A FIVE-FACTOR MODEL OF PSYCHOSIS WITH THE MMPI-2-RF

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By

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ABSTRACT

A FIVE-FACTOR MODEL OF PSYCHOSIS WITH THE MMPI-2-RF

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A study by Schoenbaum (2017) found that individuals undergoing first-episode psychosis are 24 times more likely to die within a year of diagnosis than the general population. Recent research has found that dimensional models of psychopathology, as opposed to categorical models, yield better results in terms of research utility, treatment outcomes, degree of pathology, and disease etiology (Kotov et al., 2017). Seretti and Ogliati (2004) explored six competing dimensional models of psychosis and found the best fitting model to have five factors: Activation, Positive Symptoms, Disorganization, Depression, and Negative Symptoms. This model of psychosis closely resembles constructs as measured by the Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008/2011), a structured personality test, and directly mirrors the constructs as measured by the Positive and Negative Syndrome Scale (PANSS; Kay, Opler, & Fiszbein, 1987), a structured clinical interview. This study used the MMPI-2-RF to elucidate the nature of psychosis, with a focus on a known population, individuals with psychotic disorders, in order to further understand the construct of psychosis.

CHAPTER 1: A FIVE-FACTOR MODEL OF PSYCHOSIS WITH THE MMPI-2-RF

A recent study found that individuals who were diagnosed with first episode psychosis are at an increased risk for death in the 12 months following their diagnosis (Schoenbaum, 2017). More specifically, these individuals had a mortality rate 24 times greater than the general population in the 12 months since diagnosis, with the only other group in the general population reaching those numbers in a 12-month period being those aged 70 and up (Schoenbaum, 2017). Although cause of death was not known and therefore not studied, two recent meta-analyses showed that individuals with psychosis are at an increased risk for suicidal ideation, planning, and attempt (Mcginty, Sayeed Haque, & Upthegrove, 2017; Huang, Fox, Ribeiro, and Franklin, 2017) Furthermore, just 39% of these individuals had received antipsychotic medication, and only 41% received therapy of any sort. Most healthcare services accessed by these individuals were hospital and emergency care. The authors underscored their findings with the need for better assessment and treatment services for these individuals as preventative measures.

The construct of schizophrenia was developed by German psychiatrist Emil Kraepelin, and first referred to as dementia praecox, or "split-mind," to address diagnostic issues of the late 1800's. (Kraepelin, 1904). Since then, research has come to include a full spectrum of psychotic disorders. Much of the research on psychosis until the latter portion of the twentieth century reflected a quasi-dimensional approach, in which the "schizotype" represents a small subset of the population (approximately 10%) who are at-risk for a psychotic disorder with the other 90% not being at-risk. (Rado, 1953; Meehl, 1990; Lenzenweger, 1994; Beauchaine et al., 2008). A full dimensional approach, as outlined by Rawlings, Williams, Haslam, and Claridge (2008), posits that psychosis is a "natural central nervous system variation", with schizophrenia and other disorders at the extreme, representing the functional impairment end of the spectrum, and

schizotypy closer to the opposite "normal" end, characterized by bizarre or eccentric appearance or behavior, cognitive disorganization, as well as positive and negative symptoms co-occurring with or without functional impairment.

Van Os (2009) proposed completely abolishing the diagnosis of schizophrenia, recommending the term "salience dysregulation syndrome" as being more precisely descriptive of the clinical phenomena associated with this spectrum, as well as being a far less "loaded" (with connotations) term than schizophrenia. Salience dysregulation syndrome is comparable to metabolic syndrome in that a number of regulatory processes are functionally impaired and co-occur along with other continuous risk factors. Van Os goes on to state "Many people with impaired glucose regulation also have several other continuous cardiovascular risk factors – they have a tendency to occur together . . . many people with positive psychotic experiences, that have been shown to constitute a fundamental alteration in salience attribution, also display evidence of alterations in other dimensions of psychopathology such as mania, disorganization and developmental cognitive deficit." Salience dysregulation syndrome or a psychotic disorder, then, from a dimensional standpoint, appears to be similar to developmental disorders such as an intellectual disability; existing categorically in clinical settings, and on a continuum in nature.

A review and meta-analysis by Van Os, Linscott, Myin-Germeys, Delespaul, and Krabbendam (2009) found the prevalence rate of dimensional psychotic phenomena was 5–8% in the general population, about 10 times higher than the prevalence of diagnosed psychotic disorders; indeed, taking into account prevalence and incidence rates, approximately 75-90% of psychotic experiences are transitory and fade over time. It is important to note, however, that while subclinical psychotic experiences are prevalent, a much smaller proportion of individuals will be diagnosed with a clinical psychotic disorder.

Van Os (1999), using regression models, found that conceptualizing psychosis as a dimensional construct with clinical self-report and observer report was more indicative of pathology than categorical conceptualization alone. Dimensional effects were cumulative: quality of life; social disability; satisfaction with services; abnormal movements; brief neuropsychological screen; and over the last 2 years – illness course, symptom severity, employment, medication use, self-harm, time in hospital and living independently, in addition to self-report measures, predicted greater dimensionality of illness.

The need for re-evaluating how mental disorders are perceived, defined, and studied has been the top priority for decades, but has suffered from a lack of direction. Most recently, the National Institute of Mental Health implemented the Research Domain Criteria initiative (RDoC), a framework of conducting research that combines genetics, neuroimaging, physiological measures, and self-report to identify the basic structure of mental disorders. Insel et al. (2010) cite the failure of categorical diagnoses to match genetic findings, the inadequacy of the medical model to sufficiently explain underlying mechanisms of dysfunction, and the large amount of variance in treatment response within disorders as the primary reasons to undergo this radical shift in psychopathology research. Since the emergence of the RDoC, a wealth of research has been published exploring mental disorders from the ground up, with the most recent development coming from the Hierarchical Taxonomy of Psychopathology (HiToP; Kotov et al., 2017), a departure from the common method of using DSM diagnoses or symptoms as variables of study, and instead focusing on an empirical framework of classifying psychopathology, using a hierarchical set of dimensional variables ranging from relatively broad to relatively narrow in scope. All psychotic disorders, including mood disorders with psychotic features and psychotic

personality disorders, are listed under the Thought Dysfunction domain of the HiToP. This study used the HiToP as a lens through which to view a well-validated model of psychosis.

One approach in the research of psychotic symptomology is to identify psychopathological dimensions that cluster together more often than by chance, using factor analytic strategies. Individuals experiencing psychosis have historically been excluded from psychological studies, however, due to aggressiveness and severity of illness (Miller, Strickland, Davidson, & Parrott 1983). While a lack of insight is associated with psychosis (Palmer, Gilleen, & David, 2015), lack of insight does not necessarily impede an individual's ability to use self-report measures, nor participate in scientific studies (Bell et al., 2007; Lincoln et al., 2010). More specifically, Bell et al. (2007) found that individual with schizophrenia reliably reported on short rating scales in addition to long personality inventories. Lincoln et al. (2010) had similar findings, indicating that even lower-functioning individuals could reliably report their own delusions when compared to observer report.

These factor analytic strategies initially revealed a three-factor solution (Bilder et al., 1985; Liddle, 1992, 1987; Peralta et al., 1992) in Schizophrenia, finding positive, negative, and disorganized factors. The measures used in these studies did not include measures of affect, and studies that did include them, as in Lindenmayer et al., (2004), for example, found two additional factors; mania/activation and depression/depressivity. Similarly, when studying the full psychosis spectrum, five factors have been found across studies (Dikeos et al., 2006; Kitamura et al., 1995; Lindenmayer et al., 2004; McGorry et al., 1998; McIntosh et al., 2001; Murray et al., 2005; Ratakonda et al., 1998; Serretti et al., 2001; Serretti and Olgiati, 2004; Wallwork et al., 2015).

To reiterate Schoenbaum (2017), improved assessment is crucial in terms of understanding and treating psychosis. Current research suggests that a five-factor model of psychosis most effectively represents this type of dysfunction. Currently, the only instrument in clinical practice that assesses this five-factor model is the PANSS, which is potentially quite labor intensive and rarely used in clinical settings. In contrast, the MMPI instruments are the most widely used tools for the assessment of psychopathology. The present study is designed to evaluate the ability of the existing MMPI-2-RF scales to adequately assess the five-factor model. The potential in this study is to replicate past findings within an empirical and contemporary model of psychopathology, the HiToP, extend the understanding of psychosis, and possibly establish groundwork for more efficient assessment of psychosis.

CHAPTER 2: MEASURES

MINNESOTA MULTIPHASIC PERSONALITY INVENTORY

The Minnesota Multiphasic Personality Inventory (MMPI) is an omnibus measure of psychopathology first published in 1943 by Starke Hathaway and John McKinley. The MMPI was originally intended to be a tool for differential diagnosis, and consisted of 10 Clinical scales and three Validity scales (Graham, 2012). Scale items were composed from existing measures of the time and contemporary models of psychopathology. Scale creation arose from "empirical criterion keying", a method in which the items endorsed by a specific group were used to differentiate from another, non-mutually exclusive group. Due to overlapping item content and high scale intercorrelations, its original intended use had to be augmented by using "code-types," in which the highest elevations on the test were interpreted together to form a profile.

Sixty-five years after the release of the original MMPI, the MMPI-2-RF (Minnesota Multiphasic Personality Inventory-2-Restructured Form) was released (Ben-Porath & Tellegen, 2008/2011). In 2003, Tellegen et al. restructured the clinical scales (RC scales) to diminish the effects of overlapping item content between scales as well as reduce general distress variance by pooling a common factor among the original factors into one - Demoralization (Ben-Porath, 2012). The assessment model of the MMPI-2-RF is arranged hierarchically and additively, from relatively broad to relatively narrow in scope, and harmonizes with contemporary models of psychopathology. Three broad domain measures of psychopathology- Emotional Internalizing Dysfunction (EID), Thought Dysfunction (THD), and Behavioral Externalizing Dysfunction (BXD) are arranged at the top of the hierarchy, with the restructured clinical scales at the mid-level, and specific problem scales assessing narrow facets of each domain. The Personality Psychopathology-Five, a parallel to the Big Five personality traits, is included within the MMPI-

2-RF as well, and measures enduring patterns of abnormal personality characteristics (Harkness, McNulty, & Ben Porath, 1995).

The scales in the Thought Dysfunction (THD) domain of the Minnesota Multiphasic Personality Inventory-2-Restructured Form show associations with a range of both psychotic and non-psychotic symptoms and traits in inpatient, outpatient, college, and general healthcare settings with both psychotic and non-psychotic individuals. The THD domain is a construct representing a broad range of psychotic experiences, and the scales within the domain, Ideas of Persecution (RC6), Aberrant Experiences (RC8), and Psychoticism-revised (PSYC-r) have had several important empirical findings.

Ideas of Persecution has been shown to be a valid indicator of delusions, including persecutory delusions, as well as ideas of reference (Arbisi et al., 2008; Handel & Archer, 2008), general paranoia and interpersonal mistrust (Sellbom, Graham et al., 2006), as well as alienation and blame externalization (Handel & Archer, 2008). Ideas of Persecution scores have been found to be associated with interpersonal alienation and mistrust (Tellegen & Ben-Porath, 2008) as well as weight related teasing in childhood (Wygant, Boutacoff et al., 2007). Ideas of Persecution is also correlated with broader psychotic experiences, including hallucinations and non-persecutory delusions (Arbisi et al., 2008; Handel & Archer, 2008; Tellegen & Ben-Porath, 2008/2011).

Handel and Archer (2008) found RC8 to be significantly correlated with conceptual disorganization, hallucinatory behavior, and unusual thought content on the Brief Psychiatric Rating Scale. RC8 has also been found to be significantly correlated with a diagnosis of Schizophrenia (Monnot et al., 2009) as well as Schizotypal Personality Disorder (Simms et al., 2005). Dissociative experiences have also been found to be highly correlated with the RC8 scale and unsurprisingly, proneness to imaginative and altered states of the Absorption scale of

Tellegen's (1995/2003) Multidimensional Personality Questionnaire (Tellegen & Ben-Porath, 2008/2011).

High scores on the PSYC-r scale have been found to be associated with a number of things. First, admission problems related to psychotic symptomology and psychotic symptoms in mental health status examinations. In Veteran's Administration and mental health outpatient samples, high PSYC-r scores were associated with measures of magical ideation and perceptual dysregulations. In a sample of individuals undergoing substance abuse treatment, high scores were associated with greater rates of hostility and depression. Finally, in a nonclinical sample, PSYC-r scores were associated with alienations and unusual perceptions (Ben-Porath, 2011).

CHAPTER 3: HYPOTHESES

Hypothesis 1

1: It was hypothesized that exploratory factor analysis of the MMPI-2-RF item pool (338 individual items) from individuals diagnosed with schizophrenia would reveal five distinct factors, in a non-distinct order, that reflect the five factors of psychosis found in prior research. Furthermore, it was hypothesized that five factors would explain at least one-third of the variance found. Items were factor analyzed using principle axis factoring with direct obliminique rotation. Item content was examined and items belonging to existing MMPI-2-RF scales were then chosen to represent the five-factor model in hypothesis two.

Hypothesis 2:

To test out how existing MMPI-2-RF scales map onto a latent structure, confirmatory factor analyses was used in the following hypotheses.

2a. It was hypothesized that the scales of the MMPI-2-RF identified by predominant factor loadings from the exploratory factor analysis will load onto a latent structure identified in prior research (Positive, Negative, Depressive, Activation, and Cognitive Disorganization).

2b. Fit statistics will show at least adequate fit, reflecting a dimensional relationship between each factor and the signs and symptoms of schizophrenia.

CHAPTER 4: PARTICIPANTS AND PROCEDURE

An archival dataset collected from combined locations, one, a veteran's administration medical center in Minneapolis Minnesota, and the other, the Hennepin County Medical Center, was used. Participants ranged in age from 18-76 years (M= 40 years, SD = 14). The sample was 25.6% Female, 74.4% Male and predominantly caucasian (83.4% Caucasian, 11.1% African-American, 4.6% other). Each individual from the dataset completed an MMPI-2-RF, and was diagnosed without test results being considered as a part of the diagnostic process, removing the possibility of criterion contamination. Individuals with invalid test protocols were not included in the study, resulting in a sample size of 2,023. Only individuals within the Thought Dysfunction domain of the Hierarchical Taxonomy of Psychopathology (HiToP) were included for analyses: schizophrenia spectrum disorders, cluster a personality disorders, and mood disorders with psychotic features. The final *n* was 698 individuals with disorders of Thought Dysfunction.

CHAPTER 5: ANALYSES

To test hypothesis 1, exploratory factor analysis was used on all individuals with a psychotic disorder diagnosis who were retained for analysis (698), and individual MMPI-2-RF items were factor analyzed using principle axis factoring with direct obliminique rotation. Small factor coefficients, specifically those below 0.40, were suppressed. To test hypothesis 2, confirmatory factor analysis was conducted on each factor retained from exploratory factor analysis.

CHAPTER 6: RESULTS

Figure 1 shows the scree plot obtained from the exploratory factor analysis. See Appendix A for a full listing of items and factor loadings for each factor obtained from the exploratory factor analysis. Tables 2 and 3 show the fit indices produced from confirmatory factor analysis.

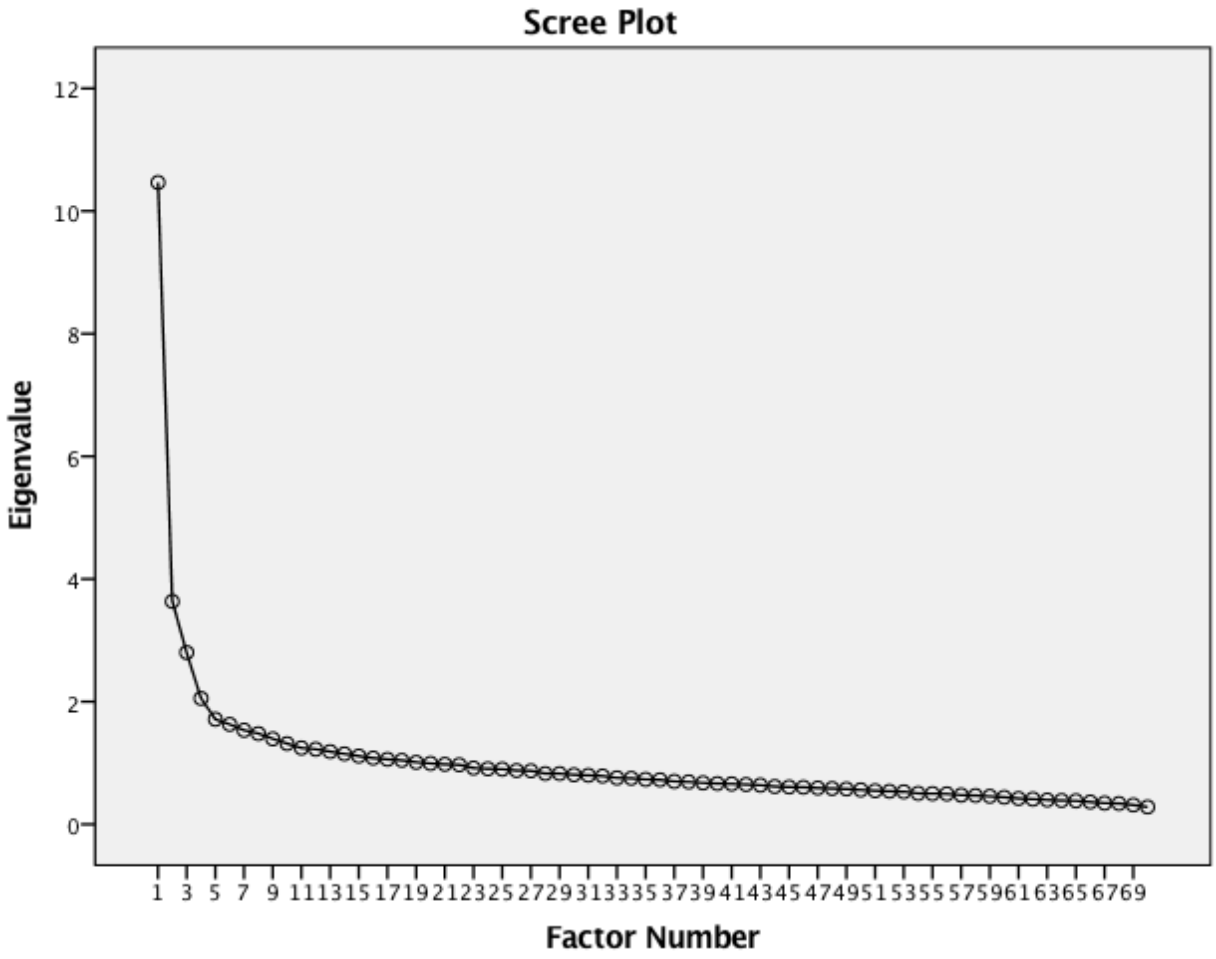

Figure 1. Scree plot. This figure illustrates the number of factors from the exploratory factor analysis.

Factor one was comprised of items from the Emotional Internalizing Dysfunction (EID) domain, Demoralization (RCd), and the scales falling under it, Helplessness/Hopelessness (HLP), Inefficacy (NFC), Self-Doubt (SFD), and Suicidality (SUI), and additionally Restructured Clinical Scale 7, Dysfunctional Negative Emotions (RC7), and Shyness (SHY). This factor is marked by unhappiness and dissatisfaction with life, having difficulty making decisions, a lack of self-confidence, current or previous suicidal ideation and/or attempts, and feelings of helplessness and hopelessness. It is also comprised of various negative emotional experiences, such as fear of criticism, embarrassment, and a sense of doom, and a discomfort with social situations. Factor one appears to mirror the depressivity factor. RCd was chosen to represent this factor in the CFA.

Factor two was comprised of items found under the EID domain, on Restructured Clinical Scale 2, Low Positive Emotions (RC2), Introversion-revised (INTR-r), Malaise (MLS), and Social Avoidance (SAV). This factor appears to reflect a lack of positive emotional experiences, such as anhedonia and vegetative symptoms of depression, and a tendency to withdraw from social situations. Furthermore, this factor is marked by extreme social introversion, emotional restriction, and difficulties forming close relationships. Factor two appears to mirror negative symptoms, specifically social anhedonia, and in some respects, such as items from RC2 and MLS, reflects physical anhedonia. RC2 was chosen to represent this factor in the CFA.

Factor three most clearly seems to mirror the factor of positive symptoms. Factor three was comprised of items falling under the Thought Dysfunction (THD) domain, specifically from Restructured Clinical Scales 6, Ideas of Persecution (RC6), and 8, Aberrant Experiences (RC8), as well as Psychoticism-revised (PSYC-r) and RC7. Factor three reflects the unusual thoughts

and perceptions and various experiences associated with thought dysfunction, or psychosis. It is further comprised of items reflecting persecutory ideation, possibly including a level of paranoid delusions. While factor one is more saturated with various negative emotional experiences than factor three, it is important to note that the items on factor three reflect a fear of negative evaluation from strangers more so than internalization. THD was chosen to represent this factor in the CFA.

Factor four was comprised of items under Restructured Clinical Scale 1 (Somatic Complaints) and its scales Cognitive Complaints (COG), Neurological Complaints (NUC), and Head Pain Complaints (HPC), and Gastrointestinal Complaints (GIC). Factor four reflects physical complaints and symptoms as well as cognitive difficulties, specifically problems with concentration, confusion, memory, and general intellectual limitations. The final piece of factor four is comprised of neurological and head pain complaints, specifically dizziness, unsteady gait, numbness, weakness, paralysis, and loss of control of movements. This factor appears to mimic the cognitive disorganization factor. RC1 was chosen to represent this factor in the CFA, with COG representing it in an alternate model.

Lastly, factor five was comprised of items from the Behavioral Externalizing Dysfunction (BXD) domain, Restructured Clinical Scales 4, Antisocial Problems (RC4), 9, Hypomanic Activation (RC9), and Disconstraint-revised (DISC-r). This factor is marked by externalizing behaviors and reflects a history of antisocial behavior and family conflicts, specifically problems with the criminal justice system, juvenile delinquency, acting-out behaviors, and substance misuse. This factor is nearly equally comprised of items reflecting hypomanic activation and disconstrained/impulsive, acting-out behaviors, with some level of interpersonal aggressiveness, over self-assertiveness, and grandiosity. Factor five then appears to resemble the activation

factor. BXD was chosen to represent this factor in the CFA, with RC4 and RC9 chosen to represent in alternate models.

Confirmatory factor analysis results showed excellent model fit, with a chi-square of 2.286 ($p = 0.319$) and all fit indices falling within an acceptable range, with the root-mean-square-error of approximation below 0.05, and goodness-of-fit indices above .90 or .95 for comparative fit index. The best fitting model was composed of the following: RCd for depressivity, RC2 for negative symptoms, THD for positive symptoms, BXD for activation, and RC1 for cognitive disorganization. The alternate model's chi-square was 7.802 ($p = 0.005$) and was composed of the following: RCd for depressivity, RC2 for negative symptoms, THD for positive symptoms, ACT for activation, and COG for cognitive disorganization. Table 3 shows the fit indices for the alternate model.

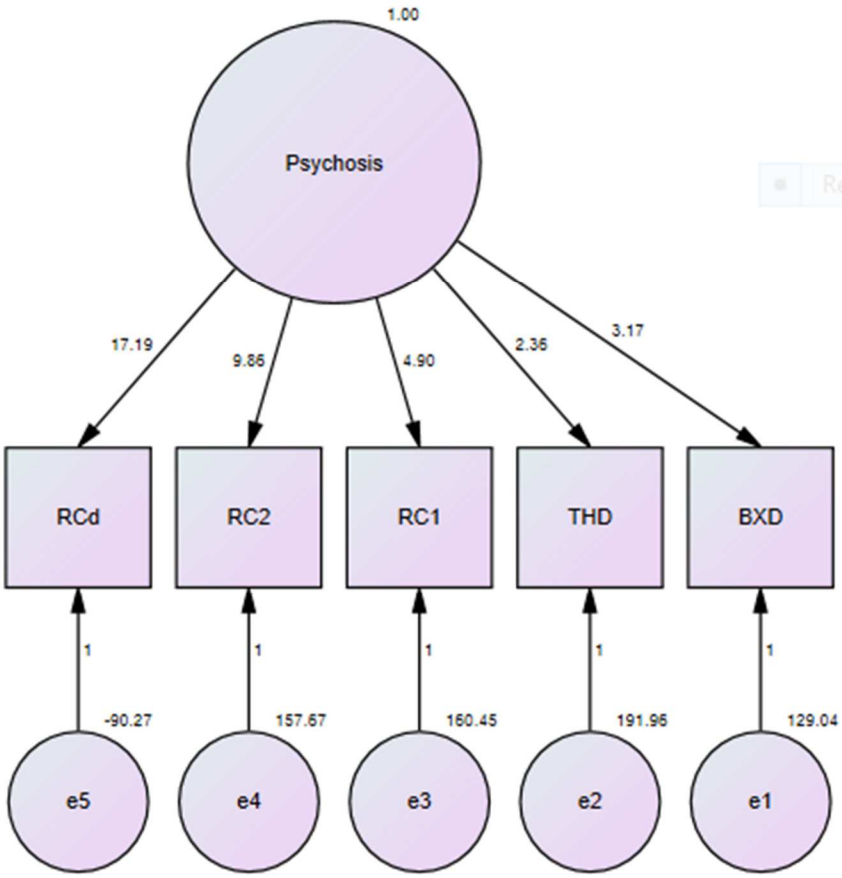

Figure 2. Confirmatory Factor Analysis output. This figure illustrates the output of the CFA best fitting model.

Table 1
Confirmatory factor analysis: goodness-of-fit indices for best fitting model

Index	Five-Factor Model (WLS)
CFI	0.99
RMSEA	0.017
GFI	0.998
AGFI	0.985
NFI	0.997

WLS = Weighted least squares; CFI = comparative fit index; RMSEA = root-mean-square-error-of-approximation; GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; NFI = normed fit index.

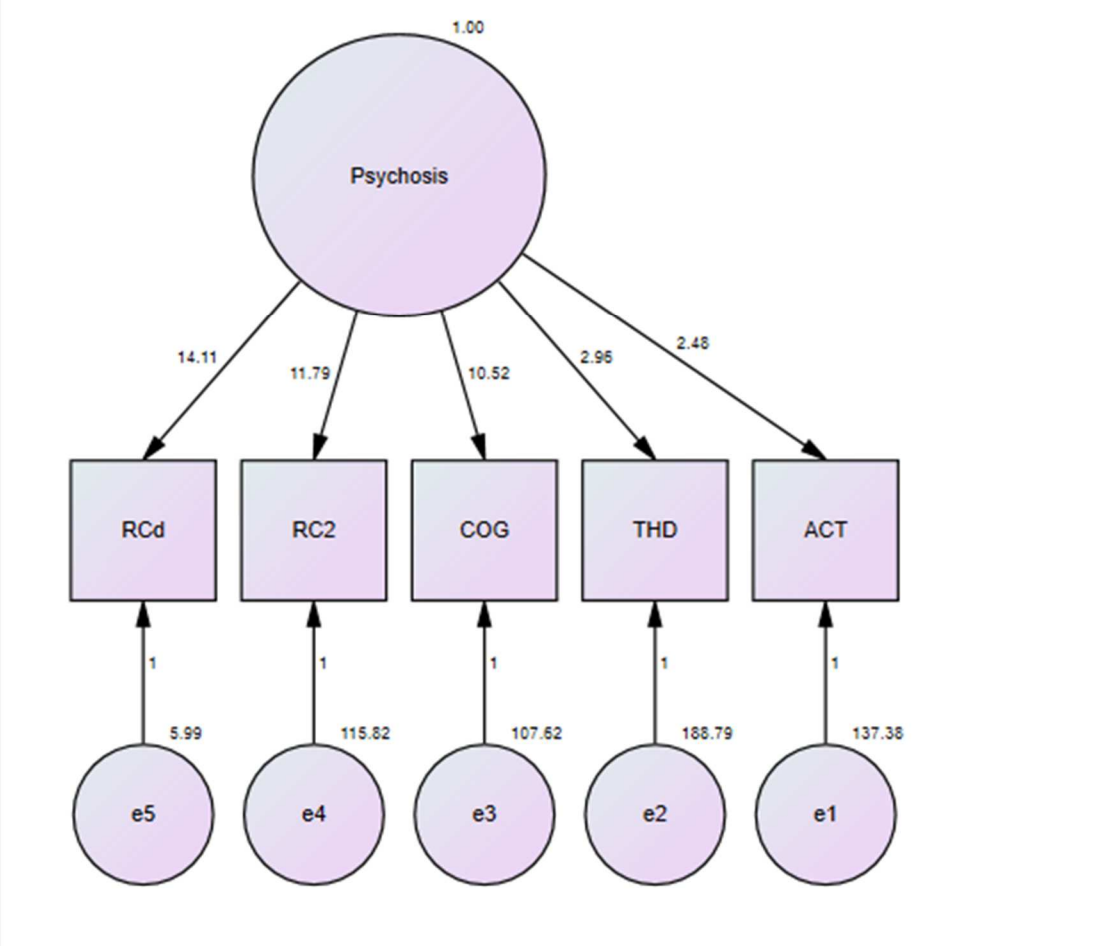

Figure 3. This figure illustrates the output of the alternate model for the CFA.

Table 2
Confirmatory factor analysis: goodness-of-fit indices for alternate model

Index	Five-Factor Model (WLS)
CFI	0.993
RMSEA	0.054
GFI	0.993
AGFI	0.900
NFI	0.992

WLS = Weighted least squares; CFI = comparative fit index; RMSEA = root-mean-square-error-of-approximation; GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; NFI = normed fit index.

CHAPTER 7: DISCUSSION

The results of the current investigation sought to replicate the five-factor model of psychosis, as identified in prior research, using the MMPI-2-RF. Results are in line with previous findings on factor models of psychosis, but not necessarily with current nosologies such as the HiToP, which posit that psychotic disorders strictly fall under the domain of thought dysfunction. Findings presented here suggest that schizophrenia is a multifactorial construct, with signs and symptoms falling under the somatic/cognitive, internalizing, externalizing, interpersonal, as well as thought dysfunction domains. One possibility, however, is that the factor structure of psychosis itself is not hierarchical, but heterarchical, with some symptoms causing others. Recent network analysis studies (Isvoranu et al., 2017; Rooijen et al., 2017) have found that this is in part what is happening. For example, when an individual is paranoid, that paranoia causes anxiety, which in turn causes activation and thus externalizing symptoms. Although no network analysis studies have taken place with the MMPI-2-RF and psychosis, one possibility of the results with this study may be that some factors are causing others to occur, rather than all factors being caused by the latent variable, psychosis.

Although the current study employed an exploratory factor analysis strategy to identify items and relevant scales necessary for the confirmatory factor analysis, this does not necessarily imply that new scales should be developed based off current results. More so, this study indicates that the pre-existing MMPI-2-RF item pool and existing scales adequately capture the symptomology of psychosis. Results from the CFA clearly indicate that RCd, RC2, THD (and its subscales, BXD (and its subscales, specifically ACT), and RC1 (specifically COG) map onto the latent structure quite well. The novel use of EFA (using only those with psychotic disorders in

the analysis) was necessary to identify relevant scales in the absence of another instrument to correlate with the MMPI-2-RF scales.

There are several implications of this study, both in terms of research and clinical settings. In terms of research settings, this study further validated the five-factor model of psychosis using one of the most widely used personality tests, the MMPI-2-RF. Furthermore, while the PANSS has been used in pharmacological treatment outcomes research for nearly three decades, the MMPI instruments to date have not. This study provides support for the MMPI-2-RF to be used as a pharmacological treatment outcome tool in psychosis, and future studies should seek to use it in such settings. For example, the MMPI-2-RF could be administered pre-medication and at follow-up, and changes in scale scores used as a measurement of response to the medication. Clinically, this study provides further support for the assessment of psychosis with the MMPI-2-RF. More specifically, when scales RCd, RC2, THD (or its subscales), RC1 (or COG), and BXD (or ACT) are elevated, clinicians should be aware that this may be an indicator of clinical psychosis. Future studies should seek to clarify whether certain symptoms are causing one another (as in a network analysis), as well as possible specific cut-score configurations predicting psychosis severity. Limitations of this study include the use of an archival dataset, and the predominantly white and male comprisal of the sample. Findings therefore may be difficult to generalize to populations less saturated by white males. Even so, this study suggests that the MMPI-2-RF can capture psychotic symptomology, and at a fraction of the time and cost used in a structured or unstructured clinical interview.

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Appendix A

Items, item's - scale membership, and factor loadings

Factor 1

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
rf274 (RCd, NFC)	0.69				
rf48 (EID, RCd, SFD)	0.64				
rf324 (NFC)	0.63				
rf232 (RCd, SFD)	0.63				-0.46
rf288 (RCd, SFD)	0.61				
rf198 (NFC)	0.61				
rf152 (NFC)	0.61				
rf204 (RCd)	0.61				-0.44
rf299 (RCd)	0.61				
rf108 (NFC)	0.6				
rf331 (EID, RCd)	0.58				-0.44
rf158 (EID, RCd)	0.57				-0.49
rf144 (RCd)	0.56				-0.41
rf89 (EID, RCd, SFD)	0.55				-0.44
rf123 (STW, NEGE-r)	0.55				
rf30 (EID, RCd)	0.55				-0.45
rf63 (RC7)	0.54			-0.42	
rf338 (K-r)	0.54				-0.44
rf105 (EID, RCd)	0.53			0.4	0.47

rf29 (STW, NEGE-r)	0.53				
rf261 (EID, RCd)	0.53			-0.41	-0.51
rf116 (NEGE-r)	0.53				-0.41
rf228 (EID, RC7, AXY)	0.53				-0.4
rf319 (AGGR-r)	0.53				
rf91 (EID, RC7, SHY)	0.53				
rf187 (EID, RCd, -K-r)	0.52				
rf136 (COG)	0.52				0.56
rf149 (RC7)	0.52				-0.43
rf322 (EID, RC7)	0.52				
rf44 (SHY)	0.52				
rf275 (RC7, AXY)	0.51		0.42		-0.44
rf22 (EID, RCd)	0.51				
rf172 (EID, RCd)	0.51				
rf62 (RCd)	0.51				
rf335 (EID, RC7)	0.51				
rf74 (RCd)	0.51			-0.43	
rf169 (EID, HLP)	0.51				
rf6 (RCd)	0.5				-0.54
rf247 (RCd)	0.5				-0.51
rf68 (NFC)	0.5				
rf27 (NFC)	0.49				
rf130 (RCd)	0.49				

rf263 (RC7, NEGE-r)	0.49				
rf315 (RCd)	0.49				
rf229 (NFC)	0.49				
rf112 (RC7)	0.48				
rf167 (EID, STW, NEGE-r)	0.48				
rf250 (EID, RC7)	0.47				-0.43
rf318 (RC7, ANP)	0.46				
rf235 (RC7)	0.46		0.47		
rf77 (RC7, NEGE-r)	0.45				
rf35 (EID, RC7, SHY)	0.45				
rf40 (PSYC-r)	0.45				
rf177 (SHY)	0.45				
rf117 (RCd)	0.45				-0.46
rf24 (IPP)	0.44				
rf51 (RC7)	0.44		0.42		
rf119 (EID, RC7, ANP)	0.44				
rf135 (HLP)	0.43				
rf217 (EID, RCd)	0.43				-0.4
rf132 (RC7)	0.43				
rf120 (EID, SUI)	0.42				-0.42
rf206 (RC7, NEGE-r)	0.41				
rf103 (FML)	0.41				
rf334 (SUI)	0.41				

rf18 (MLS, -MSF)	0.41				-0.52
rf336 (HLP)	0.41				
rf114 (EID, SHY)	0.41				
rf282 (EID, RC2, HLP)	-0.4				
rf182 (AGGR-r, -RC2)	-0.4				
rf95 (L-r)	-0.41	0.42			
rf4(EID, RC2, MLS, INTR-r)	-0.41	0.43			0.41
rf293 (EID, ANP, NEGE-r)	-0.42				0.46
rf37 (EID, NEGE-r)	-0.45				

Factor 2

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
rf201 (SAV, INTR-r)		0.63			
rf57 (EID, SAV, INTR-r)		0.61			
rf109 (SAV, INTR-r)		0.59			
rf17 (EID, RC2, SAV, INTR-r)		0.5			
rf140 (EID, RC2, INTR-r)		0.5			
rf11 (SAV, INTR-r)		0.49			
rf47 (RC9, -SAV,		0.48			

INTR-r)					
rf153 (SAV, INTR-r)		0.48			
rf323 (RC2, INTR-r)		0.47			
rf64 (EID, RC2, INTR-r)		0.47			
rf195 (RC2, INTR-r)		0.46			
rf94 (SAV)		0.44			
rf4(EID, RC2, MLS, INTR-r)	-0.41	0.43			0.41
rf95 (L-r)	-0.41	0.42			
rf278 (SAV)		0.41			
rf222 (EID, RC2, SAV, INTR-r)		0.41			
rf67 (DSF)		-0.47			

Factor 3

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
rf168 (THD, RC6, PSYC-r)			0.63		
rf92 (THD, RC6, PSYC-r)			0.62		
rf252 (THD, RC6, PSYC-r)			0.62		

rf273 (THD, RC8)			0.6		
rf287 (THD, RC6, PSYC-r)			0.58		
rf330 (THD, RC8, PSYC-r)			0.57		
rf264 (THD, RC6, PSYC-r)			0.57		
rf46 (THD, RC8, PSYC-r)			0.57		
rf139 (THD, RC8, PSYC-r)			0.56		
rf270 (THD, RC6, PSYC-r)			0.56		
rf294 (THD, RC8, PSYC-r)			0.55		
rf332 (THD, RC6, PSYC-r)			0.55		
rf71 (THD, RC6, PSYC-r)			0.54		
rf233 (RC6)			0.54		
rf129 (THD, RC6, PSYC-r)			0.52		
rf203 (THD, RC8,			0.51		

PSYC-r)					
rf14 (THD, RC6, PSYC-r)			0.51		
rf161 (RC7)			0.5		
rf199 (THD, RC8, PSYC-r)			0.5		
rf216 (THD, RC8, PSYC-r)			0.49		
rf240 (RC8, COG, PSYC-r)			0.48		
rf150 (THD, RC6, PSYC-r)			0.47		
rf34 (RC6, PSYC-r)			0.47		
rf235 (RC7)	0.46		0.47		
rf310 (RC6)			0.45		
rf257 (RC8, COG)			0.45		
rf311 (THD, RC8, PSYC-r)			0.44		
rf178 (Fp-r)			0.44		
rf194 (RC6)			0.44		
rf317 (Fp-r, BRF)			0.44		
rf133			0.43		
rf110 (THD, RC6)			0.43		

rf191 (Fp-r)			0.43		
rf314 (Fp-r)			0.43		
rf122 (THD, RC8, NUC)			0.42		
rf275 (RC7, AXY)	0.51		0.42		-0.44
rf146 (RC7, AXY, NEGE-r)			0.42		
rf51 (RC7)	0.44		0.42		
rf12 (THD, RC8, PSYC-r)			0.41		
rf307 (FML)			0.41		
rf208 (Fp-r, BRF)			0.4		

Factor 4

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**
rf223 (BXD, RC4, JCP, DISC-r)				0.52		
rf49 (BXD, RC4, SUB, DISC-r)				0.51		
rf66 (BXD, RC4, JCP, DISC-r)				0.51		
rf266 (BXD, RC4, SUB)				0.5		

rf141 (RC4, SUB)				0.5		
rf237 (BXD, RC4, SUB, DISC-r)				0.49		
rf21 (BXD, RC4, JCP, DISC-r)				0.48		
rf297 (RC4, SUB, DISC-r)				0.47		
rf93 (SUI)				0.45		
rf84 (BXD, RC9, AGG, AGGR-r)				0.45		0.41
rf193 (BXD, RC9, DISC-r)				0.44		
rf5 (RC4)				0.44		
rf312 (BXD, RC4, AGG)				0.43		
rf26 (RC9, AGG, AGGR-r)				0.43		
rf329 (BXD, RC4, AGG, AGGR-r)				0.42		
rf105 (EID, RCd)	0.53			0.4	0.47	
rf164 (SUI)				-0.41		
rf261 (EID, RCd)	0.53			-0.41	-0.51	
rf63 (RC7)	0.54			-0.42		

rf45				-0.43		
rf74 (RCd)	0.51			-0.43		
rf23 (RC7, AGG, NEGE-r)				-0.47		

Factor 5

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
rf265 (RC1, HPC)					0.6
rf136 (COG)	0.52				0.56
rf227 (RC1, NUC)					0.56
rf101 (RC1, HPC)					0.56
rf59 (COG)					0.55
rf176 (RC1, HPC)					0.55
rf174 (RC1, MLS)					0.52
rf76 (RC1, GIC)					0.51
rf200 (COG)					0.51
rf88 (RC1, HPC)					0.51
rf210 (GIC)					0.51
rf189 (RC1, HPC)					0.5
rf254 (RC1)					0.49
rf25 (EID, RC2, MLS)					0.49
rf280 (COG)					0.49

rf301 (RC1, NUC)					0.48
rf162 (RC1, NUC)					0.48
rf262 (MLS)					0.48
rf277 (RC1, NUC, NEGE-r)					0.48
rf105 (EID, RCd)	0.53			0.4	0.47
rf73 (EID, STW, NEGE-r)					0.47
rf113 (RC1, NUC)					0.47
rf333 (MLS)					0.47
rf293 (EID, ANP, NEGE-r)	-0.42				0.46
rf31 (COG)					0.46
rf163 (MLS)					0.45
rf328 (RC1, HPC)					0.45
rf125 (RC1, NUC)					0.44
rf242 (RC1)					0.44
rf230 (RC1, GIC)					0.44
rf69 (RC1, NUC)					0.43
rf15 (RC1)					0.43
rf306 (COG)					0.42
rf4(EID, RC2, MLS, INTR-r)	-0.41	0.43			0.41

rf228 (EID, RC7, AXY)	0.53				-0.4
rf217 (EID, RCd)	0.43				-0.4
rf144 (RCd)	0.56				-0.41
rf116 (NEGE-r)	0.53				-0.41
rf120 (EID, SUI)	0.42				-0.42
rf149 (RC7)	0.52				-0.43
rf250 (EID, RC7)	0.47				-0.43
rf79 (AXY)					-0.43
rf204 (RCd)	0.61				-0.44
rf89 (EID, RCd, SFD)	0.55				-0.44
rf275 (RC7, AXY)	0.51		0.42		-0.44
rf338 (K-r)	0.54				-0.44
rf331 (EID, RCd)	0.58				-0.44
rf289 (RC7, AXY)					-0.44
rf30 (EID, RCd)	0.55				-0.45
rf232 (RCd, SFD)	0.63				-0.46
rf117 (RCd)	0.45				-0.46
rf159 (RC8, COG)					-0.48
rf158 (EID, RCd)	0.57				-0.49
rf261 (EID, RCd)	0.53			-0.41	-0.51
rf247 (RCd)	0.5				-0.51
rf18 (MLS, -MSF)	0.41				-0.52

rf6 (RCd)	0.5				-0.54

Factor 6

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**
rf260 (RC3)						0.48
rf256 (RC9, AGGR-r)						0.48
rf316 (BXD, RC9, AGG, AGGR-r)						0.48
rf36 (RC3)						0.47
rf327 (RC9, AGGR-r)						0.45
rf83 (EID, RC2)						0.44
rf248 (BXD, RC9, ANP)						0.43
rf99 (RC3)						0.43
rf84 (BXD, RC9, AGG, AGGR-r)				0.45		0.41
rf321 (AGGR-r)						0.41