Psychiatry Research 268 (2018) 340–347

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Development and preliminary validation of a brief behavioral measure of psychotic propensity

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ARTICLE INFO

Keywords:
Rorschach
Rorschach Performance Assessment System
Thought and perception assessment system
Short-form development
Psychosis
Perceptual distortion
Disordered thinking

ABSTRACT

Extensive research demonstrates that the dimensional assessment of psychotic manifestations is a primary strength of the Rorschach inkblot task, which provides an in vivo sample of problem-solving behavior and normative standards concerning the logic and coherence of thought processes and the typicality of perceptual representations. This article presents foundational research for the Thought and Perception Assessment System (TPAS), a Rorschach-based system designed to assess solely for disordered thinking and perceptual aberrations using either the standard 10-card set of inkblots or alternative 3-, 4-, and 5-card short forms. Using data from three patient samples (*ns* = 61, 93, and 133) and one nonpatient sample (*n* = 118), we document the equivalence of mean scores across the full and short-form card sets. We also document satisfactory interrater reliability and validity for the full and short forms, as well as strong part-whole reliability coefficients between the short forms and the full form. Consistent with psychometric theory and the principle of aggregation, each type of coefficient decreased as a function of decreasing the number of cards. We discuss implications and future applications in research and clinical assessment.

1. Introduction

Psychosis assessment is a primary strength of the Rorschach inkblot task (e.g., Mihura et al., 2013; Wood et al., 2000). The task provides the only performance-based measure of psychotic propensity that has been extensively validated and normed. Its dimensional scores provide incremental validity over self-report, neuropsychological, and structured interview techniques (Cadenhead et al., 1996; Dao et al., 2008; Dawes, 1999; Kleiger, 2017; Meyer, 1996, 1997, 2000; Mihura et al., 2013; Moore et al., 2013; Perry and Braff, 1994; Perry et al., 1999; Su et al., 2015; Viglione et al., 2003; Zillmer and Perry, 1996). Moreover, the reliability and validity that Rorschach variables have compares favorably to other assessment instruments in psychology, psychiatry, and medicine (Meyer, 2004), and the task can be a unique resource to assist in using the DSM-5 Dimensions of Psychosis Symptom Severity scale (American Psychiatric Association, 2013). For example, Form Quality (FQ) assesses a predisposition to distorted perception, which conceptually overlaps with Hallucinations, while Cognitive Codes assess disordered thinking, which strongly overlaps with Disorganized Speech.

Meta-analyses by Mihura et al. (2013) found strong support for the Rorschach's ability to assess psychotic symptoms internationally—particularly disturbed thinking and distorted perceptions, with effect sizes (*r*) for most scores ranging from 0.35 to 0.49. The primary Rorschach composite index differentiated patients with psychotic disorders from patients with other disorders with a large effect size ($r = 0.47$, $k = 8$, $N = 1{,}047$). Subsequent studies show similar effects replicating across different countries (e.g., Benedik et al., 2013; Biagiarelli et al., 2015; Dzamonja-Ignjatovic et al., 2013; Su et al., 2015). Based on these characteristics and strengths, the Rorschach also can make important contributions the National Institute of Mental Health (NIMH) Research Domain Criteria (RDoC) initiative, which calls for "new ways of classifying mental illnesses – based on dimensions of observable behavior and neurobiological measures" (NIMH, 2015, p. 16).

When a respondent is handed the semi-ambiguous Rorschach inkblots and asked, "What might this be?," the cognitive and perceptual processes engaged are comparable to the day-to-day processes that are used to perceive and process environmental stimuli. Further, the task requires that the results of those processes be communicated to an examiner, along with a verbal rationale that links features of the inkblot to features of the object(s) that were perceived. Individuals with schizophrenia are known to exhibit abnormalities in visual perception (e.g.,

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https://doi.org/10.1016/j.psychres.2018.08.006
Received 15 December 2017; Received in revised form 24 June 2018; Accepted 1 August 2018
Available online 02 August 2018
0165-1781/

Doniger et al., 2001, 2002; Gabrovska et al., 2003; Keane et al., 2016; Kimhy et al., 2007; Minassian et al., 2004; Silverstein et al., 2006a, 2006b), communication (e.g., Andreasen and Grove, 1986; Levy et al., 2010), cognition (e.g., Bora et al., 2016; Carolus et al., 2014; Wright et al., 2016), and thinking (e.g., American Psychiatric Association, 2013; Lanin-Kettering and Harrow, 1985; Holzman et al., 1986). The demands of the Rorschach task challenge functioning in all of these domains and provide an in vivo snapshot of performance that can be coded to quantify adaptiveness versus dysfunction in order to generalize from the microcosm of the task to adaptiveness versus dysfunction in day-to-day life, including psychotic-level thinking and perception problems (e.g., Mihura et al., 2013).

The Rorschach used to be commonly included in schizophrenia research. In recent years, its use has declined, despite the unique strengths that the task brings to the dimensional quantification of distorted perception and of disorganized and illogical thought. One reason for this decline may be the absence of a normed measure that specifically targets these constructs. The Thought Disorder Index (TDI; Holzman et al., 2005; Johnston and Holzman, 1979) offers a comprehensive means to assess disordered thinking patterns in Rorschach responses and it produced pioneering research in the schizophrenia literature. However, it is criterion referenced in terms of severity levels and lacks norms. The Comprehensive System (Exner, 2003) and the Rorschach Performance Assessment System (R-PAS; Meyer et al., 2011) provide normed scores for both perceptual disturbance and disordered thinking patterns. However, both systems are multifaceted and assess for many characteristics beyond distorted perception and disorganized and illogical thought. Another reason for the declining use of the Rorschach in schizophrenia research may be the time required to administer and score responses to all 10 inkblots.

Thus, it would be optimal to have a focused and simplified system that exclusively targets psychotic-like symptomatology. To facilitate brief assessments and retesting, it also would be ideal to have structurally equivalent short form card sets available. In this study, we develop and evaluate the Thought and Perception Assessment System (TPAS), consisting of series of 3-, 4-, and 5-card sets that, along with the full 10-card set, exclusively assess for problems in thinking and perception. We do so building on features of R-PAS (Meyer et al., 2011), which is a broadband assessment measure that fixes limitations associated with earlier systems for using the Rorschach (Meyer and Eblin, 2012; Meyer et al., 2017). R-PAS variables assessing psychotic manifestations have validity at least comparable to those of its predecessor, Exner's Comprehensive System (see Meyer et al., 2011, for a comparison), with research also indicating their superiority (e.g., Dzamonja-Ignjatovic et al., 2013; Su et al., 2015).

Mirroring our own aims, the only previous effort to develop Rorschach short forms for psychosis assessment (Carpenter et al., 1993) did so using the TDI. The authors successfully created four sets of 4-card short forms, with each set showing strong part-whole correlations with the full 10 card set in two patient samples (*ns* = 61 and 62). However, the data were limited in several respects. First, the TDI assesses for disordered thinking but does not assess perceptual aberrations. Second, as noted above, the TDI lacks normative data. Third, the four short forms were not independent, as they had some overlapping cards in each set. Card color was the only basis for selecting cards for each set, and balance in the extent to which each set manifested thinking disturbance was not a factor. Fourth, the TDI uses a form of administration (clarification after each card) that is no longer taught or practiced (e.g., Mihura et al., 2017). Finally, the utility of the short-forms was established by simply correlating the short-forms scores with their corresponding full-form TDI scores. A more optimal design would have also validated the short-forms using criterion measures external to the TDI (Smith et al., 2000).

2. Methods

The present research was conducted in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

2.1. Samples

To derive and evaluate the short-forms, we used four archival adult samples that are described in the R-PAS manual (Meyer et al., 2011; see Chapters 13 and 14). The Residential Treatment sample consists of 61 patients in long-term psychiatric care (Dean et al., 2007). These patients have an average age of 37 (*SD* = 9.9) and 11 years of education. Most are unmarried (85%) and male (64%), and about half are white (54%). Psychiatric diagnoses were assigned by treating psychiatrists, and about half carry a psychotic disorder diagnosis (51%). The Mixed Clinical sample (Meyer, 2002) consists of 133 inpatients and outpatients with an average age of 30.5 (SD = 10.4) and 13.8 (SD = 3.0) years of education. Most are unmarried (80.5%) and white (58%); about half are male (49.6%). Diagnostic information for this sample was obtained from hospital billing records from before the patients were evaluated to ensure independence of predictor and criterion data. These diagnoses were assigned by treating professionals or billing staff; they establish that about half the sample carries a psychotic disorder diagnosis (46.6%). The Normative sample (Meyer et al., 2011) consists of 118 nonpatients with an average age of 40.3 (SD = 15.0) and 14.8 (SD = 2.2) years of education. Most are married (60.2%) and white (70.3%); about half are male (48.3%). These three samples were used to assess the validity of the short forms, with the Mixed Clinical and Normative samples combined into a Patient-Nonpatient sample for these analyses.

The Interrater Reliability sample consists of 93 patients derived from eight sources (Meyer et al., 2011) encompassing outpatients (41.2%), inpatients (37.6%), or a combination of both (20.4%). Two individuals independently coded all protocols, which included students in training (34.4%), pairs of experienced clinical researchers (20.4%), pairs of clinicians in general practice (7.5%), and inpatient clinicians coding in routine practice paired with researchers (37.6%).

2.2. Measures

2.2.1. Rorschach thinking and perception variables

Disorganized and illogical thinking was assessed with the Weighted Sum of Cognitive Codes (Meyer et al., 2011), which is an overall index of problems in thinking that aggregates three linguistically communicated codes (i.e., Deviant Verbalization, Deviant Response, Peculiar Logic) and three visually perceived codes (i.e., Incongruous Combination, Fabulized Combination, Contamination). Four of these codes are differentiated at two levels of severity, with Level 1 codes reflecting less severe problems in logic or communication and Level 2 codes reflecting more severe or bizarre manifestations of disturbance. All ten codes are assigned weights to reflect their relative degree of severity, with increasing severity indicating more severe disruptions in thinking. An additional disordered thinking score, Severe Cognitive Codes, sums the Level 2 Cognitive Codes along with Peculiar Logic and Contamination, which together capture all of the more severe lapses in logic and reasoning. Meyer et al. (2011) provide definitions and examples of each variable. Using externally assessed criteria (e.g., DSM diagnoses, observer ratings), meta-analytic validity coefficients for these variables ranged from r = 0.35 to 0.38 across 14 to 35 effect sizes from 1,052 to 2,478 participants (Mihura et al., 2013). In more narrowly focused analyses, these variables also clearly differentiated patients with psychotic disorder diagnoses from patients with other diagnoses (r = 0.30 to 0.41, k = 6 to 9, N = 724 to 1,019; Mihura et al., 2013).

Perceptual distortions were assessed with Form Quality variables that index the two primary components of perceptual accuracy: fit and frequency. Fit refers to how well the perceived object matches the