; [−]acute stress reaction, hockey achievements [goals and assists], improvement in long-term residential treatment, nonpatient status vs. various patient groups, [−]obese patients' eating rate, [−]physical illness deterioration and related distress, [−]psychological effects of parental cancer, [−]sexual offending, and [−]suicide attempts). The *Adjusted Difference Score,* which assesses one's Level of Coping Abilities Regardless of Current Stressors, was not significantly related to validity criteria (*r* = .19, *S* = 6, *p* = .127; e.g., PTSD). Finally, the coping style variables were either not significantly related to their criteria (*Introversive/Extratensive*; *r* = −.06, *S* = 3; e.g., fantasy proneness, propensity to manipulate objects while problem solving) or had no findings that fit inclusion criteria (*Ambitent* and *Pervasive*).

Affective features. The relationship of *White Space* to criteria assessing Oppositionality, Either the Behavior or the Emotion

[23] Although some Rorschach variables are interpreted in more than one CS section, we only report the results once. The variables interpreted in more than one section are noted in Table 2.

[24] The age-based developmental progression samples are cross-sectional samples of ages 5 to adult or ages 3 to 12. Positive associations with this criterion indicate that the variable increases with age.

Table 3
Strength of the Validity Evidence for Rorschach Comprehensive System Variables

Domain	Excellent support ($r \geq .33$, $p < .001$; $\therefore$ *FSN* > 50)	Good support ($r \geq .21$, $p < .05$, *FSN* $\geq$ 10)	Modest support ($p < .05$, $r \geq .21$, *FSN* < 10, or $r = .15$–$.20$, *FSN* $\geq$ 10)	Little ($p < .05$, $r < .15$ or *FSN* < 10) to no support ($p > .05$)	Absence of evidence (no studies)
Controls and Situational Stress	*Human Movement* *Experience Actual* *Sum of Shading* *Inanimate Movement*	*Number of Responses* *Lambda* *Weighted Sum of Color* *Diffuse Shading* *Difference Score*	*Experienced Stimulation*	*Animal Movement*[a] *Adjusted Difference Score* *Coping Style: Extratensive vs. Introversive*	*Nonhuman Movement* *Coping Style: Pervasive* *Coping Style: Ambitent*
Affective Features		*Achromatic Color* *Form-Color Ratio* *Affective Ratio* *Complexity Ratio*		*White Space* *Pure Color*	*Color Projection* *Constriction Ratio*
Interpersonal Perception		*Cooperative Movement* *Whole, Realistic Humans* *Texture* *Good Human Representations*	*Personal* *Poor Human Representations*	*Aggressive Movement*[a] *Food*[a] *Isolation Index* *Active to Passive Ratio*	*Interpersonal Interest*
Self-Perception	*Anatomy and X-ray*	*Morbid* *Reflections*	*Vista*	*Form Dimension* *Egocentricity Index*	
Information Processing	*Synthesized Response*	*Organizational Frequency*	*Vague Response* *Perseveration*	*Processing Efficiency*	*Aspiration Ratio* *Economy Index*
Cognitive Mediation	*Conventional Form* *Distorted Form* *Appropriate Form*	*Popular*	*Unusual Form* *Human Movement, Distorted Form*		*White Space Distortion*
Ideation	*Critical Special Scores* *Critical Special Scores, Severe*				*Human Movement, Formless*
Indices	*Perceptual-Thinking Index* *Suicide Constellation*		*Depression Index* *Coping Deficit Index*	*Hypervigilance Index*	*Intellectualization Index* *Obsessive Style Index*

Note. Table 1 provides the coding descriptions and construct labels for the variables. The strength of the validity evidence is derived from the meta-analytic results for the external assessment method in Table 2.
[a] Variables with little support as opposed to no support.

(Anger), was around zero ($r = .01$, $S = 10$; e.g., aggression chart ratings, conduct disorder, violent offense). There were no validity studies investigating *Color Projection*. On the other hand, *Achromatic Color* was significantly related to criteria that suggest the presence of Irritating, Negative Emotion ($r = .24$, $S = 15$; borderline personality, chronic pain, depressed patients vs. nonpatients, negative emotion measured by posterior medial prefrontal cortex activation on functional magnetic resonance imaging following negative feedback, psychological effects of parental cancer, and sexual abuse in children).

The *Form-Color Ratio* showed the expected relationship to criterion variables that indicate Emotional Impulsivity or Reactivity ($r = .32$, $S = 12$; acute stress reaction, child-abusing fathers [substantiated], [−]levels of 5-hydroxyindoleacetic acid [5-HIAA] in cerebrospinal fluid [CSF; a measure of serotonin turnover linked to aggressive dyscontrol and severity of suicide attempts], male violent offenders, patients hospitalized for psychosis vs. nonpatients, PTSD, and suicide attempts). However, its subcomponent, *Pure Color,* did not show the expected association with validity criteria that indicate Extreme Emotional Impulsivity or Reactivity ($r = -.06$, $S = 5$; eating rate in obese patients, violent offenses).

The *Affective Ratio* was significantly related to criteria that indicate Engaging in Activating Affective Situations ($r = .21$, $S = 13$; obese patients' eating rate; higher for borderline vs. schizotypal PD, and sexual offenders vs. psychopaths, lower for severely depressed patients vs. nonpatients). The *Complexity Ratio* was significantly related to validity criteria that indicate the level of Psychological Complexity ($r = .31$, $S = 8$; [−]Alzheimer's, education, ego strength ratings, IQ, [−]severe depression, and suitability for psychodynamic therapy). The few studies that investigated the *Constriction Ratio* did not have any findings that fit the Emotional Suppression or Constriction construct (example of excluded criteria: patients with enuresis vs. other pediatric patients).

Interpersonal perception. *Aggressive Movement* showed a small but significant relationship to criteria assessing Aggression or Anger, Either Expressed or Experienced ($r = .10$, $S = 17$; aggression chart ratings, borderline PD, children with divorced parents [who are more likely to witness aggression and exhibit conduct problems], and rape victims, though it was not associated with violent offenders). *Cooperative Movement* was significantly related ($r = .31$, $S = 7$) to criterion variables assessing a Tendency to Perceive Positive Interpersonal Interactions (selection as a foster parent for medically complex infants; lower for severely depressed patients and violent offenders vs. nonpatients, lower for patients with borderline personality vs. patients selected for psychodynamic therapy). The *Food* variable showed a significant but unstable ($FSN = 2$) relationship to criteria indicating Dependency Needs ($r = .15$, $S = 3$; the focus of one's earliest memories is seeking attachment with others), although few studies directly targeted its construct. The *Isolation Index* was not significantly related to its criteria that indicate Social Isolation, Either the Behavior or the Psychological Experience ($r = .12$, $S = 4$; Asperger's, child maltreatment [including 80% neglect], and parent ratings of withdrawn/depressed children).

The *Personal* score had a significant but inconsistent association with groups that are likely to use Justification of Views Based on Personal Experience ($r = .26$, $S = 2$; groups that are highly self-focused in their reasoning [antisocial and narcissistic PD] vs. nonpatients). The *Active to Passive Ratio* was not significantly related to criterion variables indicating Passive vs. Action-Oriented ($r = .24$, $S = 2$; higher for static pose models compared to strippers but not passive involvement with one's child). *Texture* showed a significant relationship to validity criteria suggesting a Desire for Interpersonal Closeness, Either Emotional or Tactile ($r = .24$, $S = 20$; histrionic personality, [−]nurses' ward ratings of social isolation, [−]oppositional defiant disorder, [−]psychopathy, and sexual offenses; higher for borderline vs. schizotypal PD, higher for secure and preoccupied attachment style and lower for avoidant attachment style).

The *Whole, Realistic Humans* variable was significantly related to criteria suggesting that Self and Others Are Viewed as Whole People ($r = .24$, $S = 16$; [−]Asperger's, selection as foster parents for medically complex infants, and [−]suicide attempts). *Interpersonal Interest* had no studies that fit inclusion criteria (examples of excluded criteria: interest in others assessed by graphology ratings, sexual abuse vs. medical condition). *Good* and *Poor Human Representations* were significantly related to criteria that assess, respectively, Healthy and Adaptive Understanding of Others ($r = .23$, $S = 6$; children's enjoyment with their parents, mothers' warm involvement with their children, and ratings of couples' interpersonal relatedness quality; higher for nonpatients vs. psychotic patients) and Disturbed and Maladaptive Understanding of Others ($r = .19$, $S = 7$; borderline personality, [−]ratings of couples' interpersonal relatedness quality, and psychotic patients vs. nonpatients).

Self-perception. The *Morbid* score was significantly related to external criteria suggesting the presence of Morbid Thoughts, Images, or Feelings ($r = .29$, $S = 33$; amyotrophic lateral sclerosis patients, child maltreatment, chronic pain, progressive multiple sclerosis patients, psychiatric patients vs. nonpatients, psychological effects of parental cancer, many trauma samples [e.g., combat PTSD, rape victims], and higher for patients with major depression vs. nonpatients). Seeing images of internal body parts (*Anatomy and X-ray*) was significantly related to criteria consistent with Preoccupations With Body Vulnerability or Its Functioning ($r = .33$, $S = 7$; psychological effects of parental cancer, sexual and/or physical abuse history, and spinal cord injury).

Finally, of the two measures that assess perspective taking, Emotionally Negative Self-Evaluation (*Vista*) showed a significant relationship to its criteria ($r = .19$, $S = 18$; [−]CSF 5-HIAA levels, psychiatric patients vs. nonpatients, sexual abuse in children, and suicide attempts), but Introspective Capacity (*Form Dimension*) did not ($r = .13$, $S = 4$; offenders' degree of psychopathy, psychodynamic therapy suitability). *Reflections,* a variable believed to assess Narcissistic Tendencies was significantly related to its criteria ($r = .23$, $S = 12$; narcissistic personality and ratings of narcissism on sentence completion test). However, the *Egocentricity Index* was not significantly related to criteria indicating Egocentricity, Either Narcissistic or Distress-Related (High) or Negative Self-Image (Below Low Cutpoint) ($r = .12$, $S = 8$; egocentric earliest memory, psychopathy, severe depression, suicide attempt; though it was related to narcissistic personality in two of three comparisons).

Information processing. The *Synthesized Response* was significantly related to other criteria suggesting the Ability to Synthesize Concepts ($r = .37$, $S = 13$; age-based developmental progression in children, [−]Alzheimer's, creativity, IQ, and [−]psychosis). *Vague Responses* were significantly related to criteria consistent with having

Vague or Unsophisticated Thinking but the findings were not stable ($r = .22$, $S = 3$, $FSN = 1$). The *Perseveration* score was significantly related to criteria suggesting Difficulty Shifting a Cognitive Set ($r = .29$, $S = 3$; perseveration errors on cognitive testing, severe closed head injury). *Organizational Frequency* was significantly related to measures indicating one's Ability to Sustain Cognitive Effort ($r = .28$, $S = 15$; [−]Alzheimer's, [−]bipolar, [−]closed head injury, IQ, and [−]long- vs. short-term heroin use). However, the Propensity to Process or Account for Information during these cognitive efforts (*Processing Efficiency*) was not related to its validity criteria ($r = .12$, $S = 7$; age-based developmental progression in children, IQ, and a measure of visual cognitive synthesis). No studies fit inclusion criteria for the remaining Rorschach variables in this section (*Aspiration Ratio* and *Economy Index*; examples of excluded criteria: IQ, perseveration errors on cognitive testing, psychopathy, psychosis).

Cognitive mediation. The variables assessing a Tendency to Perceive the World as Others Do (*Conventional Form*) and Distorted Perceptions (*Distorted Form*) were each significantly related to criteria in the expected directions (respectively, $r = .48$ and .49, $S = 20$ and 24; psychotic disorders and other disorders with perceptual and cognitive disturbances [Alzheimer's, Asperger's, autism, autogenous or highly unrealistic obsessions, bipolar disorder, borderline personality], nonverbal measures of cognitive and perceptual processing, and psychiatric patients vs. nonpatients). In contrast to the *Conventional Form* variable, the *Distorted Form* variable was able to differentiate patients with psychosis from other patients with distorted perceptions (e.g., borderline and schizotypal PD). Although the newer *Appropriate Form* variable had fewer studies, it was significantly related to its Reasonably Appropriate Perceptions criteria ($r = .46$, $S = 4$; [−]borderline personality and other PDs with distorted perceptions, [−]high risk for psychosis, [−]psychosis, and a measure of nonverbal cognitive processing). *Unusual Form* only had one observation fitting its criterion label of Uncommon or Creative Views That Are Not Simply Misperceptions ($r = .32$, $k = 7$; creativity).

The *Popular* score had a significant relationship to criteria indicating tendency towards Popular or Socially Common Perceptions ($r = .31$, $S = 20$; age-based developmental progression in children, [−]Alzheimer's, [−]Asperger's, [−]earliest memories involve unconventionality, [−]psychosis, [−]severe head injury, and [−]violent offense). No studies fit inclusion criteria for *White Space Distortion*'s specific interpretation that Strong Anger Leads to Distorted Perceptions. The closest matches were separate investigations of its relationship to violence (to address the *White Space* interpretation) and psychosis (to address the *Distorted Form* interpretation) and neither of these findings was statistically significant.

Ideation. The *Human Movement, Distorted Form* variable had a significant relationship to criteria indicating Distorted Perceptions of Others, Including Psychotic Perceptions ($r = .20$, $S = 17$; borderline and other PDs with distorted perceptions of others, dissociative disorders, and psychotic disorders). The measure of Impaired Ideational Control (*Human Movement, Formless*) was not included in any validity studies. The *Intellectualization Index* was included in studies but none that fit its construct of Minimizing Emotional Experiences by Intellectualizing (i.e., major depression, parental capacity ratings, and pedophilia). The closest relevant finding was its significant relationship to education.

The Thought Disturbance variable (*Critical Special Scores*) was significantly related to its validity criteria, with robust findings ($r = .38$, $S = 27$; autism, autogenous or highly unrealistic obsessions, bipolar disorder, high risk for psychosis, [−]neurophysiological markers of psychosis [prepulse inhibition, pupillary dilation], and psychotic disorders; higher for borderline and other personality disturbances with distorted thinking vs. nonpatients). Its subcomponent variable that assesses Severe Thought Disturbance (*Critical Special Scores, Severe*) was also significantly related to its criteria ($r = .35$, $S = 8$; bipolar disorder, high risk for psychosis, and psychosis).

Indices. Of the six indices, four were significantly related to their criteria in the expected direction. The *Perceptual-Thinking Index* was significantly related to criteria assessing Disturbed Thinking and Distorted Perceptions ($r = .39$, $S = 17$; autogenous or highly unrealistic obsessions, bipolar disorder, high risk for psychosis, and psychotic disorders; higher for borderline and other personality disturbances with distorted thinking vs. nonpatients). The *Depression Index* was significantly related to criterion measures of Depressive Tendencies ($r = .19$, $S = 19$; [−]CSF 5-HIAA levels, and higher for depressed patients and patients in general vs. nonpatients). The *Coping Deficit Index* was significantly related to criteria assessing Interpersonal and/or Emotional Deficits ($r = .20$, $S = 12$; Asperger's, [−]psychological resiliency in burn patients [hospital staff ratings], and violent offense). The *Suicide Constellation* was significantly related to Suicide Risk criteria ($r = .41$, $S = 4$; [−]CSF 5-HIAA levels, effected suicide, lethal suicide attempt, and suicidality ratings). In contrast, the *Hypervigilance Index* was significantly related to its Interpersonal Vigilance criteria in the *opposite* of the expected direction ($r = -.14$, $S = 3$; paranoid disorders, sexually abused children). Finally, the *Obsessive Style Index* had no studies that fit inclusion criteria (excluded criteria were sexual abuse in children and a comparison of pre- and posttreatment values in different cohorts of patients).

Psychotic or Depressive Diagnoses: Patient Versus Nonpatient Comparison Sample

As shown in Table 4, the relevant Rorschach variables differentiated the target diagnostic samples (psychotic and depressed patients) from nonpatients with generally larger effect sizes than when the target samples were compared to other psychiatric samples (range = .26 to .72 vs. .15 to .47). This moderator was statistically significant only for the *Perceptual-Thinking Index* and *Depression Index,* though all eight comparisons were in the predicted direction. The average effect size for the nine findings that we omitted due to potential criterion contamination was significantly smaller than that in the other 107 findings ($r = .41$ vs. .11, $p < .001$), which is in the opposite direction than predicted if criterion contamination were inflating effect sizes.

Unpublished Studies by the Test Author

In 160 instances, an unpublished predictor–criterion validity finding from studies coordinated by the CS test author was reported in the test manual (Exner, 2003). The necessary information to compute effect sizes could be found for 73 effects. For the 35 CS variables for which we could compute an effect size, the unweighted mean was .55 ($S = 67$). For the 34 variables with sample-size information, the weighted mean from a random-effects model was $r = .56$ ($S = 62$). These results were statistically significant, and the average effect size is large relative to our primary meta-analytic findings ($r = .56$ vs.

Table 4
Moderator of Rorschach Validity for Psychotic and Depressive Diagnosis: Patient Versus Nonpatient Comparison Sample

Variable and comparison group	*N*	*k*	Samples	*r* RE	*p r*	FSN	95% CI	*r* UW	*Q*	*p Q*	*p* Dif
Psychotic Disorder											
Perceptual-Thinking Index: Disturbed Thinking and Distorted Perceptions											
Nonpatients	160	3	3	.72	<.001	64	[.60, .82]	.70	3.7	.155	
Other Psychiatric Patients	1,047	9	8	.47	<.001	155	[.35, .57]	.43	33.2	<.001	.003
Critical Special Scores: Thought Disturbance											
Nonpatients	361	6	5	.53	<.001	46	[.34, .68]	.53	18.4	.003	
Other Psychiatric Patients	1,019	9	8	.41	<.001	348	[.34, .48]	.38	12.1	.145	.219
Critical Special Scores, Severe: Severe Thought Disturbance											
Nonpatients	504	6	5	.38	<.001	72	[.26, .49]	.41	9.0	.108	
Other Psychiatric Patients	724	6	5	.30	<.001	112	[.22, .38]	.32	6.0	.309	.272
Distorted Form: Distorted Perceptions											
Nonpatients	439	7	6	.61	<.001	153	[.49, .71]	.59	16.2	.013	
Other Psychiatric Patients	1,073	10	8	.47	<.001	185	[.35, .56]	.42	33.6	<.001	.063
Conventional Form: Tendency to Perceive the World as Others Do											
Nonpatients	361	6	5	.57	.010	9	[.15, .81]	.50	75.4	<.001	
Other Psychiatric Patients	548	6	5	.31	.007	10	[.09, .51]	.27	26.7	<.001	.251
Popular: Popular or Socially Common Perceptions											
Nonpatients	366	5	4	.35	<.001	48	[.22, .46]	.37	5.4	.251	
Other Psychiatric Patients	504	5	4	.15	.138	0	[−.05, .34]	.15	14.9	.005	.098
Human Movement, Distorted Form: Distorted Perceptions of Others, Including Psychotic Perceptions											
Nonpatients	482	8	7	.26	.023	7	[.04, .45]	.23	33.6	<.001	
Other Psychiatric Patients	969	9	7	.24	<.001	74	[.15, .33]	.23	14.3	.074	.905
Depressive Disorder											
Depression Index: Depressive Tendencies											
Nonpatients	304	4	3	.45	<.001	32	[.29, .59]	.46	6.4	.095	
Other Psychiatric Patients	304	4	3	.17	.004	8	[.05, .27]	.19	2.2	.524	.005

Note. *N* = number of independent observations; *k* = number of effect sizes; Samples = number of samples; *r* RE = summary effect size correlation according to a random-effects model; *p r* = significance of the *r* RE; FSN = fail-safe *N,* the number of comparable effect sizes with null results required to bring the observed significance of *r* RE down to a level above *p* = .05; 95% CI = the 95% confidence interval about *r* RE; *r* UW = summary unweighted mean effect size correlation across all samples; *Q* = chi-square index of variability in effect sizes according to a fixed-effect model; *p Q* = the significance level associated with *Q,* where values below .05 indicate the need for a random-effects model; *p* Dif = the significance of the difference between the effect reported in this row and the effect reported in the previous row for this variable.

.27), exceeding the 95% CI in Table 2 for all but three variables. For the 39 effect sizes that we included in this review that came from the test author's *published* studies, the unweighted *r* was .38; the weighted *r* was .41.

Exploratory Analyses Applicable to Incremental Validity

Because there were a large number of introspectively assessed validity findings based on the MMPI, and meta-analyses suggest sound support for the global validity of the MMPI (Atkinson, 1986; Hiller et al., 1999; Meyer & Archer, 2001; Parker et al., 1988), we conducted exploratory analyses to address incremental validity. That is, if the Rorschach shows stronger associations with its external validity criteria than it does with the MMPI, and the MMPI is a valid measure of these criteria, then the Rorschach should show incremental validity in predicting similar criteria. Of the introspectively assessed meta-analytic findings, 212 of the total 386 effects were from the MMPI and their unweighted average effect size association with Rorschach variables was $r = .07$. Given that the unweighted average effect size association between Rorschach variables and externally assessed criteria was $r = .27$ ($k = 770$), the findings support the logical conclusion that valid Rorschach variables should show incremental validity over the MMPI in predicting construct-relevant external criteria.

Discussion

The state of the Rorschach empirical literature and that of psychological assessment more generally is analogous to that which led Smith and Glass (1977) to conduct their classic meta-analysis on the effectiveness of psychotherapy. As they stated, "Scholars and clinicians are in the rather embarrassing position of knowing less than has been proven, because knowledge, atomized and sprayed across a vast landscape of journals, books, and reports, has not been accessible" (Smith & Glass, 1977, p. 760). Therefore, it is in this spirit, as well as in response to specific repeated appeals (e.g., Garb et al., 2005; Hunsley & Bailey, 2001), that we meta-analytically summarized the published validity literature for the main variables included in the popular CS (Exner, 2003; Meyer et al., in press). We emphasized the Rorschach as a performance-based test and focused our primary analyses on studies that used externally assessed criteria (e.g., observer ratings, diagnoses) rather than introspectively assessed criteria to establish validity. Initial moderator analyses supported this approach.

Our meta-analyses reported findings for most (85%) of the 65 variables targeted for review. Across all variables, the mean

validity for externally assessed characteristics (e.g., observer ratings, psychiatric diagnosis) was $r = .27$, compared to $r = .08$ for introspectively assessed characteristics (e.g., self-report). There was wide variation regarding how often the variables were studied (0 to 33 times) and how well-supported they were (r range = $-.14$ to .49). Nonetheless, it is particularly noteworthy how closely the validity effect sizes for the 53 variables in our primary meta-analyses (i.e., using externally assessed validity criteria) mirror the distribution of validity effect sizes found in meta-analytic reviews of psychological assessment more broadly. In each case, two thirds of the validity effect sizes are a magnitude of $r = .21$ or above (Hemphill, 2003; Meyer et al., 2001).

Comparison to Previous Validity Reviews of Individual Rorschach Variables

Rorschach CS test manual.[25] For the 65 variables targeted for review, compared to the test manual we report construct-relevant CS validity data for more than three times as many variables (55 vs. 17) obtained from more than 9 times the number of journal articles (210 vs. 23). We found little to no validity support for over a third (25) of the targeted variables, either due to nonsignificant findings (10), significant findings but with low or unstable validity coefficients (three), or a lack of studies (12). The 12 variables that lacked published CS validity studies in our meta-analyses also lacked them in the test manual. For six of these variables, unpublished studies by the test author were cited in the manual. For the 10 variables with nonsignificant findings, the test manual cited validity findings based on CS results from about 40 unpublished studies by the test author but just three published studies, whereas we draw on findings from 65 published studies. For the three variables with significant findings but low or unstable validity effect sizes, the test manual cited validity findings from 10 unpublished studies and no published studies, whereas we draw on findings from 33 studies. Overall, our analyses included considerably more CS validity findings from the published literature than the test manual, and the results were less globally supportive.

We reviewed the CS test manual to compute the overall validity effect size for the test author's unpublished studies. Compared to our findings, the overall effect was larger ($r = .56$ vs. .27) and outside the upper 95% CI boundary for almost all variables. We cannot say what accounts for this difference. We can only note that the unpublished validity findings in the test manual for which we could calculate effects are not consistent with the effect sizes in the peer-reviewed published literature.

Other reviews. Our meta-analytic findings were largely consistent with the conclusions of other major Rorschach validity reviews. The support we found for the *Perceptual-Thinking Index* as a measure of Disturbed Thinking and Distorted Perceptions and, more specifically, psychosis is consistent with the three major reviews by Jørgensen et al. (2000, 2001), Viglione (1999), and Wood et al. (2000). We found modest support for the *Depression Index*'s ability to differentiate patients with a depressive disorder from patients with other clinical diagnoses, which is a more positive conclusion than the negative findings reported in the three previous reviews. Prior reviews did not report specific study inclusion criteria that would allow a direct comparison to our review. In contrast to our review, they included studies with criterion contamination and a range of different mood disturbances (vs. limiting it to major depressive disorder and dysthymia as we did). However, consistent with Jørgensen et al.'s review, we found that the *Depression Index* was better at distinguishing depressed patients from nonpatients ($r = .45$, $p < .001$) than from other patients ($r = .17$, $p = .004$). Consistent with Viglione's conclusions, our meta-analyses supported the validity of (a) the *Suicide Constellation* as an indicator of suicide risk and (b) two situational stress variables (*Inanimate Movement* and *Diffuse Shading*) as more likely to occur for people who have experienced moderate to severe stressors.

Similar to Nezworski and Wood (1995) but in contrast to the CS test manual, our meta-analysis did not support the *Egocentricity Index*'s validity. For introspectively assessed validity criteria, the test manual (Exner, 2003) cited support from four published studies, but our validity coefficient based on eight samples was negligible ($r = .05$). When using externally assessed validity criteria, the test manual reported good validity support from five published and 11 unpublished studies, but the validity coefficient from eight published samples in our meta-analysis was small ($r = .12$). For the *Egocentricity Index*'s subcomponent variable, *Reflections,* our meta-analysis found slightly more validity support than Nezworski and Wood's review, but we were able to include many studies that were published after their article was written.

Comparison to Validity Meta-Analyses for Individual Scales of Self-Report Tests

In a critique of the Rorschach, Garb et al. (2005) stated, "It is striking that focused meta-analyses have been conducted for so few Rorschach scores" (p. 106), which implies that focused meta-analyses have been conducted for most psychological test variables. However, none of the popular multiscale self-report instruments used in clinical, neuropsychological, and forensic settings (Archer et al., 2006; Archer & Newsom, 2000; Camara et al., 2000) have comprehensive construct validity meta-analyses for each of their scales.[26] The two most extensive validity meta-analyses for multiscale self-report instruments are for the MMPI and the Millon Clinical Multiaxial Inventory (MCMI), which are also the two most popular. McGrath and Ingersoll (1999a, 1999b) summarized the validity effect sizes for the MMPI high-point codes, which represent an interpretive approach based on the *combination* of the two or three most elevated scores across the 10 traditional scales. This extensive review found an average validity effect size of only $r = .07$ ($N = 8{,}614$) using conceptually relevant criteria.

Rogers, Salekin, and Sewell (1999) examined the validity of the PD scales on the first and second versions of the MCMI. The criteria were limited to other measures of the same PD, which we

[25] In order to make direct comparisons more easily, we applied our methodology to the test manual and thus only focused on validity studies that were conducted using CS variables. The test manual also reports study findings from earlier Rorschach systems that contain the precursor variables on which many CS variables were based. We did not consider these findings.

[26] Determined by a PsycINFO search on February 16, 2012, using as keywords [*test name*] and (*meta analysis* or *literature review*), limited to peer-reviewed articles written in English.

organize here by their method of assessment. When the MCMI scales were correlated with parallel measures of PDs assessed by self-report, which is essentially an alternate forms reliability design (i.e., monotrait–monomethod coefficient; Cronbach & Meehl, 1955), the average effect size relationship was $r = .57$ ($k = 118$). The average scale validity using diagnostic information obtained from patient self-report combined with clinician observation via semistructured interviews was $r = .36$ ($k = 105$); validity obtained directly from clinician ratings was $r = .12$ ($k = 35$). In sum, it is difficult to compare the validity effect sizes we observed for Rorschach variables to those found for self-report scales since so few of the latter have been published, though our average effect is much larger than the validity found for the MMPI code types.

Strength of the Validity Evidence for Rorschach Variables

Strongly supported variables. The Rorschach variables with the strongest validity support tended to target cognitive and perceptual processes. In particular, the *Perceptual-Thinking Index* and its two primary components, *Critical Special Scores* and *Distorted Form,* had the largest, most robust validity coefficients in our meta-analyses (rs = .38 to .49, *FSN*s = 520 to 1,521). The ability of these Rorschach variables to detect and differentiate patients with psychotic disorders from patients with other disorders was notable (rs = .41 to .47, *FSN*s = 155 to 348). These findings are consistent with previous reviews (Exner, 2003; Jørgensen et al., 2000, 2001; Viglione, 1999; Wood et al., 2000), and our meta-analyses go beyond them by using a systematic review of the literature that includes significantly more studies.

Other variables supported in our meta-analyses assess psychological resources and cognitive complexity (*Lambda, Experience Actual, Human Movement, Difference Score, Complexity Ratio, Synthesized Response, Organizational Frequency*). Each of these variables had medium, sturdy effect size relationships with their validity criteria (rs = .28 to .37, *FSN*s = 190 to 682). Research indicates that cognitive strengths and abilities predict important mental health variables, such as reduced psychiatric hospitalizations (Gale, Batty, Tynelius, Deary, & Rasmussen, 2010) and better functional outcomes for people with schizophrenia (Green, Kern, Braff, & Mintz, 2000). Even more germane to these specific Rorschach variables is their support in the literature as positive indicators of the ability to engage in psychotherapy and as good predictors of treatment outcome (Alpher, Perfetto, Henry, & Strupp, 1990; Gerstle, Geary, Himelstein, & Reller-Geary, 1988; LaBarbera & Cornsweet, 1985; R. E. Lee, 1996; Nygren, 2004b).

Two other supported variables assess impulsive or dangerous behaviors: the *Form-Color Ratio* ($r = .32$, $S = 12$) and *Suicide Constellation* ($r = .41$, $S = 4$), which assess, respectively, Emotional Impulsivity or Reactivity and Suicide Risk. The *Suicide Constellation* is designed for use with adults, but replicated validity support exists for using a modified version of this scale with adolescents (rs = .71 and .45; Blasczyk-Schiep, Kazén, Kuhl, & Grygielski, 2011; Silberg & Armstrong, 1992). As a caveat, although the *Suicide Constellation* data are impressive, given how difficult it is to predict suicide and serious self-harm risk, there are important parameters around these results. First, suicide and serious self-harm are low-base-rate events. As a result, elevated scores will generally result in a large number of false-positive alarms (Hunsley & Bailey, 2001; Viglione, 1999). Second, other important suicide risk predictors must be assessed by alternative methods, such as assessing for specific ideas related to (a) suicide, death, or hope for the future; (b) plans or actual steps towards suicide; (c) access to lethal means; or (d) a history of previous self-harm or suicide attempts (Joiner, 2005), as these issues cannot be determined from Rorschach responses.

Variables that assess Distressing or Irritating Internal Stimuli (*Sum of Shading*) and Mental Distraction or Agitation, Often as a Reaction to a Moderate to Severe Stressor (*Inanimate Movement*), were also supported as valid measures. Importantly, the method used to assess these constructs via the Rorschach (see Table 1 for a description of coding criteria) is notably different from an introspective method of assessment. At best, these variables were weakly related to introspective criteria of assessing distress or mental distraction. Thus, when a clinician asks a patient if he or she feels distressed or distracted, the answer will not necessarily correspond to the patient's Rorschach results, and vice versa. Because the Rorschach is an implicit measure, the person may not recognize the discomfort or irritation, but it might be observed by others or alter the person's view of the world in various ways. Self-report measures are more indicative of the explicit discomfort the person recognizes in himself or herself.

Finally, three other variables with strong validity support are referred to as *Contents* in the Rorschach literature (Exner, 2003): (a) *Cooperative Movement,* (b) *Morbid,* and (c) *Anatomy and X-ray*. *Content* scores refer to implicitly assessed ideas and images that are on one's mind (e.g., "a *sad* [or *dead*] rabbit" is a *Morbid* content). The scores themselves do not indicate whether the person's experience of the particular content is pleasant, neutral, or aversive or whether the person identifies with it or experiences it as foreign (Hsiao, Meyer, & Mihura, 2012). For example, people who give many *Morbid* responses to the Rorschach might either identify with the morbid images by feeling damaged or dysphoric themselves, might find the morbidity aversive, or could experience sadistic pleasure in it.

Least supported variables. The least supported variables can be characterized in three ways: (a) the absence of validity evidence (no studies), (b) evidence of the absence of validity (nonsignificant findings), or (c) low or unstable levels of validity (significant findings but with validity coefficients in the lowest quartile of the psychological assessment literature or just above this point but with uncertain sturdiness). More than a third of the CS variables in our meta-analyses (25 of 65) fit these criteria and are listed in the right two columns of Table 3. The least supported variables vary in how much interpretive emphasis they receive in the test manual. Some variables receive very little interpretive emphasis (e.g., *Animal Movement*; *Nonhuman Movement*; *Color Projection*; *Human Movement, Formless*), while others carry more weight (e.g., *White Space, Pure Color, Egocentricity Index, Processing Efficiency,* the *Coping Style* variables).

It is difficult to summarize the psychological constructs of the least supported variables, as they are not cohesive. However, two characteristics are worthy of mention: (a) Some have very low base rates and (b) most were not included in Rorschach systems prior to the CS. Regarding base rates, the *Obsessive Style Index, Color Projection,* and *Human Movement, Formless,* have mean frequencies per protocol ranging from <.01 to .03 (Meyer et al., 2007), which make them almost impossible to research. Accord-

ingly, no studies in our primary analyses included these variables. Similarly, 11 other CS variables are, on average, coded as present less than one time per protocol. Only one of these variables had strong validity support in our meta-analyses (*Critical Special Scores, Severe*). Due to the principle of aggregation (Rushton, Brainerd, & Pressley, 1983), more frequently occurring variables should have more reliable validity support than variables that rarely occur because random errors of measurement when coding cancel out more readily with the former than the latter.

The fact that most of these variables were not included in major Rorschach systems prior to the CS is important because it means there cannot be any published research on them before the first edition of the CS (Exner, 1974); thus, our review encompasses all the available data. Only five of the 23 poorly supported variables existed before the CS: (a) *Pure Color,* (b) *Interpersonal Interest,* (c) *Animal Movement,* and (d) two *Coping Style* variables (*Extratensive vs. Introversive* and *Ambitent*). The test manual reports published validity literature from previous Rorschach systems for each of these variables. For the *Interpersonal Interest* and *Coping Style* variables, the test manual cites positive findings from earlier published validity reviews (Draguns, Haley, & Phillips, 1967; J. L. Singer & Brown, 1977). For *Pure Color,* the cited literature is limited to its occurrence in very young children's protocols, although more research is cited for *Animal Movement*. Therefore, the pre-1974 validity literature for these five Rorschach variables should be systematically reviewed before concluding they are invalid, although one should not assume the contrapositive (i.e., one should not assume that they are valid variables simply because there is no proof to the contrary).

The Method of Measurement in Psychology

The overall validity effect size in our primary analyses is comparable to that of other Rorschach meta-analyses (Bornstein, 1999; Diener et al., 2011; Hiller et al., 1999; Meyer & Archer, 2001), as well as psychological assessment more generally (Hemphill, 2003; Meyer et al., 2001). For example, in child and adolescent assessment, where it is common to collect ratings of psychological characteristics from various sources (e.g., child/adolescent, parents, teachers, clinicians, peers), the literature has consistently revealed validity effect sizes (*r*s) around .20 to .35 when comparing one source of information to another (Achenbach, McConaughy, & Howell, 1987; Meyer, 2002b). For adult PDs, Klonsky, Oltmanns, and Turkheimer (2002) found that the convergent coefficient between self- and informant ratings was a median correlation of .36 ($k = 11$) across dimensional traits and a median kappa of .14 ($k = 6$) for categorical diagnostic decisions. For normal personality dimensions as assessed by the Big Five model, Connelly and Ones (2010) found that the uncorrected convergent coefficients between self- and informant ratings ranged from $r = .29$ (Agreeableness; $k = 151$) to .41 (Extraversion; $k = 186$).

The preceding examples of validity effect sizes in psychological assessment are based on source differences that typically hold constant the questionnaire or rating scale and its test items. The uniformity in item content helps ensure maximal construct overlap and maximal empirical convergence across methods. If one were to use different questions or items for each source of ratings, the constructs would differ slightly, and convergent validity coefficients would be lower. Similarly, if rater judgments of personal qualities were evaluated relative to specific behaviors observed in a particular context, the asymmetry between predictor and criterion would result in lowered validity coefficients (Funder, 1995; Wittmann, 1988, 1991, 2004). For the same reasons, validating Rorschach scores relative to the less perfectly matched criteria in our analyses should produce smaller validity effect size relationships in general than those noted in the previous paragraph.

Importantly, moderator analyses revealed that the introspective method provided the most dissimilar type of criterion for the Rorschach variables, producing small validity coefficients on average rather than the medium effects that were produced across a range of externally assessed criteria. In this regard, our results are consistent with those of other Rorschach meta-analyses (Diener et al., 2011; Hiller et al., 1999; Meyer & Handler, 1997) and with psychological assessment validity meta-analyses more generally. For example, based on data from Spangler's (1992) meta-analysis, Meyer et al. (2001) reported that achievement behaviors (e.g., job performance, income earned) were more strongly predicted by the achievement motive as assessed implicitly by story narratives ($r = .22$, $k = 82$) than when assessed introspectively by self-report ($r = .15$, $k = 104$). Furthermore, the association between achievement motives assessed by story narratives and introspective methods was small ($r = .09$, $k = 36$). A. G. Greenwald, Poehlman, Uhlmann, and Banaji (2009) found a medium effect size association between personality constructs assessed by the implicit association test (IAT) and criterion behavior ($r = .28$, $k = 24$) but a smaller association between IAT and introspectively assessed personality constructs ($r = .17$, $k = 21$). Other meta-analyses have found small effect size relationships when impulsivity ($r = .10$, $k = 608$; Cyders & Coskunpinar, 2011) and memory ($r = .15$, $k = 673$; Beaudoin & Desrichard, 2011) have been assessed introspectively versus by behavioral performance. Thus, what people say is true about their personal characteristics bears little association to these same qualities as assessed by behavioral performance tasks, though the latter also typically show stronger relations to other externally assessed criteria.

More broadly, research in clinical psychology and experimental psychology frequently finds that introspectively assessed characteristics show low correspondence with parallel characteristics assessed by external assessment methods (Freund & Kasten, 2012; Nisbett & Wilson, 1977; Wilson & Dunn, 2004). Although we use the terms *introspective* and *external* to classify our assessment methods, popular terms used for analogous method distinctions are *explicit, self-reported, self-attributed, conscious,* and *declarative,* as compared to *implicit, performance-based, behavioral, nonconscious, automatic,* and *nondeclarative* (Bargh & Chartrand, 1999; Bornstein, 2011; McClelland, Koestner, & Weinberger, 1989; Meyer & Kurtz, 2006; Schultheiss, 2007; Wilson & Dunn, 2004). Given the lack of correspondence between introspective self-report and other methods of assessment, psychology's growing reliance on quickly completed self-ratings as its primary source of knowledge is clearly limiting (Baumeister, Vohs, & Funder, 2007; Bornstein, 2003, 2011).

Incremental Validity and Assessment Method

Tests of incremental validity are one way of assessing the clinical utility of using more than one assessment method. Practically, if a well-validated test for a particular clinical condition

takes little time and money to administer, score, and interpret, it is important to know why a clinician should use an additional test to assess for that condition. In this regard, because the Rorschach is more time consuming than popular self-report instruments (Camara et al., 2000), the argument has been made that self-report tests like the MMPI-2 are the test of choice unless the Rorschach can provide incremental validity (Lilienfeld et al., 2000; Meyer & Viglione, 2008).

Low correlations between the MMPI and Rorschach have either been interpreted as proof of the Rorschach's invalidity (although not as proof of the MMPI's invalidity; Hunsley & Bailey, 1999; Lilienfeld et al., 2000) or as what should be expected given the tests' dissimilar methods (Meyer, 1996b, 1997). Nonetheless, to the extent that each test contains valid measures, they should logically show incremental validity when jointly predicting a relevant criterion variable. As one part of this logical formula, global meta-analyses have supported the construct validity of the MMPI with medium effects (Atkinson, 1986; Hiller et al., 1999; Meyer & Archer, 2001; Parker et al., 1988). Although we could not perform formal tests of incremental validity, we tested the other two parts of this logical equation using the data in our study. When limiting our introspective measures to MMPI scales, their overall association to construct-relevant Rorschach variables was minimal (r = .07, k = 212). Given that the average validity coefficient across all Rorschach variables relative to externally assessed criteria was almost 4 times larger (r = .27, k = 770), valid Rorschach scores should provide incremental validity over the MMPI when predicting relevant, nonintrospective criteria.

One would generally expect that Rorschach variables with the strongest validity support would be the best candidates for providing incremental validity, and the evidence supports this rationale. Studies have shown that when predicting psychotic disorders, relevant Rorschach variables show incremental validity over relevant MMPI scales (Dao, Prevatt, & Horne, 2008; Meyer, 2000b; Ritsher, 2004). Studies also support the incremental validity of other CS Rorschach variables over introspective methods, including the *Suicide Constellation, Morbid,* and *Inanimate Movement* (Blasczyk-Schiep et al., 2011; Fowler, Piers, Hilsenroth, Holdwick, & Padawer, 2001; Hartmann & Grønnerød, 2009; Hartmann, Sunde, Kristensen, & Martinussen, 2003). In addition, meta-analytic data have documented the incremental validity of the Rorschach Prognostic Rating Scale, which is a non-CS measure developed to assess functional capacity, to predict subsequent outcome over IQ and the MMPI Ego Strength scale (Meyer, 2000a). Viglione and Hilsenroth (2001) and Meyer and Viglione (2008) provided reviews of additional incremental validity findings.

Study Critique and Potential Limitations

Protection against bias. To determine which study findings qualified as validity coefficients, we first identified associations that study authors had hypothesized and, from this pool, reliably selected findings that were clearly relevant to construct validity. We also identified all instances when an author had studied one of these relationships but had not presented it as a hypothesis. The mean effect sizes in these two sets of data (r = .26 vs. .29, respectively) argued against hindsight bias as artificially inflating the initially hypothesized findings. Regarding the extent to which our selection of validity coefficients was based on confirmation bias (or cherry-picking), if we were operating under extreme bias and chose the largest 770 effect sizes from our database, we would have to eliminate the top 299 effect sizes from consideration to arrive at our average effect size of .27.

To prevent inflated results from individual studies, we (a) excluded studies that selectively reported significant findings or that aligned method variance across predictor and criterion, (b) recomputed adult normative comparisons using a contemporary reference sample (Meyer et al., 2007), (c) omitted CS normative comparisons for children, (d) adjusted the study's findings for *Number of Responses* when it was significantly associated with the criterion variable, and (e) omitted studies in the diagnostic moderator analyses when Rorschach data were clearly available to the diagnosticians (Lijmer et al., 1999; Wood et al., 2000).[27]

Finally, across Rorschach variables, the funnel plots, tau, and Egger's regression test indicated the meta-analytic effects were not inflated due to spuriously large effect sizes that can emerge from small samples. Our strength of the evidence classifications relied on the FSN to ensure that the observed findings would be robust against the potential for researchers to not publish null findings. Taken alone, any of these procedures provides incomplete protection against bias. However, their individual limitations offset each other enough that, in combination, they support the overall trustworthiness of the findings.

Excluded Rorschach results. We excluded a large number of Rorschach studies because they were (a) not published in a peer-reviewed journal, (b) written in a non-English language, (c) published before 1974, or (d) conducted using a Rorschach system other than the CS. Limiting our findings to those published in peer-reviewed journals helped ensure study quality, and our analyses did not reveal publication bias. It is not clear in what direction, if any, limiting findings to studies written in the English language would bias our results. Evidence from medical trials suggests that excluding publications from meta-analyses when they are written in a language other than English makes little practical difference and, if anything, results in more conservative estimates from better quality studies (Jüni, Holenstein, Sterne, Bartlett, & Egger, 2002). Although the language of the articles in the included studies was limited to English, about a quarter (27%) of the studies were conducted outside the United States.[28] We discussed the implications of excluding studies published before 1974 when we reviewed the strength of the validity evidence for Rorschach variables. With respect to Rorschach variables from other systems that were excluded from consideration, most are rarely used in contemporary research and practice (Meyer et al., in

[27] The fact that the overall effect size for these omitted studies was significantly *smaller* than for the other diagnostic studies in the moderator analyses is counterintuitive. It is possible that such studies are generally less methodologically sound, given that both predictor and criterion are procured from archival clinical records in which data collection is not under the researcher's control. This limitation would not in itself create bias, but it could introduce random error that compromises the study's internal validity.

[28] Countries in which studies were conducted were Australia, Brazil, Canada, Finland, France, India, Israel, Italy, Japan, Korea, the Netherlands, Norway, the Philippines, Poland, Portugal, Russia, Spain, Sweden, the United States, and Venezuela.

press). Of those that are used in practice, three have meta-analyses that support their validity: the Rorschach Oral Dependency scale as a measure of interpersonal dependency (Bornstein, 1999), the EII as an index of psychiatric severity (Diener et al., 2011), and the Mutuality of Autonomy Scale as a measure of implicit representations of self and other (Graceffo, Mihura, & Meyer, 2012).

Rorschach constructs and their validity criteria. We use the term *validity criterion* to refer to the variables with which we expect Rorschach variables to covary, but, as we have discussed, not all criterion measures assess constructs that are isomorphic with the target construct. There are existing criterion measures that adequately encompass the relevant constructs for the *Perceptual-Thinking Index* and *Depression Index,* such as the psychotic and depressive disorders. For these variables, we are most assured that the criterion measures are a good test of their construct validity. For other variables, isomorphic criteria do not exist, so relevant nonisomorphic criteria were chosen to match the target construct sufficiently to be considered in the conceptual bull's-eye. As previously noted, this is a more stringent standard than used in previous Rorschach, MMPI, and WAIS IQ validity meta-analyses (Hiller et al., 1999; McGrath & Ingersoll, 1999b; Meyer & Archer, 2001; Parker et al., 1988), though we were able to reliably classify all findings for close fit to the constructs listed in Table 1.

One consequence of adopting this construct matching standard rather than a more liberal one (e.g., defining a relevant finding as one that is likely to be statistically significant) is that the pool of relevant effect sizes is smaller. For example, using this matching standard to more closely target each Rorschach variable's construct resulted in the exclusion of about three quarters of the eligible CS predictor–criterion associations reported in Hiller et al.'s (1999) meta-analysis. For a number of Rorschach variables that assess somewhat unique, complicated, vague, or ill-defined constructs,[29] no scales on other psychological tests or readily measured criterion variables provide good construct correspondence. As a result, there was no published validity literature that we judged as fitting their core construct.

Although we used stricter inclusion standards than previous psychological test validity meta-analyses, there were still varying degrees to which the validity criteria encompass each Rorschach variable's construct. This situation is not specific to the Rorschach. To date, most construct validity studies have relied on traditional methods of test validation that are roughly based on the idea of Cronbach and Meehl's (1955) *nomological network* as described in their classic article on construct validity. Thus, the validity of a target variable is not determined by a single correct criterion that isomorphically matches the target variable's construct in scope, intensity, and all other relevant parameters, but by the network of meaningful associations between observable data and theoretical constructs that has accrued over time across many samples and different lines of investigation.

Our study set out to only examine heteromethod criteria that theoretically should provide good evidence for convergent validity, though as part of this we also documented relevant discriminant validity by showing that Rorschach variables generally have small associations with introspective self-reported characteristics of purportedly similar constructs. Nonetheless, we did not attempt to document specific patterns of meaningful convergent and discriminant correlations. Doing so would require specifying a network of somewhat distinct or tangential constructs that should show smaller levels of association with the target variable. Thus, to truly assess a nomological network, one would need to evaluate the fit of observed data to an expected pattern of high, medium, low, and near-zero validity coefficients. Although statistical procedures have been developed to aid in this (Westen & Rosenthal, 2003), we think Cronbach and Meehl (1955) were correct when they said, "The integration of diverse data into a proper interpretation cannot be an entirely quantitative process" (p. 300).

With respect to convergent criteria, one potential limitation of our analyses is reliance on the same validity criterion to document validity for more than one Rorschach variable (e.g., IQ and borderline PD served as one of the criteria for several target variables). One consequence of this is that the resulting nomological network is not unique to each variable. A substantial amount of Rorschach research has been conducted in clinical settings. So the overlapping criterion variables also speak to the relative bluntness of many of the validation criteria that are available in clinical practice (e.g., diagnoses, clinical groups with particular histories). The Rorschach literature would benefit from an infusion of experimental research using creatively crafted criterion variables that more narrowly and directly encompass the target variable's construct. Some examples drawn from this review include using EEG-based mirror neuron activity for validating the empathy component of the *Human Movement* score (Mental Abilities, Including Planning, Imagination, and Empathy; Giromini, Porcelli, Viglione, Parolin, & Pineda, 2010) or ingestion of placebo versus amphetamine under double-blind conditions to evaluate the validity of Mental Distraction or Agitation of the *Inanimate Movement* variable (Perry et al., 1995).

When considering validation through the nomological network, it is important to recognize that even for test variables with a fairly good one-to-one match to a criterion construct, the effect sizes will vary depending on other aspects of the study's method and design. For example, when examining the ability of a test scale to detect psychosis, some studies compared their psychotic sample to a clinical sample of patients rather than to a nonpatient sample. Although doing so speaks to the construct validity of the variable, it is nevertheless a weaker criterion because some degree of psychotic symptomatology will be shared across the two patient groups (Markon et al., 2011). To assess the impact of this phenomenon, we conducted moderator analyses comparing target diagnostic samples to both patient and nonpatient control samples, documenting that, as expected, the nonpatient comparisons produced the largest validity effect sizes and the clearest evidence for construct validity.

[29] As an example of a Rorschach variable with a core construct that is virtually impossible to target with relevant behavioral criteria, the *Adjusted Difference Score* purportedly assesses one's Level of Coping Abilities Regardless of Current Stressors. However, it is impossible to know how one would be coping *without* one's current-day stressors. An example of a Rorschach variable with a complicated core construct is the *Egocentricity Index,* which is interpreted as measure of Egocentricity, Either Narcissistic or Distress-Related. However, when the index score falls below a certain cutpoint, the person is said to have a Negative Self-Image that is not egocentric. Therefore, the scale is not a single construct along one continuum.

What Is the Rorschach Method?

Although, historically, the Rorschach has been classified as a projective test, contemporary psychologists do not equate the test method with projection (Bornstein, 2007; Exner, 1989; McGrath, 2008; Meyer & Kurtz, 2006). Our study was not designed to clarify how to understand the Rorschach as a specific method of assessment. However, given the results of our moderator analyses, we can be fairly certain that it is more similar to other methods that involve an external assessment of a person than it is to methods based on introspection.

Current views on the nature of the Rorschach method are consistent with more contemporary views on construct validity that focus on the parallel between the behaviors, characteristics, and processes involved in generating the coded response and the construct of interest (Bornstein, 2011, 2012; Borsboom, Mellenbergh, & van Heerden, 2004; Embretson, 1983). As Borsboom et al. (2004) stated,

> The concept of validity may never have been necessary because the instruments were generally set up on the basis of an idea of how they would work. In that case, the question of what it is, precisely, that is measured can simply be resolved by pointing to the processes that lead to the measurement outcomes. (p. 1067)

As applied to the Rorschach, contemporary psychologists have postulated that the nature of the most valid variables should be those for which the coded behaviors (mental or otherwise) in the response process most closely parallel the extratest behaviors they are inferred to assess (McGrath, 2008; Meyer & Archer, 2001; Meyer & Viglione, 2008). Although we did not directly test this hypothesis, the fact that *Critical Special Scores* and *Form Quality* had the strongest validity support in our meta-analyses is consistent with it. For example, as a measure of Thought Disturbance, *Critical Special Scores* are derived from coding the respondent's verbalizations for thinking disturbance as indicated by language and logic and by illogical or bizarre connections between response objects (see Table 1). Thus, what is coded in the microcosm of the task can be readily generalized to parallel everyday behaviors outside of the testing context. However, in some instances, support for this hypothesis is not as clearly evident. *Sum of Shading* garnered strong validity support in its meta-analysis, but the parallel between its response process—where codes are assigned for focusing on the darkness and lightness of the ink—and its construct Distressing or Irritating Internal Stimuli is not as obvious. Nonetheless, these findings are consistent with research that links perceptions of darkness to negative affect (Meier & Robinson, 2005; Meier, Robinson, Crawford, & Ahlvers, 2007).

Implications for Future Research

In broad brushstrokes, key foci for future Rorschach research are continuing to refine an understanding of the test's most valid constructs, elucidate the specific nature of the test's methods, and determine the best uses of the test. Our meta-analyses have provided some vital results that researchers can use to further hone answers to these issues and address others.

For example, given that a notable strength of the Rorschach is its ability to detect psychosis, primary and secondary prevention research might refine its ability to detect high-risk psychosis cases. Recent research has provided some support for using *Perceptual-Thinking Index* scores to detect high-risk psychosis groups (Ilonen, Heinimaa, Korkeila, Svirskis, & Salokangas, 2010; Kimhy et al., 2007). The *DSM-5* Psychotic Disorders Work Group initially proposed an attenuated psychosis syndrome to identify young people at high risk for developing a psychotic disorder (Carpenter, 2009; Woods et al., 2009). Although this proposal for applied practice was controversial and subsequently dropped, the need remains for research to evaluate the relative value of identifying high-risk individuals. The efficiency and cost-effectiveness of using the Rorschach for such purposes might be enhanced by using an abbreviated form of the test (e.g., using fewer cards, coding only perceptual and thinking disturbance variables), which preliminary research supports as viable (Eblin, Meyer, Mihura, & Viglione, 2012).

Given the near independence of most Rorschach scores and introspective self-reports, a fruitful line of research would continue to explore incremental validity relative to externally assessed criteria. This type of study can help to determine the optimal way to combine scores for nomothetic prediction. In general, the research literature would benefit from more studies with validity criteria that directly target the desired constructs and, as discussed in previous Rorschach meta-analyses (Hiller et al., 1999; Meyer & Archer, 2001), it would be optimal if this research was programmatic and cumulative. As much as possible, researchers should clearly explicate the processes and concepts within their nomological network that link observable data to each other, theoretical constructs to the observable data, and theoretical constructs to each other. Although there is already guidance for this kind of research in the Rorschach literature (see Widiger & Schilling, 1980, or Meyer, 1996a), what is needed now more clearly than before is for this research to be designed with an appreciation of how the method of assessment uniquely shapes the nature of the predictor and criterion constructs (Kagan, 1988). Thus, appropriate criteria in the nomological network for Rorschach variables need to be specified to parallel the performance-based coding of inkblot-delimited attributions and behaviors, including those related to perceptual fit and conventionality (e.g., *Distorted Form*), implicit mental representations (e.g., *Good Human Representations*), thematic imagery (e.g., *Morbid*), attentiveness to features of the perceptual environment (e.g., *Diffuse Shading*), cognitive-perceptual organization (e.g., *Synthesized Response*), and the coherence and clarity of communication (e.g., *Critical Special Scores*). The coding of these response behaviors produces valid constructs but also constructs that are uniquely shaped (and limited) by the task and show little association with seemingly similar constructs assessed by introspective self-report.

For practical information that can be used in clinical practice, research designs should aim to clarify the distinguishing personality characteristics and situational factors that produce particular patterns of agreement and disagreement across methods (Bing, LeBreton, Davison, Migetz, & James, 2007; Bornstein, 2011; Meyer, 1996b, 1997; see, e.g., Berant, Newborn, & Orgler, 2008), as well as what experimental procedures can cause scores on one method but not the other to change (Bornstein, 2012; Borsboom et al., 2004; see, e.g., Hsiao et al., 2012). Conducting research of this nature will go a long way toward developing more sophisticated empirical guidelines for multimethod assessment in applied practice.

Finally, we strongly encourage researchers to conduct construct validity meta-analyses for the individual scales of other popular multiscale instruments. As discussed, no other multiscale instrument, regardless of the test method (e.g., self-, parent-, or clinician-rated inventory; personality performance test; cognitive performance test) has published validity meta-analyses for each of its clinical scales. Many multiscale tests have no meta-analytic support for any of their clinical scales. We should acknowledge, however, that conducting validity meta-analyses for the individual scales of instruments containing 50 or more scales, each assessing a different construct, is a highly complicated and time-consuming task. Hopefully, our meta-analyses of a multiscale assessment instrument can provide some methodological guidelines for others considering this endeavor, including the importance of distinguishing validity relative to introspective self-reports versus externally assessed criteria.

Implications for Practice

Clinicians who use the Rorschach should be familiar with our results and apply them to their clinical practice. In doing so, they should bear in mind that our meta-analyses address each Rorschach variable's validity only insofar as it is defined by its construct label and supported by the related validity criteria. We did not test each aspect of the CS test manual's (Exner, 2003) interpretations related to the causes, consequences, and associated features of each variable (e.g., the conventionalism shown in Popular responses is also said to be associated with perfectionism [Exner, 2003, p. 380], and we did not attempt to assess the latter) or those related to the interplay between the variables (e.g., "If there are no *formless M* responses in the record, [then] one *M*− may represent some peculiarities in thinking that are created by a preoccupation that interferes with mediation or the clarity of thinking" [Exner, 2003, p. 421]). Instead, we focused on the core concept of each Rorschach variable. As a handy guideline for use in practice, clinicians can refer to the information in Table 3 that indicates the strength of the validity evidence for the core interpretation of each of the major CS variables. For instance, the table indicates that the evidence does not support inferences about oppositionality in the context of elevated scores on the *White Space* variable or the idea that one can glean information about the Propensity to Process or Account for Information from the *Processing Efficiency* variable.

A major goal of our study was to evaluate a performance-based assessment method that could complement the introspective methods commonly used in clinical practice. Our findings support the Rorschach's general ability to do so, as the data suggest its valid scores should provide incremental validity over self-report methods. In addition, clinicians should not expect information obtained through the Rorschach to directly correspond to introspectively assessed information; it is more likely to correspond to information obtained by other externally assessed methods (e.g., observer ratings, cognitive performance tests). Discrepancies *within* a method of assessment should be more cause for concern or further investigation than discrepancies across methods, as the latter can lead to an enhanced understanding of the patient (Bornstein, 2009; Meyer et al., 2001). Agreements within each method should not be interpreted as evidence of convergent validity but, rather, as evidence of reliability (i.e., consistency of information in an alternate-forms monomethod context). Moreover, if a clinician's confidence in his or her judgments is based solely on the congruence of information within the same method or very similar methods (e.g., self-report via questionnaires and interviews, or two separate Rorschach responses), he or she risks confidently basing decisions on the shared error of method-specific variance (Campbell & Fiske, 1959; Podsakoff, MacKenzie, Jeong-Yeon, & Podsakoff, 2003). Cross-method research suggests that clinicians can benefit from using more than one assessment method with their patients (Achenbach, Krukowski, Dumenci, & Ivanova, 2005; Kraemer et al., 2003; Meyer et al., 2001), but the clinician must be cognizant of the different methods and know how to best use this information to understand what the pattern of cross-method findings says about the idiographic qualities of the person being assessed.

Conclusions

This review provides a roadmap to ways in which personal qualities can be validly assessed via responses given to Rorschach inkblot stimuli. From this, we provided specific suggestions for advancing Rorschach-based assessment in research and practice and for advancing the incremental gains that come from multimethod assessment more generally. We hope our findings provide evidence-based guidance for clinical work and stimulate new research to answer lingering questions about how best to understand people based on how they perform, as a complement to what they say based on introspection.

Clinicians face formidable challenges in staying abreast of the continuously evolving empirical literature on a vast array of disorders, psychological tests, and therapeutic interventions. The Rorschach provides a good example of some of the consequences of this difficulty. Due to the challenge of making sense of its complex, scattered, and disparate literature, particularly within the context of highly publicized critiques, many psychologists have simply concluded that it is invalid. But this is not accurate. Therefore, similar to Smith and Glass's (1977) classic meta-analysis of psychotherapy effectiveness, we have imposed some order on the Rorschach literature to gain a more accurate picture of it. Even further like Smith and Glass's situation, we do not expect ours to be the final word on the topic. Indeed, we hope that it is not. As Karl Popper (1934/1959) stated, "The wrong view of science betrays itself in the craving to be right; for it is not his *possession* of knowledge, of irrefutable truth, that makes the man of science, but his persistent and recklessly critical *quest* for truth" (p. 281).

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Appendix

Validity Criteria per Rorschach Variable in the Meta-Analyses

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
	Controls and Situational Stress
Number of Responses: The Ability or Tendency to Respond With Many Ideas	
1	[−]Alzheimer's patients vs. age- and education-matched controls[158]
2	[−]Closed head injury vs. nonclinical[60,63]
2	Creativity (Alternate Uses Test, Torrance Test–Figural and Verbal Flexibility and Fluidity)[66,135]
1	[−]Failure to complete a full psychological assessment[68]
8	IQ (mostly Wechsler tests)[32,81,94,116,152,198,202,204]
1	Positive vs. negative/withdrawn psychotic symptoms[52]
Lambda: Avoidance vs. Attentiveness to Complexity, Subtlety, or Nuance	
1	Alzheimer's patients vs. age- and education-matched controls[158]
1	Closed head injury vs. nonclinical[63]
2	[−]Education level[54,122]
7	[−]IQ (mostly Wechsler tests)[20,94,110,116,152,202,204]
1	[−]Psychodynamic therapy abilities and ego strength, clinician ratings; applicants selected for psychodynamic therapy[150]
Human Movement: Mental Abilities, Including Planning, Imagination, and Empathy	
1	[−]ADHD symptoms within a clinical sample[137]
1	[−]Alzheimer's patients vs. age- and education-matched controls[158]
1	[−]Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	[−]Closed head injury vs. nonclinical[63]
2	Creativity (Alternate Uses Test, Torrance Test)[66,135]
3	Age-based developmental progression in children (5 years to adult [2], 3 to 12 years [cross-sectional])[120,141,203]
2	Education[54,140]
4	IQ (mostly Wechsler tests)[32,81,94,204]
2	Mirror neuron activity (by electroencephalograph)[87,164]
Weighted Sum of Color: Emotions Influence Thoughts and Experiences	
1	[−]Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	Bipolar, with mania and psychosis vs. nonclinical[145]
3	Borderline personality patients vs. other patients (nonborderline, schizotypal PD, or mixed PD)[62,179,210]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
Experience Actual: Cognitive and Emotional Resources	
1	[−]ADHD symptoms within a clinical sample[137]
1	[−]Closed head injury vs. nonclinical[63]
2	Education[54,140]
3	IQ (mostly Wechsler tests)[32,110,202]
2	Psychodynamic therapy abilities and ego strength, clinician ratings; applicants selected for psychodynamic therapy[149,150]
2	[−]Psychotic patients vs. nonclinical[110,115]
1	Psychologically resilient vs. nonresilient burn patients, hospital staff ratings[106]
2	[−]Violent offenders vs. nonoffenders[73,202]
Experienced Stimulation: Distracting, Distressing, or Irritating Internal Experiences	
1	Biopsychological distress (worsening of distress ratings and IBD symptoms)[165]
1	Chronic-pain inpatients vs. nonclinical[205]
3	PTSD and acute stress (veterans) vs. nonclinical (2) or veteran controls[97,180,191]
1	Sexually abused (genital contact) vs. medical patients (not in physical distress)[124]
Sum of Shading: Distressing or Irritating Internal Stimuli	
2	Borderline personality patients vs. other patients (nonborderline; schizotypal PD)[62,210]
1	Chronic-pain inpatients vs. nonclinical[205]
1	Depression-related disorder vs. nonclinical[82]
1	Sexually abused (genital contact) vs. medical patients (not in physical distress)[124]
Diffuse Shading: Distress or Helplessness, Often as a Reaction to a Moderate to Severe Stressor	
1	Amphetamine vs. placebo[159]
1	Biopsychological distress (worsening of distress ratings and IBD symptoms)[165]
1	Childhood sexual abuse, early (age 3 to 8 years) vs. later (age 9 to 16 years)[209]
1	Chronic-pain inpatients vs. nonclinical[205]
2	Depressed vs. controls (mostly nonclinical)[100,134]
1	Dysthymia vs. conduct disorder patients[200]
1	Maltreatment severity (80% neglected)[155]
1	Psychologically nonresilient vs. resilient burn patients, hospital staff ratings[106]
1	Psychological effects of parental cancer vs. more stable illnesses (diabetes or respiratory)[69]
3	[−]Psychopathic vs. PD patients (narcissistic, borderline) or nonclinical (2)[61,73,78]
3	[−]Psychopathy, degree within offender samples[78,130,182]
1	Self-mutilating vs. non-self-mutilating inpatients[119]
1	Suicide attempters, depressed, inpatients vs. nonclinical[61]
5	Trauma: combat-related PTSD (5) or acute stress (1) vs. nonclinical[75,88,97,169,181,191]
1	Trauma: PTSD vs. ODD[103]
1	Trauma: rape victims vs. nonclinical[169]
1	Uncontrollable vs. controllable stress (laboratory-induced)[136]
Texture—see *Self-Perception* section	
Vista—see *Self-Perception* section	
Achromatic Color—see *Affective Features* section	
Inanimate Movement: Mental Distraction or Agitation, Often as a Reaction to a Moderate to Severe Stressor	
1	Amphetamine vs. placebo[159]
1	Biopsychological distress (worsening of distress ratings and IBD symptoms)[165]
1	Chronic-pain inpatients vs. nonclinical[205]
1	Dissociative disorder inpatients vs. nonclinical[27]
1	Psychological effects of parental cancer vs. more stable illnesses (diabetes or respiratory)[69]
6	PTSD (5) or acute stress (1), veterans vs. nonclinical (5) or combat controls[75,88,97,181,191,194]
1	PTSD vs. ODD[103]
1	Rape victims vs. nonclinical[169]
1	Self-mutilating vs. non-self-mutilating inpatients[119]
1	Stressed (laboratory-induced) vs. nonstressed controls[136]
Animal Movement: Pressing Primary Needs	
1	Eating rate, obese patients: initial and accelerated[59]
3	Sex offender vs. psychopath or nonsexual offender[39,79]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
Nonhuman Movement: Need-Driven Mental Distractions (no data)	
Difference Score: Current Level of Coping Abilities	
1	[−]Acute stress vs. controls (all veterans)[180]
1	[−]Biopsychological distress (worsening of distress ratings and IBD symptoms)[165]
1	[−]Bipolar, with mania and psychosis vs. nonclinical[145]
1	[−]Bulimic patients vs. nonclinical[201]
1	[−]Bulimic, purging vs. nonpurging vs. nonbulimic college students[184]
1	[−]Chronic-pain inpatients vs. nonclinical[205]
4	[−]Combat-related PTSD vs. nonclinical[75,88,97,191]
1	[−]Eating rate, obese patients: initial and accelerated[59]
1	Improvement in residential treatment[86]
1	[−]Mothers (outpatients) with autistic child vs. mothers (nonclinical) of children without behavior problems[55]
1	Performance, hockey players (goals and assists)[48]
1	[−]Psychological effects of parental cancer vs. more stable illnesses (diabetes or respiratory)[69]
2	[−]Sex offenders vs. nonclinical[39,95]
1	[−]Suicide attempters vs. inpatient controls[10]
1	[−]Violent offenders vs. nonoffenders[202]
Adjusted Difference Score: Level of Coping Abilities Regardless of Current Stressors	
1	[−]Biopsychological distress (worsening of distress ratings and IBD symptoms)[165]
5	[−]PTSD (4) and acute stress (veterans) vs. nonclinical[75,88,97,181,191]
Coping Style: *Extratensive vs. Introversive*: Externally Responsive and Emotional vs. Internally Directed and Ideational	
1	[−]Fantasy proneness ratings[168]
1	Manipulating objects during IQ testing (Block Design and Object Assembly)[151]
1	[−]Pain tolerance (behavioral/timed)[67]
Coping Style: *Ambitent:* Poorly Defined or Inconsistent Coping Style (no data)	
Coping Style: *Pervasive:* Pervasively Internally or Externally Oriented (no data)	
	Affective Features
White Space: Oppositionality, Either the Behavior or the Emotion (Anger)	
1	Aggression, parent ratings[193]
1	Aggression, patient chart ratings[12]
1	Alienating coparent, clinician ratings[113]
2	Conduct disorder vs. other patients[5,8]
1	Hostility scale (Thematic Apperception Test)[193]
1	Oppositionality or noncompliance earliest memory[163]
1	Psychopathic, violent offenders (high vs. medium vs. low)[130]
1	Psychopathic, violent offenders vs. nonclinical[73]
2	Violent offense within an offender sample[43,79]
Color Projection: Activating Emotions or Ideas Replace Depressive Ones (no data)	
Achromatic Color: Irritating, Negative Emotion	
2	Borderline PD vs. other PD (narcissistic, antisocial, schizotypal)[62,78]
2	Bulimic vs. nonbulimic college students[183,184]
1	Chronic-pain inpatients vs. nonclinical[205]
4	Depressed vs. controls (mostly nonclinical)[82,84,100,134]
1	Depression, clinician ratings[31]
1	Maltreatment severity[155]
1	Negative emotion assessed by fMRI (pMPFC activity)[112]
1	Psychological effects of parental cancer vs. more stable illnesses (diabetes or respiratory)[69]
1	Sexually abused (genital contact) vs. medical patients (not in physical distress)[175]
1	Suicide attempters, depressed vs. nonsuicidal, nondepressed inpatients[176]
Form-Color Ratio: Emotional Impulsivity or Reactivity	
1	Acute stress and PTSD, veterans vs. nonclinical[88,181]
1	Child-abusing parent, substantiated[113]
1	[−]CSF 5-HIAA (measure of serotonin turnover) in suicide-attempt patients[131]
1	Positive psychotic symptoms vs. nonclinical[52]
1	Purging bulimic vs. nonpurging bulimic vs. nonbulimic college students[184]
3	Suicide attempters vs. controls (mostly inpatients)[10,26,176]
3	Violent offenders vs. nonoffender[73,99,202]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
Pure Color: Extreme Emotional Impulsivity or Reactivity	
1	Child-abusing parent, substantiated[113]
1	Eating rate, obese patients: initial and accelerated[59]
3	Violent offenders vs. nonviolent offenders (1) or nonoffenders (2)[43,73,202]
Affective Ratio: Engaging in Activating Affective Situations	
3	Borderline PD vs. other PD (narcissistic, schizotypal, mixed) patients[20,62,179]
1	Bulimic vs. nonbulimic college students[184]
4	[−]Depressed patients vs. other patients (2) or nonclinical (2)[5,8,84,134]
1	Eating rate, obese patients: initial and accelerated[59]
2	Sex offenders vs. other offenders[30,79]
2	Violent offenders vs. nonviolent offenders or nonoffenders[43,202]
Complexity Ratio: Psychological Complexity	
1	[−]Alzheimer's patients vs. age- and education-matched controls[158]
1	Age-based developmental progression in children (5 years through adult, cross-section)[141]
2	Education[54,140]
3	IQ (Wechsler tests)[32,198,204]
1	[−]Major depressive disorder (severe, recurrent) patients vs. nonclinical[84]
1	Psychodynamic therapy abilities and ego strength, clinician ratings; applicants selected for psychodynamic therapy[150]
Constriction Ratio: Emotional Suppression or Constriction (no data)	
Interpersonal Perception	
Aggressive Movement: Aggression or Anger, Either Expressed or Experienced	
1	ADHD with ODD vs. ADHD without ODD patients[16]
1	Aggression, patient chart ratings[12]
2	Borderline PD vs. other PD (mixed, schizotypal) patients[62,179]
1	Children of divorced vs. nondivorced parents[188]
3	Combat-related PTSD (2) or acute stress (1) vs. nonclinical[97,181,191]
1	Conduct disorder vs. other patients[8]
1	Rape victims vs. nonclinical[169]
1	Self-mutilating vs. non-self-mutilating inpatients[119]
1	Sexually abused (physical contact) children vs. controls[74]
4	Violent offenders vs. controls (nonoffender, nonclinical [2], nonviolent offenders)[43,73,99,202]
1	Violent offense level, forensic report ratings[125]
Cooperative Movement: Tendency to Perceive Positive Interpersonal Interactions	
1	[−]Borderline personality, difficult-to-treat patients vs. other patients (selected for positive qualities or general)[149]
1	Child's relationships with parents, clinician ratings ([−]rejection of parent, enjoyment of relationships)[114]
1	Chosen as foster parents for medically complex infants (based largely on healthy relationships)[42]
1	[−]Major depressive disorder (severe, recurrent) patients vs. nonclinical[84]
1	Psychodynamic therapy abilities (based on formal ratings or selection for therapy)[150]
2	[−]Violent offender vs. nonclinical[73,99]
1	Warm-involved parent, clinician ratings; [−]child abuse, substantiated[113]
Food: Dependency Needs	
1	Attachment-seeking earliest memory[163]
2	Pedophile vs. psychopath or non-sex offender[30,79]
Isolation Index: Social Isolation, Either the Behavior or the Psychological Experience	
1	Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	Major depressive disorder (severe, recurrent) patients vs. nonclinical[84]
1	Maltreatment severity (80% neglected)[155]
1	Withdrawn/depressed, parent ratings[104]
Personal: Justification of Views Based on Personal Experience	
1	Antisocial PD outpatients vs. nonclinical[102]
1	Narcissistic PD outpatients vs. nonclinical[102]
1	Psychopathic, violent offenders vs. nonclinical[73]
Active to Passive Ratio: Passive vs. Active Orientation	
1	Parent role reversal with child; [−]warm-involved parent, clinician ratings[113]
1	Static pose models vs. strippers[206]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
Whole, Realistic Humans: Self and Others Viewed as Whole People	
1	[−]Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	[−]Child abuse, substantiated; parent capacity, clinician ratings ([−]alienating coparent, [−]role reversal with child, warm-involved parent)[113]
1	Chosen as foster parents for medically complex infants (based largely on healthy relationships)[42]
1	[−]Conduct disorder (severe vs. moderate vs. mild) vs. dysthymia[200]
1	[−]Psychopathic, violent offenders (high vs. medium vs. low)[130]
1	[−]Psychopathic, violent offenders vs. nonclinical[73]
5	[−]Psychotic patients vs. nonclinical[52,115,134,145]
2	[−]Sex offender vs. nonclinical[39,95]
1	[−]Sex offender vs. violent offender vs. nonoffender[107]
1	[−]Substance-abusing inpatients vs. nonclinical[195]
1	[−]Suicide attempters vs. inpatient controls[10]
1	[−]Violent murderers vs. nonclinical[43]
Interpersonal Interest: Interest in People (no data)	
Texture: Desire for Interpersonal Closeness—Emotional or Tactile	
1	[−]Antisocial PD total criteria met[24]
1	[−]Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	Attachment style (Preoccupied vs. Secure vs. Avoidant, Dismissive, or Fearful), combined self- and partner ratings[38]
3	[−]Conduct disorder vs. depressed patients[5,8,200]
1	Histrionic PD total criteria met[25]
1	[−]Inpatients isolating in their room, nurses' ratings[70]
1	[−]ODD vs. PTSD[103]
3	[−]Psychopathic vs. PDs (borderline or narcissistic) or nonclinical (3)[61,73,77,78]
1	[−]Psychopathy, degree within offender samples[78,130,182]
1	[−]Schizotypal PD vs. borderline patients[62]
4	Sex offender vs. nonoffender (2) or non-sex offender (2)[39,79,85,207]
1	Warm-involved parent, clinician ratings[113]
Good Human Representations: Healthy and Adaptive Understanding of Others	
1	Child's enjoyment of relationship with parent, clinician ratings[114]
1	[−]Cluster A or borderline PD outpatients vs. nonclinical[101]
1	Interpersonal relatedness quality (combined self- and observer ratings) (nonpatients)[33]
1	[−]Psychosis—schizophrenic to normal continuum[157]
1	[−]Psychotic inpatients vs. nonclinical[101]
1	[−]Sex offender (ephebophile) vs. nonoffender (all priests)[85]
1	Warm-involved parent, clinician ratings[113]
Poor Human Representations: Disturbed and Maladaptive Understanding of Others	
1	Borderline pathology vs. nonborderline outpatients[210]
1	Cluster A or borderline PD outpatients vs. nonclinical[101]
1	[−]Interpersonal relatedness quality (combined self- and observer ratings)[33]
1	Parent role reversal with child, clinician ratings[113]
1	Psychosis—schizophrenic to normal continuum[157]
1	Psychotic inpatients vs. clinical and nonclinical controls[101]
1	Psychotic symptoms, patient chart ratings[3]
1	Sex offender (ephebophile) vs. nonoffender priests[85]
	Self-Perception
Morbid: Morbid Thoughts, Images, or Feelings	
1	ALS patients vs. nonclinical[154]
3	Borderline PD vs. other PD (narcissistic; schizotypal; antisocial, nonpsychopathic)[62,78]
1	Chronic-pain inpatients vs. nonclinical[205]
3	Clinical (outpatients [2], inpatients) vs. nonclinical[27,41,44]
3	Depressed (mostly patients) vs. controls (mostly nonpatients)[84,100,146]
4	Depressed-related disorders vs. other disorders[6,8,37,127]
1	Depression, clinician ratings[31]
1	Dissociative identity disorder (high rates of physical or sexual abuse, suicide attempts, borderline PD) vs. nondissociating patient controls[174]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
1	Maltreatment severity[155]
1	Multiple sclerosis, progressive vs. nonclinical[128]
1	Psychological effects of parental cancer vs. more stable illnesses (diabetes or respiratory)[69]
1	Self-mutilating vs. non-self-mutilating inpatients[119]
2	Sexually abused (genital and physical contact) vs. nonclinical or medical patients (not in physical distress)[74,175]
3	Suicide attempts, near lethal (2/3), inpatients vs. other inpatients (parasuicidal or nonsuicidal) or nonpatients[26,71,176]
5	Trauma: combat-related PTSD (4) or acute stress (1) vs. nonclinical[75,88,97,181,191]
1	Trauma: PTSD vs. ODD[103]
1	Trauma: rape victims vs. nonclinical[169]
1	Trauma history by interview[187]
Anatomy and X-ray: Preoccupations With Body Vulnerability or Its Functioning	
1	Dissociative identity disorder (high sexual or physical abuse rates) vs. psychiatric controls[174]
1	Enuretic children vs. pediatric controls[129]
1	Psychological effects of parental cancer vs. more stable illnesses (diabetes or respiratory)[69]
2	Sexually abused children vs. controls[9,74]
1	Somatic complaints of burn patients, parent ratings[104]
1	Spinal cord injury (paraplegic and tetraplegic) vs. nonclinical[17]
Egocentricity Index: Egocentricity, Either Narcissistic or Distress-Related (if High) or Negative Self-Image (if Below Low Cutpoint)	
High	
1	Egocentric earliest memory[163]
2	Narcissistic PD vs. other PD patients (borderline, nonpsychopathic antisocial) or nonclinical[78,102]
1	Psychopathic offenders vs. nonclinical[73]
3	Psychopathy, degree within offender samples[78,130,182]
Below Low Cutpoint	
1	Major depressive disorder (severe, recurrent) patients vs. nonclinical[84]
1	Suicide attempters vs. inpatient controls[10]
Reflections: Narcissistic Tendencies	
1	Narcissistic vs. borderline or nonpsychopathic antisocial PDs[78]
1	Narcissistic PD total criteria[102]
7	Psychopathy, degree within offender samples (4) or vs. nonclinical (3)[45,61,73,79,80,130,182]
1	Sentence Completion Blank (scored for narcissism)[61]
5	Sex offenders vs. nonclinical (2) or non-sex offender (2)[30,39,79,207]
Vista: Emotionally Negative Self-Evaluation	
2	Bulimic vs. nonbulimic college students[183,184]
1	[−]CSF 5-HIAA (measure of serotonin turnover) in suicide-attempt patients[131]
7	Depression-related disorders vs. other disorders (4) or controls (3; mostly nonclinical)[5,6,8,37,84,100,134]
1	Pedophile, nonviolent vs. psychopathic[79]
4	[−]Psychopathy vs. other offenders (2) or nonclinical (2)[61,73,78,130]
1	Sexually abused (genital contact) vs. medical patients (not in physical distress)[175]
3	Suicide attempters vs. other inpatients (1) or nonclinical (2)[26,61,176]
Form Dimension: Introspective Capacity	
1	Psychodynamic therapy abilities, clinician ratings; applicants selected for psychodynamic therapy[149,150]
1	[−]Psychopathic vs. nonclinical[79]
2	[−]Psychopathy, degree within offender samples[45,130]
Whole, Realistic Humans—see *Interpersonal Perception* section	
	Information Processing
Synthesized Response: Ability to Synthesize Concepts	
1	[−]Alzheimer's patients vs. age- and education-matched controls[158]
1	Creativity (Torrance Test–Figural and Verbal)[66]
2	Age-based developmental progression in children (5 years through adult, cross-section)[141,203]
2	Education[54,140]
5	IQ (mostly Wechsler tests)[2,81,94,110,204]
2	[−]Psychotic patients vs. nonclinical[52,145]
Vague Response: Vague or Unsophisticated Thinking	
2	[−]Age-based developmental progression in children (5 years through adult, cross-section)[141,203]
1	[−]IQ (Wechsler tests)[2]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
Perseveration: Difficulty Shifting a Cognitive Set	
1	Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	Closed head injury, severe vs. nonclinical[60]
1	Perseverative errors, Wisconsin Card Sort Test[110]
Organizational Frequency: Ability to Sustain Cognitive Effort	
1	[−]Alzheimer's patients vs. age- and education-matched controls[158]
3	[−]Bipolar patients vs. nonclinical[132,145,153]
1	[−]Closed head injury vs. nonclinical[63]
2	Age-based developmental progression in children (5 years through adult, cross-section)[141,203]
2	Education[54,140]
5	IQ (mostly Wechsler tests)[32,81,110,116,204]
1	[−]Long-term vs. short-term heroin users[40]
Processing Efficiency: Propensity to Process or Account for Information	
1	[−]Closed head injury vs. nonclinical[63]
2	Age-based developmental progression in children (5 years through adult, cross-section)[141,203]
2	IQ (Wechsler tests)[110,116]
1	[−]Long-term vs. short-term heroin users[40]
1	[−]Perseverative errors, Wisconsin Card Sort Test[110]
1	Rey-Osterrieth Complex Design Test–Organization and Delay scores[186]
Aspiration Ratio: Match Between Achievement Goals and Ability (no data)	
Economy Index: Relative Focus on the Big Picture, Obvious Facts, or Idiosyncratic Detail (no data)	
	Cognitive Mediation
Conventional Form: Tendency to Perceive the World as Others Do	
1	[−]Alzheimer's patients vs. age- and education-matched controls[158]
1	[−]Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	[−]Autistic disorder vs. nonclinical[57]
1	[−]Autogenous (schizotypal-related) OCD vs. nonautogenous anxiety patients[123]
3	[−]Borderline personality (2) or borderline and Cluster A PD vs. controls (mostly nonclinical)[101,147,160]
2	[−]Depressed (mostly patients) vs. controls (mostly nonclinical)[100,134]
1	[−]Dissociative disorder inpatients vs. nonclinical[27]
12	[−]Psychotic disorders vs. other disorders (8) or nonclinical (7)[1,52,62,101,115,123,134,145,148,160,161]
1	[−]Psychotic disorders, schizotypal PD, or borderline PD vs. nonpsychotic patients[140]
1	Rey-Osterrieth Complex Design Test—accuracy of copying the design[186]
1	[−]Schizophrenics, not rehospitalized after 2 years vs. nonclinical[64]
Distorted Form: Distorted Perceptions	
1	Alzheimer's patients vs. age- and education-matched controls[158]
1	Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	Autistic disorder vs. nonclinical[57]
1	Autogenous (schizotypal-related) OCD vs. nonautogenous anxiety patients[123]
1	Bipolar, manic vs. major depressive disorder (all inpatients)[178]
2	Clinical vs. nonclinical[41,44]
1	Cluster A and borderline PD outpatients vs. nonclinical[101]
1	High risk for psychosis vs. non-high-risk patients[108]
1	Information processing deficits via pupillary dilation[144]
1	Psychotic disorders, schizotypal PD, and borderline PD vs. nonpsychotic patients[140]
13	Psychotic patients vs. other patients (9) or nonclinical (7)[1,28,46,52,62,99,101,108,115,123,145,148,157,195]
1	Psychotic symptoms, parent ratings[185]
1	Psychotic thinking, semistructured interview[196]
1	Sensorimotor gating disturbance via prepulse inhibition[156]
1	Substance-abusing inpatients vs. nonclinical[195]
Appropriate Form: Reasonably Appropriate Perceptions	
1	[−]Cluster A and borderline PD outpatients vs. nonclinical[101]
1	[−]High risk for psychosis vs. non-high-risk patients[108]
4	[−]Psychotic inpatients vs. other patients (3) or nonclinical[46,101,108]
1	Rey-Osterrieth Complex Design Test—accuracy of copying the design[186]
Unusual Form: Uncommon but Creative Views That Are Not Simply Misperceptions	
1	Creativity (Torrance Test–Figural and Verbal subtests)[66]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
Popular: Popular or Socially Common Perceptions	
1	[−]Alzheimer's patients vs. age- and education-matched controls[158]
1	[−]Asperger's disorder vs. behavior- and emotional-problem controls[105]
1	[−]Autogenous (schizotypal-related) OCD vs. nonautogenous anxiety patients[123]
1	[−]Closed head injury, severe vs. nonclinical[60]
3	Age-based developmental progression in children (5 years to adult [2], 3 to 12 years [cross-sectional])[120,141,203]
1	[−]Psychopathic vs. nonclinical[79]
1	[−]Psychopathic vs. nonpsychopathic violent offender[99]
1	[−]Psychopathic, violent offenders vs. nonclinical[73]
10	[−]Psychotic patients vs. other patients (4) or nonclinical (6)[52,53,62,99,115,123,134,145,161]
1	[−]Schizophrenics, not rehospitalized after 2 years vs. nonclinical[64]
1	[−]Unconventionality, earliest memory[163]
2	[−]Violent offender vs. nonclinical[43,99]
White Space Distortion: Strong Anger Leads to Distorted Perceptions (no data)	
	Ideation
Human Movement, Distorted Form: Distorted Perceptions of Others, Including Psychotic Perceptions	
2	Borderline PD (2) or Cluster A PDs vs. nonclinical[28,101]
1	Dissociative identity disorder inpatients vs. nonclinical[28]
1	High risk for psychosis vs. non-high-risk patients[108]
15	Psychotic patients vs. other patients (9) or nonclinical (9)[6,28,46,52,53,62,99,101,108,115,123,145,148,157,195]
1	Psychotic symptoms, parent ratings[185]
1	Psychotic symptoms, patient chart ratings[3]
Human Movement, Formless: Impaired Ideational Control (no data)	
Intellectualization Index: Minimizing Emotional Experiences by Intellectualizing (no data)	
Critical Special Scores: Thought Disturbance	
1	Autistic disorder vs. nonclinical[57]
1	Autogenous (schizotypal-related) OCD vs. nonautogenous anxiety patients[123]
2	Bipolar patients vs. nonpsychotic patients or nonclinical[153,178]
5	Borderline personality (4) or Cluster A and borderline PD (1) vs. nonpsychotic patients (3) or nonclinical (2)[101,147,149,179,210]
1	High risk for psychosis vs. non-high-risk patients[108]
1	Information-processing deficits via pupillary dilation[144]
1	Positive vs. negative psychotic symptoms[52]
1	Psychotic disorders, schizotypal PD, and borderline PD vs. nonpsychotic patients[140]
16	Psychotic patients vs. nonclinical (6) or other patients (10)[1,6,21,28,46,52,62,101,108,115,123,145,148,157,161]
1	Psychotic symptoms, patient chart ratings[3]
1	Psychotic thinking in children, semistructured interview[196]
1	Sensorimotor gating disturbance via prepulse inhibition[156]
Critical Special Scores, Severe: Thought Disturbance, Severe	
1	Bipolar, manic vs. major depressive disorder (inpatients)[178]
1	High risk for psychosis vs. non-high-risk patients[108]
8	Psychotic patients vs. nonclinical (6) or other patients (mix of Axis I and II disorders) (5)[46,99,101,108,115,145,146,195]
Active to Passive Ratio—see *Interpersonal Perception* section	
Morbid—see *Self-Perception* section	
	Indices
Perceptual-Thinking Index: Disturbed Thinking and Distorted Perceptions	
1	Autogenous (schizotypal-related) OCD vs. nonautogenous anxiety patients[123]
2	Bipolar patients vs. other patients or nonclinical[109,178]
1	Cluster A and borderline PD outpatients vs. nonclinical[101]
1	High risk for psychosis vs. non-high-risk patients[108]
1	Psychosis, combined clinician and patient ratings[50]
3	Psychosis, parent ratings[104,185,189]
1	Psychosis, patient chart ratings[11]
1	Psychosis, semistructured interview[196]
1	Psychotic disorders, schizotypal PD, and borderline PD vs. nonpsychotic patients[140]
11	Psychotic patients vs. other patients (10) or nonclinical (3)[1,6,47,62,101,108,109,123,148,170,189]

(*Appendix continues*)

Appendix (*continued*)

Rorschach variable/Number of samples	Validity criteria per Rorschach variable
	Depression Index: Depressive Tendencies
2	Clinical vs. nonclinical[22,44]
1	[−]CSF 5-HIAA (measure of serotonin turnover) in suicide-attempt patients[131]
1	Depression and anxiety, parent ratings[104]
2	Depression, clinician ratings[31,171]
2	Depression, parent ratings[13,190]
10	Depression-related disorders vs. other disorders (7) or nonclinical (5)[8,13,36,82,84,100,109,140,171]
1	Major depressive disorder (number of *DSM* criteria met)[23]
1	Maltreatment severity[155]
1	Sexually abused (physical contact) children vs. controls[74]
Coping Deficit Index:	Interpersonal and/or Emotional Deficits
1	Asperger's disorder vs. behavior- and emotional-problem controls[105]
2	Borderline personality, severe disturbance vs. outpatients or nonclinical[36,149]
1	[−]Chosen as foster parents for medically complex infants (based largely on healthy relationships)[42]
1	Psychologically nonresilient vs. resilient burn patients, hospital staff ratings[106]
1	Parent role reversal with child; [−]warm-involved parent, clinician ratings[113]
1	Sex offender vs. nonclinical[95]
1	Social skills deficits, parent ratings[190]
1	Suicide attempters, near lethal vs. parasuicidal and nonsuicidal (inpatients)[72]
1	Violent offenders vs. nonoffenders[43,73,202]
Suicide Constellation:	Suicide Risk
1	[−]CSF 5-HIAA (measure of serotonin turnover) in suicide-attempt patients[131]
1	Suicidality ratings of inpatient admission notes[138]
1	Suicide attempters, near lethal vs. parasuicidal and nonsuicidal inpatients[72]
1	Suicide, effected vs. controls (patients with and without history of suicide attempts; nonclinical)[65]
Hypervigilance Index:	Interpersonal Vigilance
2	Paranoid psychosis or PD vs. other patients (mainly psychosis and mood disorders)[14,138]
1	Sexually abused (physical contact) children vs. controls[74]
Obsessive Style Index:	Obsessive Information Processing (no data)

Note. Superscripted numbers indicate the meta-analysis references listed after this table. Number of samples = total number of samples for correlation results or number of target samples for group contrasts (a target sample may be compared to more than one control sample); [−] = an inverse association was hypothesized; ADHD = attention-deficit/hyperactivity disorder; ALS = amyotrophic lateral sclerosis; CSF = cerebrospinal fluid; *DSM* = *Diagnostic and Statistical Manual of Mental Disorders*; fMRI = functional magnetic resonance imaging; IBD = inflammatory bowel disease; OCD = obsessive-compulsive disorder; ODD = oppositional defiant disorder; PD = personality disorder; pMPFC = posterior medial prefrontal cortex; PTSD = posttraumatic stress disorder; 5-HIAA = 5-hydroxyindoleacetic acid.

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References are listed by number to correspond to the superscripted criterion variable in the foregoing table.

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