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Contemporary Psychopathology Assessment: Mapping Major Personality Inventories onto Empirical Models of Psychopathology

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Having a method of correctly classifying a psychological construct of interest is a cornerstone of effective clinical practice and research. However, existing classification systems for mental disorders, such as those represented in the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD), have limitations that prevent clinicians and scientists from achieving correct classification, hampering assessment, intervention, and etiological research efforts. These limitations are primarily related to the polythetic nature of mental disorders represented in current diagnostic systems. Specifically, polythetic definitions result in heterogeneous symptom presentations amongst individuals who purportedly have the same discrete mental disorder, as well as excessive amounts of comorbidity between mental disorders (Brown & Barlow, 2005; Widiger & Clark, 2000; Widiger & Sankis, 2000).

The goal of this chapter is to introduce an alternative, dimensional view of psychopathology that has been emerging in the literature in the last 15–20 years. An overview of how two broadband instruments already available in clinical practice, the Minnesota Multiphasic Personality Inventory 2–Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008/2011; Tellegen & Ben-Porath, 2008/2011) and the Personality Assessment Inventory (Morey, 1991/2007), can be used to assess psychopathology within the structural frameworks proposed in this literature is then provided. The chapter ends with implications of using the MMPI-2-RF and Personality Assessment Inventory (PAI) to assess this framework in research and clinical practice, as well as a brief discussion of the limitations of multivariate structural models and directions for future examination.
DIMENSIONAL MODELS OF PSYCHOPATHOLOGY

Large epidemiological studies have demonstrated that comorbidity amongst mental disorders is the rule (not the exception) for most mental disorders (Brady & Sinha, 2005; Grant, Stinson, Dawson, Chou, Dufour, et al., 2004; Grant, Stinson, Dawson, Chou, Ruan, et al., 2004; Kessler et al., 2006; Kessler, Chiu, Demler, & Walters, 2005; Kessler & Wang, 2008; Reiger et al., 1990). These observations led to the development of complex models that attempt to account for associations between numerous discrete disorders at once. In general, the goal of these models is to test whether certain disorders share a portion of their etiologies with one another and whether each individual disorder can be considered a unique manifestation of a broader, underlying predisposition for developing certain types of disorders (Eaton, South, & Krueger, 2010; Krueger & Markon, 2006). These models add to what is understood about comorbidity between disorders, as they can include multiple disorders that are known to be related within the same study. This inclusion allows for links between pairs of disorders to be investigated, while also exploring how the presence of a third disorder (or more) influences that link. These models can also examine whether comorbidity between certain psychiatric disorders result from shared underlying liabilities, non-unique predispositions for developing certain types of disorders, or associations between liabilities (Krueger & Markon, 2006).

MODEL OF INTERNALIZING AND EXTERNALIZING DYSFUNCTION

Several large-scale community studies have provided support for a model of internalizing and externalizing problems that will be referred as the Multivariate Correlated Liabilities Model (MCLM) (Kendler, Prescott, Myers, & Neale, 2003; Kramer, Krueger, & Hicks, 2008; Krueger, 1999; Krueger, Capsi, Moffitt, & Silva, 1998; Krueger & Markon, 2006; Krueger, McGue, & Iacono, 2001; Lahey et al., 2008; Slade & Watson, 2006; Vollebergh et al., 2001). A conceptual representation of the MCLM based on the results of these studies is displayed in Figure 4.1. The model has two broad, moderately correlated dimensions, representing predispositions for internalizing and externalizing disorders. These correlated liabilities are displayed in Figure 4.1 as the ovals connected by a double-headed arrow. The externalizing factor is believed to reflect a propensity for excessive disinhibited behaviors. The liability for internalizing dysfunction is hypothesized to reflect a propensity to express distress inwardly.

Individual mental disorders have been linked to each of the liabilities described above (Katz, Cox, Clark, Oleski, & Sacevich, 2011; Kendler et al., 2003; Kramer et al., 2008; Krueger, 1999; Krueger et al., 1998; Krueger & Markon, 2006; Lahey et al., 2008; Slade & Watson, 2006; Vollebergh et al., 2001). These connections between discrete disorders and the different predispositions are displayed in Figure 4.1 as the rectangles connected to the liabilities by a directional arrow, which indicate that the predisposition is believed to be causing the
manifestation of that distinct type of disorder. Early studies provided evidence to link substance dependence and juvenile/adult antisocial behavior disorders to the externalizing factor. Subsequent studies suggested that antisocial behaviors not meeting criteria for antisocial personality disorder, alcohol and illicit drug abuse, inattention, hyperactivity-impulsivity, and oppositional defiant disorder were also related to the broad, externalizing factor. Disorders including unipolar mood, anxiety, and somatoform disorders have been connected to the broad internalizing factor.

Previous studies that examined the MCLM demonstrated that the internalizing and externalizing factors were moderately to strongly correlated (Krueger, 1999; Krueger et al., 1998; Krueger & Markon, 2006; Slade & Watson, 2006; Vollebergh et al., 2001). The association between the two broad predispositions for dysfunction is displayed in Figure 4.1 as the non-directional arc (double-headed arrow). Subsequent studies in children, adolescents, and adults have suggested that this shared variance likely reflects a genetically driven, higher-order factor describing a generalized predisposition for psychopathology (Caspi et al.,
2013; Lahey et al., 2011, 2012). Broadly, these results strongly indicate that individuals with mental disorders do not always fall into an internalizing or externalizing group. Rather, individuals who are at risk for psychopathology are likely to have some experience of both internalizing and externalizing symptoms.

Additional support has been garnered for the MCLM, as it has been demonstrated to be similar across diverse cultures (Krueger et al., 1998; Krueger, Chertsova-Dutton, Markon, Goldberg, & Ormelet 2003; Krueger et al., 2001; Slade & Watson, 2006; Vollebergh et al., 2001) and across genders (Kramer et al., 2008; Krueger, 1999). There is also an accumulating body of evidence to suggest that this model replicates well across age groups (Kramer et al., 2008; Krueger, 1999; Lahey et al., 2008; Vollebergh et al., 2001). Lastly, predispositions for internalizing and externalizing dysfunction have been demonstrated to be relatively stable over short periods of time (i.e., one year and three years; Krueger et al., 1998; Vollebergh et al., 2001).

Elaborations on the Internalizing Spectrum

In major classification systems, mood and anxiety disorders have typically been organized into two discrete classes of disorders. This conceptualization of mood and anxiety problems is contrary to studies demonstrating that many of these types of difficulties are genetically more similar than they are different (e.g., Kendler et al., 2003) and that all of these disorders are linked in varying degrees to difficulties with negative affect (Watson, 2005). The MCLM resolved this discrepancy by demonstrating that both mood and anxiety disorders could be linked to a latent predisposition for developing internalizing problems. However, “lumping” all mood and anxiety disorders within a single dimension ignored important distinctions between these disorders. Subsequent research demonstrated that the internalizing liability could be bifurcated into two, more distinct predispositions (Krueger, 1999; Krueger & Markon, 2006; Watson, 2005). These sub-factors represent unique manifestations of a broader disposition for internalizing problems and were originally termed “Anxious-Misery” and “Fear.” To emphasize the role of distress in the anxious-misery disorders, the Anxious-Misery internalizing sub-factor has been alternatively labeled as “distress” disorders (Watson, 2005). These sub-dimensions are displayed in Figure 4.1 as the two ovals that are connected to the internalizing predisposition by the directional path (one-headed arrow), which indicates that the predisposition for internalizing causes the distinct subtypes of internalizing problems. The Anxious-Misery dimension is hypothesized to represent internalizing problems that have as their primary feature a tendency to experience severe levels of psychological distress. The Fear dimension is hypothesized to represent difficulties whose primary features are related to phobic fearfulness and anxiety sensitivity.

Connections between discrete mood, anxiety, and other disorders and the Distress and Fear subdimensions are displayed in Figure 4.1 as the rectangles...
connected to the specific liabilities by a directional arrow. Disorders characterized by a generalized dysphoria, including major depression, dysthymic disorder, generalized anxiety disorder, and post-traumatic stress disorder, have been linked to the anxious-misery (distress) subdimension (Cox, Clara, & Enns, 2002; Kendler et al., 2003; Krueger, 1999; Slade & Watson, 2006; Vollebergh, et al., 2001). Disorders not typically conceptualized as mood or anxiety disorders, including somatoform disorder and bulimia/binge eating disorders, have also been tentatively linked to the distress subdimension. Alternatively, disorders with a core feature of fearfulness and phobic anxiety, including social phobia, specific phobia, agoraphobia, panic disorder, and obsessive compulsive disorder, have been linked to the fear subdimension. Notably, in these studies, the association of obsessive compulsive disorder with the Fear subdimension has been less strongly supported than that demonstrated for the other phobia-related disorders.

Elaborations on the Externalizing Spectrum

Previous studies on the MCLM demonstrated support for one higher-order factor underlying disorders of antisocial behavior, impulsivity, and substance dependence (e.g., Krueger et al., 2001). This finding, however, stood in direct contrast to results from behavioral genetics studies indicating that there was substantial unique genetic and environmental variance associated with each externalizing disorder (e.g., Kendler et al., 2003). As such, Krueger and colleagues (Krueger, Markon, Patrick, Benning, & Kramer, 2007) hypothesized that a more comprehensive model of the externalizing liability could be developed if aspects of antisocial behaviors/personality, substance use disorders (SUDs), and disinhibited personality traits were viewed as elements of an externalizing spectrum. Beginning with over 20 constructs describing antisocial, impulsive, and substance-use phenomena drawn from both psychopathology and personality literatures, competing structural models were calculated using data from a large participant sample of college students and correctional inmates. The final, best-fitting model is displayed in Figure 4.2. The model has three uncorrelated factors, Externalizing Problems, Callous-Aggression, and Substance Misuse, which are displayed in Figure 4.2 as the ovals. The model has a bifactor structure, meaning that all measured variables in the model loaded onto the general Externalizing factor, but only specific subsets of the manifest variables loaded on the Callous-Aggression and Substance Misuse factors.

In the elaborated model of externalizing dysfunction, each liability is hypothesized to cause varying observable symptoms and behaviors (Krueger et al., 2007). These are displayed in Figure 4.2 as the rectangles connected to the liabilities by a directional path (one-headed arrow). The broad Externalizing liability was demonstrated to be related to all of the examined behaviors/symptoms, but was most strongly related to measures of irresponsibility and problematic impulsivity. This indicates the core deficits of externalizing problems relate
to the inability to approach life in a planful manner. The Callous-Aggression liability was composed of markers of aggressive and unempathetic attitudes. Measures of relational aggression, destructive aggression, and lack of empathy most strongly related to the Callous-Aggression liability. Finally, the third liability, Substance Misuse, was characterized by measures describing the propensity for involvement with substances and substance-related consequences. The Substance Misuse factor was most strongly characterized by measures of marijuana use, marijuana problems, and other illicit drug use.

Theoretically, the emergence of three independent factors suggests that the manifestation of a specific externalizing difficulty is multiply determined (Krueger et al., 2007). More specifically, this model indicates the emergence of an externalizing difficulty can be traced to at least three sources, including the general externalizing propensity, an independent propensity to develop either callous-aggression or substance-related problems, and a highly specific propensity to engage in and experience the measured behavior or symptom. This result represents one of the most important aspects of this study, as the emergence of three independent factors and multiple underlying pathways leading to the same specific outcomes parallels results from genetic studies of the externalizing spectrum, which have demonstrated disorder-specific genetic and environmental risk factors for externalizing disorders (Kendler et al., 2003; Krueger et al., 2002). This result also aligns conceptualization of externalizing disorders characterized by callous-aggression with the extant literature, as this bifactor maps onto features specific to psychopathy (e.g., "meanness," Patrick & Drislane, 2014; or "affective-interpersonal" psychopathy traits; e.g., Hare, 2003) and also resembles what is distinctive about the individual differences antagonism domain found in most omnibus personality models (e.g., DSM-5 Section III; APA, 2013).
EXPANSIONS TO THE MCLM TO INCLUDE LESS FREQUENTLY OCCURRING DIFFICULTIES

Thus far, this discussion of structural models of psychopathology has been limited to disorders that are more prevalent. However, to be useful in research and practice, dimensional models of psychopathology will need to include less frequently occurring and more severe types of mental disorders (e.g., schizophrenia), as well as maladaptive personality patterns. Empirical work that attempts to include these types of difficulties has begun to emerge in the recent literature, though the conclusions that can be drawn from these studies are not as well supported as those just discussed for internalizing and externalizing problems. Nonetheless, there are three relatively robust findings in the emerging literature that warrant inclusion in the current discussion: that of a third independent dimension representing a liability for psychotic disorders, the placement of somatic difficulties in structural models of psychopathology, and the convergence of personality and psychopathology models on similar structures.

A Third Dimension—Psychosis

Earlier studies on the MCLM were primarily conducted in large, community-dwelling samples where the prevalence of psychotic phenomena, such as symptoms of schizophrenia and schizotypal personality disorder, were less common, leaving open to question how these types of difficulties would be best described by structural models of psychopathology. To begin answering this question, Kotov and colleagues (Kotov, Chang, et al., 2011; Kotov, Ruggero, et al., 2011) conducted two large-scale studies using clinical inpatient and outpatient samples in order to determine if these types of symptoms would best be described by existing internalizing and externalizing liability concepts, or if a third, independent factor representing psychotic symptoms would emerge. Results of both studies suggested psychotic symptoms were not well accounted for by a model containing only internalizing and externalizing problems. Rather, results indicated that psychotic symptoms were best conceptualized as manifestations of a third dimension of psychopathology, which they termed “psychosis” (also sometimes referred to as “thought disorders”; Caspi et al., 2014). Subsequent studies in large epidemiological samples from Australia (Wright et al., 2013), New Zealand (Caspi et al., 2014), and the United States (Fleming, Shevlin, Murphy, & Joseph, 2014) have supported the inclusion of a Psychosis liability in the externalizing/internalizing MCLM framework.

The final, best-fitting model in studies that have included a Psychosis liability is displayed in Figure 4.3. The model has three correlated factors—Externalizing, Internalizing, and Psychosis—which are displayed in Figure 4.3 with ovals connected by double-headed arrows. Diverse empirical evidence supports linking to the Psychosis liability such disorders as schizophrenia, schizotypal personality disorder, paranoid personality disorder, and schizoid personality disorder (Caspi et al., 2014; Kotov, Chang, et al., 2011; Kotov, Ruggero, et al., 2011).
Figure 4.3 The Multivariate Correlated Liabilities Model Incorporating Psychosis Dimension.

PSYCHOSIS = Psychotic Disorders Liability; SCZ = Schizophrenia; STYP = Schizotypal Personality Disorder; SZD = Schizoid Personality Disorder; PAR = Paranoid Personality Disorder; DEL = Delusions regarding thought control and grandiosity; EXTERN = Externalizing Liability; AGGRESS = Callous-Aggression Dimension; SUBS = Substance Misuse Dimension; INTERN = Internalizing Liability; DISTRESS = Distress Sub-dimension; DEP = Major Depressive Disorder; DYS = Dysthymic Disorder; GAD = Generalized Anxiety Disorder; SOM = Somatization Disorders; PTSD = Post-Traumatic Stress Disorder; EAT = Bulimia/Binge Eating Disorder; FEAR = Fear Sub-dimension; SOC = Social Phobia; SEP = Separation Anxiety Disorder; SPH = Specific (Simple) Phobias; PD = Panic Disorder; AG = Agoraphobia; OCD = Obsessive-Compulsive Disorder.
Hallucinations, paranoid delusions, and delusional thoughts regarding controlling others' thinking, believing events have special meaning, and believing one has special powers have also been demonstrated to be best predicted by the predisposition for disordered thinking (Fleming et al., 2014; Wright et al., 2013). All of these symptoms and syndromes are displayed in Figure 4.3 as rectangles. A directional arrow connects the individual syndromes and symptoms with the Psychosis liability, indicating the predisposition for psychosis is hypothesized to cause the discrete disorders.

Somatization—Internalizing or “Other” Dysfunction?

Practitioners in medical, neuropsychological, and forensic disability settings are likely to encounter individuals for whom somatic difficulties dominate the clinical picture. Such manifestations can come in the form of medically unexplained symptoms as well as distress about genuine medical conditions. Therefore, it is important that structural models of psychopathology clearly recognize and account for somatic problems. At this time, somatization is typically not recognized as its own higher-order domain in the psychopathology literature. This is because early studies examining commonly occurring mental difficulties demonstrated somatic problems were related to the Internalizing liability (Krueger et al., 2003). However, accumulating evidence suggests that consideration of whether somatic difficulties would be better described in another way in these models is warranted for two reasons. First, in Krueger and colleagues' (2003) study, the prediction of somatic difficulties by the higher-order internalizing factor was substantially smaller than what it provided for mood and anxiety disorders. Specifically, results indicate that the internalizing factor only accounted for 4% of variance in somatization, which is substantially below conventional standards. Second, Kotov, Ruggero, et al. (2011) demonstrated that somatic difficulties formed a unique liability that was related to, yet distinct from, the liabilities for internalizing, externalizing, and psychotic dysfunctions. Similar results for an independent somatic factor have been suggested in studies examining the structure of broadband instruments, such as the MMPI-2-RF (Anderson et al., 2015; McNulty & Overstreet, 2014). Nonetheless, although these initial findings are promising, additional structural evidence is needed before an independent somatic factor can be formally included in the MCLM.

Moving Further Down in the Hierarchy to Five-Factor Space

Recent elaborations of quantitative personality and psychopathology hierarchies have suggested that the general three-factor structure just reviewed can be further subdivided (e.g., Bagby et al., 2014; Markon, Krueger, & Watson, 2005; Wright et al., 2012). Results from these analyses are consistent with five-factor models in “normative” personality (e.g., Goldberg, 2006) and pathological personality developments (e.g., Harkness & McNulty, 1994; Krueger, Derringer, Markon, Watson, & Skodol, 2012). These models have served as a foundation for
the development of the maladaptive personality trait model presented in DSM-5 Section III as an alternative way to operationalize personality psychopathology (e.g., Krueger et al., 2012).

Recent research using Goldberg's (2006) so-called "bass-ackwards" modeling has provided consistent evidence of how the personality-psychopathology hierarchies develop as one systematically descends subsequent levels of abstractions. Several studies have focused on single measures (e.g., Bagby et al., 2014; Kushner, Quilty, Tackett, & Bagby, 2011; Tackett, Quilty, Sellbom, Rector, & Bagby, 2008; Wright et al., 2012), whereas others have examined combinations of measures (e.g., Markon et al., 2005; Wright & Simms, 2014). The results have been strikingly similar, especially at the fifth level of the hierarchy, with factors indicating negative affectivity/neuroticism and detachment/introversion (bifurcation from internalizing); disinhibition/unconscientiousness and antagonism (bifurcation from externalizing), and psychoticism/openness.² A visual representation of this structure is provided in Figure 4.4. Moreover, the manifestations of the hierarchy appear slightly different, depending on populations examined. For instance, in patient samples, the big three psychopathology domains reviewed earlier emerge (e.g., Bagby et al., 2014; Chmielewski & Watson, 2007; Kotov, Chang, et al., 2011; Kotov, Ruggero, et al., 2011); whereas, in student or community samples, the negative affectivity/neuroticism, detachment/introversion, and externalizing tend to materialize (e.g., Wright et al.,

![Figure 4.4 Five-Factor Model of Psychopathology/Personality.](image-url)

*Note that the displayed structure is the one that emerges from analyses using community/university samples. In clinical samples, the psychoticism factor emerges higher in the structure (e.g., Bagby et al., 2014). The unidentified boxes at the bottom of the hierarchy represent individual syndromes or items.*
2012). These findings make sense, of course, given the construct variations in these different populations. Overall, these hierarchical analyses are important as they demonstrate at least two important things (1) It does not matter which personality model one examines, as they typically map onto each other and represent different levels of analyses within the broader personality hierarchy, and (2) personality and psychopathology variance map onto one another in important ways from an empirical hierarchy perspective.

THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY--2-RESTRUCTURED FORM

The Minnesota Multiphasic Personality Inventory--2--Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008) refers to the most recent of the MMPI family of instruments that began with the original MMPI developed in the 1930s and published in 1943 (Hathaway & McKinley, 1943). The MMPI-2-RF is composed of 338 of the original 567 MMPI-2 true/false items, and aggregates onto nine validity and 42 substantive scales. The major aim of this section is to illustrate how the MMPI-2-RF hierarchy of scales maps onto the broader quantitative/empirical structure of psychopathology discussed earlier.

Initial development of the MMPI-2-RF constituted the restructuring of the eight original MMPI clinical scales (Tellegen et al., 2003), which were constructed in the 1930s using an empirical keying method whereby items that differentiated diagnostic groups from healthy controls were included on scales for such disorders. Recognizing the substantial strengths of the clinical scales, which included extensive empirical validation and decades of clinical experience among practitioners, it has been known for some time that the scales themselves were not psychometrically optimal as measures of diagnostic constructs (Tellegen & Ben-Porath, 2008; Tellegen et al., 2003). The primary step in developing these scales was to identify and extract a common general emotional distress dimension (labeled “dairyization”) that saturates the clinical scales, elucidate distinct target constructs from each scale, and thereby improve their convergent and discriminant validity. This resulted in a set of nine Restructured Clinical scales (RC scales; Tellegen et al., 2003), including a measure of demoralization and eight other scales assessing key components of the basic Clinical scales (except Scale 5 [Masculinity/Femininity] and 0 [Social Introversion], which do not measure psychopathology constructs), scored on both the MMPI-2 and the MMPI-2-RF.

After the RC scales had been introduced to the MMPI-2, work continued on several other psychometrically efficient scales for a new version of the inventory—the MMPI-2-RF (Ben-Porath & Tellegen, 2008; Tellegen & Ben-Porath, 2008). This version of the MMPI was designed to take advantage of the clinically useful variance of the MMPI-2 item pool in an efficient and psychometrically up-to-date manner. Scales developed for the MMPI-2-RF were intended to assess (a) constructs not directly measured by the RC scales, (b) facets of the broader RC scales, or (c) distinctive core components from the original clinical scales not covered by the RC scales. A set of higher-order scales was also developed to
provide a hierarchically organized interpretative framework for the test (Tellegen & Ben-Porath, 2008). Lastly, the MMPI-2-RF contains revised versions of standard MMPI-2 validity scales, as well two new validity scales assessing somatic and cognitive over-reporting.

Higher-Order Structures

Most of the MMPI-2-RF scales are organized in a hierarchical fashion that maps onto the general hierarchical three-factor structure of psychopathology (Kotov, Chang, et al., 2011; Kotov, Ruggero, et al., 2011; Wright et al., 2012). Specifically, the three higher-order (H-O) scales—Emotional-Internalizing Dysfunction (EID), Thought Dysfunction (THD), and Behavioral-Externalizing Dysfunction (BXD)—all map onto the three broad contemporary psychopathology domains. The nine RC scales occupy the middle level of the hierarchy, and the 23 specific problems (SP) scales compose the lowest level with a very narrow, facet-based representation of psychopathology, including specific problems not directly assessed via the broader scales (e.g., suicidal ideation). Extant to the three-level hierarchy, but no less important with respect to empirical psychopathology structures, are the Personality Psychopathology Five (PSY-5; Harkness & McNulty, 1994; see also Harkness, McNulty, Finn, Reynolds, & Shields, 2014) scales that provide a dimensional assessment of maladaptive personality traits from a five-factor perspective akin to that of DSM-5 Section III (APA, 2013).

Although it certainly would be expected that the H-O scales would map onto contemporary psychopathology structures, it is noteworthy that these scales were developed based on factor analysis of the nine RC scales (Tellegen & Ben-Porath, 2008; see also Sellbom, Ben-Porath, & Bagby, 2008b). Tellegen and Ben-Porath (2008) conducted a series of exploratory factor analyses in large outpatient and inpatient samples, and found that three RC scales representing demoralization (RCd), low positive affectivity (RC2), and high negative affectivity (RC7) consistently loaded on an internalizing factor. RC scales reflecting antisocial behavior (RC4), hypomanic activation (RC9), and, to a lesser degree, cynicism (RC3) loaded on an externalizing factor and RC scales indexing persecutory ideation (RC6) and aberrant experiences (RC1) were core markers for a psychoticism factor. Subsequent research has replicated and extended these findings in a variety of samples from North America and Europe. For instance, Hoelzle and Meyer (2008) and Sellbom et al. (2008b) independently reported almost identical findings in large psychiatric samples from the United States and Canada, respectively. Van der Heijden and colleagues (Van der Heijden, Rossi, Van der Velde, Derksen, & Egger, 2013a) replicated Sellbom et al.’s (2008b) findings across five large Dutch clinical and forensic samples, again, finding that the RC scales adhered to a three-factor higher-order structure. Most recently, Anderson et al. (2015) conducted a conjoint exploratory factor analysis using MMPI-2-RF scale sets with the Personality Inventory for DSM-5 (PID-5; Krueger et al., 2012) in a large Canadian psychiatric sample. These authors found that the three higher-order domains could be extracted in
analyses using each of the four MMPI-2-RF scale sets in conceptually expected ways. It is noteworthy that, in these latter results using the lower-order scale sets, that a fourth factor representing social detachment, introversion, and low affective arousal consistently emerged. This result is similar to much of the PAI research (reviewed later) on this topic, as well as the five-factor models described earlier (e.g., Wright et al., 2012). Thus, quantitative hierarchical research using the RC scales, which were developed without any particular diagnostic nosology in mind, but rather were grounded in Tellegen's theory of self-reported affect (e.g., Tellegen, 1985; Watson & Tellegen, 1985), strongly suggests the hierarchical organization of the MMPI-2-RF conforms to the same structure as identified in the extant psychopathology epidemiology literature just reviewed.

Domain-Specific Structures

More recent research has emerged to indicate that, within each domain, the SP scales also map onto extant empirically validated structures. Sellbom (2011) demonstrated that the internalizing SP scales conformed to Watson’s (2005; see also work by Krueger, 1999; Krueger & Markon, 2006) quantitative hierarchical structure of emotional disorders. Specifically, MMPI-2-RF scales Suicide/Death Ideation (SUI), Helplessness/Hopelessness (HLP), Self-Doubt (SFD), Inefficacy (NFC), and Stress and Worry (STW) loaded on a “distress” factor, whereas Anxiety (AXY), Behavior-Restricting Fears (BRF), and Multiple Specific Fears (MSF) loaded on a “fear” factor in a very large outpatient mental health sample. Sellbom (2010, 2011; see also Sellbom, Marion, et al., 2012) also elaborated on externalizing psychopathology structures in a variety of community, correctional, and forensic samples. By and large, the research has shown that the four externalizing SP scales, including Juvenile Conduct Problems (JCP), Substance Abuse (SUB), Aggression (AGG), and Activation (ACT), load onto a broad externalizing domain, but also can be modeled in accordance with Krueger et al.’s (2007) bifactor structure in which residual subfactors of callous-aggression and substance misuse can be identified. Finally, Sellbom, Titcomb, and Arbisi (2011; see also Titcomb, Sellbom, Cohen, & Arbisi, under review) found that the thought-dysfunction items embedded within RC6 (Ideas of Persecution) and RC8 (Aberrant Experiences) can be modeled according to an overall thought-dysfunction factor, but also isolating a residual, paranoid-ideation subfactor (in a bifactor framework) that corresponds to a neuropsychiatric etiology model that separates paranoid delusions from schizophrenia more broadly (Blackwood, Howard, Bentall, & Murray, 2001).

Research has also established that MMPI-2-RF scale scores map onto the broader five-factor structure of personality and psychopathology (see, e.g., Bagby et al., 2014; Markon et al., 2005; Wright & Simms, 2014; Wright et al., 2012). McNulty and Overstreet (2014) subjected the entire set of MMPI-2-RF scales (corrected for item overlap) to factor analyses in very large outpatient and inpatient mental health samples. They found a six-factor structure, with five
of the factors mirroring the aforementioned PSY-5 domains and a sixth factor reflecting somatization. The PSY-5 scales in their own right overlap both conceptually and empirically with the personality trait domains listed in DSM-5 Section III, which provides an alternative model for operationalizing personality disorders (Anderson et al., 2013; see also Anderson et al., 2015). When the PSY-5 domain scales were subjected to a conjoint factor analysis with the DSM-5 Section III personality-trait facets (as operationalized by the PID-5), the five-factor higher-order structure emerged, with the PSY-5 loading on their expected domains (see also Bagby et al., 2014, for analyses with the PSY-5 items). Recent research has further shown that the PSY-5 scales operate similarly to the DSM-5 Section III model in accounting for variance in the formal Section II personality disorders (PD; e.g., Finn, Arbsi, Erbes, Polusny, & Thuras, 2014; Sellbom, Smid, De Saeger, Smit, & Kamphuis, 2014). For instance, Avoidant PD is best predicted by Negative Emotionality/Neuroticism (NEGE-r) and Introversion/Low Positive Emotionality (INTR-r), Antisocial PD by Aggressiveness (AGGR-r), and Disconstraint (DISC-r), Borderline by Negative Emotionality/Neuroticism (NEGE-r) and Disconstraint (DISC-r), Narcissistic by Aggressiveness (AGGR-r), and Schizotypal by Psychoticism (PSYC-r).

CONSTRUCT VALIDITY EVIDENCE FOR THREE-FACTOR MODELS

The three-factor models generally, and the H-O scales specifically, have evinced substantial evidence for construct validity, especially in terms of how they map onto personality trait models and mental health symptomatology. For instance, the MMPI-2-RF Technical Manual presents validity data from a range of medical, mental health, forensic, and nonclinical settings to indicate that these scales are distinctly associated with clinician-rating, interview, record review, and self-report data reflecting psychopathology symptoms of internalizing, externalizing, and thought disorder, with generally very good discriminant validity (Tellegen & Ben-Porath, 2008).

Particularly relevant to contemporary psychopathology models are personality and psychopathology associations, as the differentiation between personality traits and psychopathology symptoms as distinct constructs is becoming less and less tenable (e.g., Hopwood & Sellbom, 2013; Krueger & Markon, 2014). Numerous studies using different personality trait models have revealed a very distinct pattern: EID (the internalizing factor based on aforementioned factor analyses with RC scales) is primarily associated with trait measures reflecting negative affectivity/neuroticism and introversion/(low) positive emotionality; THD (the thought disturbance factor) is related to absorption, psychoticism, and peculiarity; and BXD (the externalizing factor) is generally associated with trait measures of disinhibition, (low) conscientiousness, antagonism/(low) agreeableness, and sensation-seeking (Sellbom et al., 2008b; Tellegen & Ben-Porath, 2008; Van der Heijden, Egger, Rossi, & Derksen, 2012; Van der Heijden, Rossi, Van der Veld, Derksen, & Egger, 2013a, 2013b).
SPECIFIC PSYCHOPATHOLOGY DOMAINS

Internalizing

Research has accumulated to suggest that individual MMPI-2-RF scale scores map onto specific hierarchical models of internalizing psychopathology in ways predicted by theory. In one of the first studies in this regard, Sellbom, Ben-Porath, and Bagby (2008a) examined the utility of Demoralization (RCd), Low Positive Emotions (RC2), and Dysfunctional Negative Emotions (RC7) as markers of an expanded model of temperament in predicting “distress” and “fear” disorders within Watson’s (2005) framework for internalizing disorders. They used both clinical and nonclinical samples, and via structural equation modeling, showed that RCd mapped onto the distress disorders, whereas RC7 was preferentially associated with fear disorders. RC2, as expected, differentiated depression (within the distress domain) and social phobia (within the fear domain) from the other disorders. In another study examining PTSD comorbidity, RCd was the best predictor of internalizing/distress psychopathology (Wolf et al., 2008).

Several recent studies have also specifically examined predictors of PTSD within contemporary frameworks. Among the RC scales, RCd seems to consistently be a predictor of global PTSD symptomatology, and in particular, the distress/dysphoria factor associated with this disorder, with RC7 being a meaningful predictor in some as well (Arbisi, Polusny, Erbes, Thuras, & Reddy, 2011; Miller et al., 2010; Sellbom, Lee, Ben-Porath, Arbisi, & Gervais, 2012; Wolf et al., 2008; see also Forbes, Elhai, Miller, & Creamer, 2010). More specifically, among the SP scales, Anxiety (AXY) appears to be the best predictor of PTSD symptoms in various clinical and/ or veteran samples (Arbisi et al., 2011; Sellbom, Lee, et al., 2012). Anger Proneness (ANP) is a good predictor of hyperarousal symptoms, and Social Avoidance (SAV) of avoidance symptoms (Sellbom, Lee, et al., 2012; see also Koffel, Polusny, Arbisi, & Erbes, 2012). Finally, Koffel et al. (2012) have begun to identify specific MMPI-2-RF item markers of DSM-5 PTSD symptoms in a large U.S. National Guard sample, but these require further validation before their use can be recommended.

Externalizing

Numerous studies have shown good convergent and discriminant validity of the externalizing RC (RC4 and RC9) and SP (Juvenile Conduct Problems [JCP], Substance Abuse [SUB], Aggression [AGG], and Activation [ACT]) scales that make up the externalizing spectrum. As documented in the Technical Manual and elsewhere, across nonclinical, mental health, and forensic samples, JCP is preferentially associated with crime data and impulsivity. Not surprisingly, SUB is the most potent predictor of alcohol and drug misuse, but it tends to be a good predictor of general externalizing and sensation-seeking as well (Johnson, Sellbom, & Phillips, 2014; Tarascavage, Luna-Jones, & Ben-Porath, 2014; Tellegen & Ben-Porath, 2008). AGG is more specifically associated with behavioral manifestations of both reactive (or angry) and instrumental forms of aggression (Tellegen & Ben-Porath, 2008). ACT is specifically associated with externalizing as reflected
in manic or hypomanic episodes (e.g., euphoria, psychological energy, racing thoughts) and is the MMPI-2-RF scale that best differentiates bipolar mood disorder from unipolar mood and psychotic disorders (Sellbom, Bagby, Kushner, Quilty, & Ayearst, 2012; Watson, Quilty, & Bagby, 2011). Finally, the MMPI-2-RF PSY-5 scales AGGR-r and DISC-r, albeit outside of the formal structural hierarchy, provide for dispositional tendencies towards externalizing behavior and, in particular, personality pathology, including antisocial personality disorder, narcissistic personality disorder, and psychopathy as evidenced in a variety of forensic samples (e.g., Sellbom et al., 2014; Wygant & Sellbom, 2012).

In terms of psychopathy (of which the callous-aggression component can be considered a core), Sellbom and colleagues have demonstrated that RC4, RC9, AGGR-r, and DISC-r can predict scores on a variety of psychopathy measures (Phillips, Sellbom, Ben-Porath, & Patrick, 2014; Sellbom, Ben-Porath, Lilienfeld, Patrick, & Graham, 2005; Sellbom, Ben-Porath, & Stafford, 2007; Sellbom, Lee, et al., 2012; Wygant & Sellbom, 2012). Specifically, results indicated that these externalizing scales, in combination with low scores on a variety of internalizing scales (particularly those pertaining to fearfulness), were good predictors of scores on the Psychopathy Checklist: Screening Version (Hart, Cox, & Hare, 1995) and the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) in nonclinical, forensic, and correctional samples.

Thought Dysfunction

Four scales of the MMPI-2-RF are particularly relevant for assessing the psychotic dimension that emerges in structural models of psychopathology, namely the Higher-Order Thought Dysfunction (THD) scale, RC6 (Ideas of Persecution), RC8 (Aberrant Experiences), and the Psychoticism (PSYC-r) scale (Tellegen & Ben-Porath, 2008). Research to date has shown that the two main indicators of specific psychotic symptomatology, RC6 and RC8, are effective in differentiating between paranoid delusional and non-paranoid psychotic presentations. More specifically, in a large inpatient psychiatric sample, Arbis, Sellbom, and Ben-Porath (2008) and Sellbom et al. (2006) found that RC6 was preferentially associated with a history and active presence of delusions (particularly grandiose and persecutory types), whereas RC8 is a better predictor of hallucinations and non-persecutory delusions. Handel and Archer (2008) replicated these findings in another large inpatient sample. Furthermore, research with the PSY-5 PSYC-r scale has found it to be a good predictor of global thought disturbance and disconnection from reality (Tellegen & Ben-Porath, 2008), as well as Schizotypal Personality Disorder (Sellbom et al., 2014).

Somatization

As discussed earlier, somatization is typically not recognized as its own higher-order domain in the psychopathology literature. However, such measurement is featured on many omnibus personality and psychopathology inventories,
including the PAI and MMPI-2-RF, and structural analyses do seem to tentatively support its distinct (from internalizing psychopathology) nature (e.g., Kotov, Ruggero, et al., 2011).

The MMPI-2-RF RC1 (Somatic Complaints) scale is the broadest measure of somatization on the instrument, with five SP scales reflecting preoccupation with general physical debilitation (MLS), gastrointestinal complaints (GIC), head pain complaints (HPC), neurological/conversion symptoms (NUC), and cognitive memory and attention complaints (COG). The hierarchical structure of these scales has been supported (Thomas & Locke, 2010). The Technical Manual presents validity evidence that all scales are good predictors of somatic preoccupation with reasonable discriminant validity. Some more specific research has indicated that NUC is a particularly potent predictor of non-epileptic seizures in medical settings (Locke et al., 2010), Gervais, Ben-Porath, and Wygant (2009) have shown that the COG scale is a good predictor of self-report memory complaints in a very large disability sample.

THE PERSONALITY ASSESSMENT INVENTORY

The Personality Assessment Inventory (PAI; Morey, 1991, 2007) is a broadband self-report instrument that is similar to the MMPI-2-RF in many respects. Like the MMPI instruments, the PAI was designed to measure a range of constructs likely to be of interest to practitioners in a variety of personality-assessment settings. Like the MMPI, the PAI includes several validity scales designed to indicate the degree to which an individual’s approach to the test affects their responses. Both instruments are interpreted based on large normative samples, including those from the general population and specific samples relevant to the formulation of a particular case (e.g., other pre-employment applicants in a personnel-selection context). Like the MMPI, the PAI is widely used in a host of assessment settings, and a large body of research supports its validity and clinical utility for a range of applications.

However, there are important differences between the PAI and the MMPI-2-RF. Some differences have to do with the format and content of the instruments. For instance, there are specific differences in the scales that are included on each instrument, even though the overall collection is similar in covering personality and psychopathology relatively comprehensively. Also, whereas the MMPI-2-RF items are true/false, the PAI uses a 4-point Likert response scale. Other differences have to do with the approaches taken to developing each test. The most central and unique aspect of the PAI, relative to other instruments, is the use of construct-validation test-development strategies based on the work of Loewinger (1957) and Jackson (1971). Interestingly, the roots of this model of test development go back to the early days of the MMPI, when Meehl and others were using that instrument to transform the approach to test construction and validation in the field (e.g., Cronbach & Meehl, 1955).

A key feature of the construct-validation approach involves establishing content validity by formally articulating the variables that the test is designed
to measure, and identifying content that measures those variables as directly as possible. This requires an underlying theory of what is intended to be measured. In the case of the PAI, the “theory” was ultimately practical. The goal was to measure most of the constructs most clinical assessors would be interested in assessing most of the time. A premium was placed on constructs that were used across theoretical orientations and practice settings and that had temporal stability in the clinical assessment lexicon. PAI scales are grouped into four major sections based on the domain of variables they assess. First are validity scales that assess various approaches to test completion. Second are clinical scales that measure psychiatric constructs such as depression, anxiety, alcohol problems, and schizophrenia. Third are treatment-consideration scales designed to measure other features of the person or their environment that may be of clinical interest, including aggression, suicidal ideation, social support, stress, and treatment motivation. Finally, there are two scales that are designed to assess normative interpersonal style. These scales are normative in the sense that they are the only two scales on the PAI for which high scores are not necessarily either good or bad (Morey & Hopwood, 2006). Content validity was broadened via the inclusion of subscales for ten of the 22 PAI full scales. For instance, the depression scale has subscales assessing cognitive (e.g., hopelessness), affective (e.g., subjective sadness), and physiological (e.g., sleep problems) aspects of the construct. Having identified the scales that would be measured, many items were written to directly assess each of these variables, and various empirical procedures were used to trim the measure to its final, 344-item version.

Given their different approaches to test development, it is interesting to note that, like the MMPI-RF, research suggests that the factors that describe the covariance of PAI scales correspond rather well to factor-analytic models of personality and psychopathology (e.g., O’Connor, 2002; Wright et al., 2013). Specifically, several exploratory factor analyses of the PAI scales have consistently suggested three or four factors (Hoelzle & Meyer, 2009; Morey, 2007). When fourth factors sometimes emerge, they often reflect salient features of the sample, such as the substance abuse factor identified by Karlin et al. (2006) in a sample of chronic pain patients for whom opiate abuse is a common issue. Four factors were present in the PAI community and clinical samples. In the community normative sample, the first two factors correspond very closely to internalizing and externalizing dimensions that are commonly found in psychopathology measures. The third factor has to do with antagonistic personality features such as egocentricity, exploitation, and narcissism, which in its more distinct form appears in Krueger et al’s (2007) externalizing hierarchy (“callous-aggression”). The fourth factor involves social detachment, introversion, and low affective arousal. Interestingly, unlike the MMPI-2-RF analyses (especially with nine RC scales), which tend to yield the three higher-order psychopathology factors, these PAI findings are more akin to what often appears at the “fourth” level in personality/psychopathology structures (e.g., Markon
et al., 2005; Tackett et al., 2008; Wright et al., 2012). More specifically, in these structures, “disinhibition” breaks down into specific representations of unconscientiousness and antagonism.

Research also shows that PAI scales are sensitive and specific to direct measures of higher-order factors of personality and psychopathology. For instance, in the initial validation studies, each of the higher-order dimensions of the normal range NEO Personality Inventory (NEO-PI; Costa & McCrae, 1985) was specifically correlated with several PAI scales. Research with instruments whose content focuses on more pathological elements of personality traits, such as the Personality Inventory for DSM-5 (Krueger et al., 2012), shows similar patterns (Hopwood et al., 2013). In the remainder of this section, we provide more specific information about connections between PAI scales and higher-order dimensions of personality and psychopathology.

Internalizing

A general distress factor with strong loadings on PAI scales such as Depression (DEP), Anxiety (ANX), Anxiety-Related Disorders (ARD), Borderline Features (BOR), Suicidal Ideation (SUI), and Stress (STR) is invariably the first factor extracted across studies examining the structure of the PAI scales. As with the MMPI-RF, validity correlations among these scales provide important information about lower-order fear and distress variants of the internalizing dimension. Numerous studies have demonstrated the sensitivity of PAI scales to distress disorders (e.g., major depression) and fear disorders (e.g., panic disorder or phobias), as well as the ability of PAI scales to discriminate between these classes of disorders (e.g., Fantoni-Salvador & Rogers, 1997). Furthermore, Veltri, Williams, and Braxton (2004) found that PAI DEP correlated .55 with MMPI-2-RF RC7 (Dysfunctional Negative Emotions) and .70 with RC2 (Low Positive Emotions), whereas PAI ARD correlated .45 with RC2 and .70 with RC7, suggesting that the PAI and MMPI-2-RF operate similarly in terms of distinguishing fear and distress disorders.

PAI scales are also available for the targeting of specific constructs within this domain. The DEP and ANX scales have the strongest loadings on the internalizing factor. Both of these scales have subscales focused on the affective, cognitive, and physiological aspects of the constructs, which generally tend to be related to the distress aspects of that factor. The one exception is the ANX-Physiological subscale, which, together with the ARD-Phobias subscale, is the most specific to fear symptoms involving panic and phobias among PAI scales. For instance, in the initial validation studies, Morey (1991) showed that ANX-Physiological correlated .62 and ARD-Phobias correlated .60 with the MMPI Wiggins Phobias Content Scale, whereas the average correlation between MMPI Phobias and other PAI ANX and ARD scale correlations was .37.

Several PAI scales can be used to assess other, more specific problems on the internalizing spectrum. For instance, an emerging literature supports the
validity of the PAI, and particularly the ARD-Traumatic Stress scale, for assessing post-traumatic symptoms (e.g., Edens & Ruiz, 2005). In addition, the ARD-T scale had a sensitivity of 79% and a specificity of 88% for a PTSD diagnosis based on the Clinician Administered PTSD Scale in a group of women who had been exposed to traumatic events (McDevitt-Murphy, Weathers, Adkins, & Daniels, 2005). The PAI Suicidal Ideation (SUI) scale has been shown to be a valid indicator of suicidal behavior (Hopwood, Baker, & Morey, 2008). The PAI Somatic Complaints (SOM) scale, which typically loads on the internalizing factor of the PAI, focuses on common health concerns, the somatization of psychological symptoms, and the presence of bizarre or unlikely symptoms. The SOM scale has been shown to be sensitive to a variety of health conditions, such as headaches (Brendza, Ashton, Windover, & Stillman, 2005), pain (Karlin et al., 2006), and diabetes (Jacob, 2002).

**Externalizing**

The second factor that is typically extracted in factor analyses of the PAI has the strongest loadings on Antisocial Features (ANT), Alcohol Problems (ALC), and Drug Problems (DRG), implying an underlying externalizing dimension. The ANT scale has subscales measuring antisocial behaviors directly, as well as subscales that measure psychopathic features including callous egocentricity and sensation-seeking. These scales have demonstrated empirical validity in discriminating disorders from the externalizing spectrum. For instance, Edens, Buffington-Vollum, Colwell, Johnson, and Johnson (2002) reported an area under the curve (AUC) of .70 using the ANT scale to indicate categorical psychopathy diagnoses based on the Psychopathy Checklist–Revised (Hare, 2003), whereas Ruiz, Dickinson, and Pincus (2002) reported an AUC of .84 using the ALC scale to predict interview-based alcohol dependence.

**Antagonism**

A third factor that is often extracted in factor analyses of the PAI scales has its strongest loadings on Mania (MAN), Dominance (DOM), and Aggression (AGG). Common among these scales is a tendency toward self-importance, controlling behavior, and interpersonal insensitivity, which are collectively similar to the personality construct Antagonism and the liability toward callousness-aggression that emerges in structural psychopathology models. The MAN scale has specific subscales measuring irritability and frustration tolerance, grandiosity and self-esteem, and energy or activity. The Aggression (AGG) scale also generally exhibits strong loadings on the PAI externalizing factors, and has scales sampling behaviors related to an aggressive attitude, verbally aggressive behavior, and physically aggressive behavior. An emerging body of research, mostly in forensic samples, speaks to the validity of AGG to be associated with and predictive of violent and other aggressive behaviors (e.g., Edens & Ruiz, 2005; see also Gardner et al., 2015, for a meta-analysis).
Detachment

In other samples, such as the PAI community normative sample, the fourth factor has its highest loadings on high Nonsupport (NON) and low Warmth (WARM), implying social detachment, disconnection, and introversion, akin to the social-detachment/introversion factor that emerges from structural models of psychopathology and personality discussed earlier. In addition to these scales, numerous PAI scales provide additional information about this aspect of personality and psychopathology. In particular, the Schizophrenia (SCZ) Social Detachment subscale provides a direct assessment of disconnection from the social environment, which is common among psychotic individuals, but is also a common concern among individuals with other forms of psychopathology.

Thought Dysfunction

Although thought disorder is often identified as a major spectrum of psychopathology and is often reflected in one of the major factors explaining covariation in MMPI-2-RF scales, it has not been identified in factor analyses of the PAI full scales. One reason for this finding has to do with participant sampling, insofar as no factor analyses have been based on samples with a high representation of psychotic individuals. A second reason has to do with the proportion of scales on the PAI targeting thought dysfunction. Only two full scales, Schizophrenia (SCZ) and Paranoia (PAR), directly target psychotic content, and several of the subscales of these full scales will tend to relate more strongly to other factors (such as social detachment, as described above). Like other broadband measures with a relatively small number of scales tapping thought dysfunction (e.g., the Schedule for Nonadaptive and Adaptive Personality [SNAP] or Dimensional Assessment of Personality Pathology [DAPP]), the proportion of content on the PAI may not be sufficient to yield a robust thought-dysfunction factor. That being said, the PAI scales have been shown to be empirically effective in distinguishing between individuals with and without psychotic disorders. For example, Klonsky (2004) reported an effect size difference of $d = 1.29$ in distinguishing schizophrenic and non-schizophrenic patients using PAI SCZ.

CONCLUSIONS AND FUTURE DIRECTIONS

In the past several decades, empirical literature has clearly supported a dimensionally based MCLM hierarchy for psychopathology, which defies current thematic organizations represented in diagnostic manuals. These dimensional models are likely to be more useful to neuropsychology and mental health practitioners because research continues to identify and elaborate on neurobiological and psychosocial referents for the liability factors, rather than focus on distinct and fallacious categories of disorder. In this chapter, we have reviewed how two of the most commonly used, omnibus personality inventories in psychological practice, the MMPI-2-RF and PAI, map onto these empirical psychopathology structures. The
results are quite impressive for both inventories, and it is important to note that none of these analyses was ever rigged or otherwise set up to confirm the extant structures, rather, exploratory analyses identified them in parallel. Subsequent validity research on both MMPI-2-RF and PAI scale scores clearly indicates that the higher-order structures and the scales that compose them reflect constructs that are located within nomological networks similar to those in the extant literature. Therefore, clinical neuropsychologists and other mental health practitioners who use these inventories in practice can rest assured that their scale scores map onto contemporary and empirically validated models of psychopathology, as well as can be used to generate hypotheses about diagnostic considerations (based on current nosologies) and standing on individual difference personality traits.

Even in light of these sanguine conclusions, there is still much work needed in both empirical investigations of psychopathology structures and the assessment of these structures as we move forward. As would be expected from the methods used to conduct latent-structure analyses, many of our current concepts of the structure of psychopathology, such as that represented in the MCLM, are a result of the types of symptoms and difficulties that were examined, as well as the types of individuals who were included in the studies' samples. We have tried to highlight in this chapter the effects of these methodological issues with our inclusion of three-, four-, and five-factor models of psychopathology. However, our understanding of psychopathology from a dimensional point of view is ever evolving. Future research is needed to reconcile current ambiguities (e.g., an independent somatization factor?) and to further establish a replicable structure that accounts for more of the dysfunctions practitioners encounter in their diverse practices (e.g., impulse-control disorders, eating disorders, paraphilias). Equally important for future work is ensuring that assessment instruments already in use, such as the MMPI-2-RF and the PAI, map onto emerging personality/psychopathology structures. Research of this type allows us to bridge the divide between categorical conceptualizations currently necessary for medical documentation and financial reimbursements and dimensional models that allow large bodies of clinical science research to be more easily applied in routine practice. These efforts will require that both assessment scholars and practitioners move away from the categorical thinking about psychological dysfunctions we have all been trained to use, as well as crystallized beliefs about the distinctions between psychopathology and personality. The previous efforts reviewed in this chapter represent the first steps toward this type of work, both in terms of central liabilities leading to mental difficulties and how our major assessment instruments conform to these structures. However, it should be clear that much additional work is needed, especially concerning mapping existing scales onto more specific liabilities in personality and psychopathology hierarchies.

AUTHOR NOTES

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NOTES

1. To our knowledge, the model being described in this chapter has not been given an official name, perhaps because this would not be in the "model in development" spirit that pervades conclusions sections in reports of these studies. For ease of reference, we have given the model a name in this chapter. Although it is a mouthful, we hope the reader will forgive us for choosing "Multivariate Correlated Liabilities Model." We chose this name because the discussed models represent multivariate extensions of the Correlated Liabilities Model (Klein & Riso, 1993; Neale & Kendler, 1995).

2. The latter abstraction is typically psychoticism/thought dysfunction when sufficient indicators of such individual differences are included; however, when predominant measures of the five-factor model are used, openness tends to appear at the fifth level.

3. The nature of the third factor tends to depend on the sample in which the analysis is conducted (see, for example, Morey, 2007; and Hoelzle & Meyer, 2009).

REFERENCES


Poster presented at the Annual Meeting of the Society for Personality Assessment, Chicago, IL.


When Is a Test Reliable Enough and Why Does It Matter?

STEPHEN C. BOWDEN AND SUE FINCH

It is important to recognize that any obtained score is only one in a probable range of scores whose size is inversely related to the test reliability. (Nunnally & Bernstein, 1994, p. 291)

There has never been any mathematical or substantive rebuttal of the main findings of psychometric theory. (Schmidt & Hunter, 1996, p. 199)

CLINICAL SCENARIO
A 67-year-old male patient is assessed after family physician referral for the evaluation of possible early dementia. In the context of no other significant illness, a family informant provides a history of minor everyday memory failures. Premorbid cognitive ability is judged to be of at least “high average” standing (corresponding to scores of 110 or above on a test of general cognitive ability, with a population mean of 100 and a standard deviation of 15; e.g., Wechsler, 2009) estimated from the patient’s educational and occupational attainment. On a well-validated test of anterograde memory function (or long-term retrieval ability; see Chapter 3 in this volume), with the same population mean and standard deviation, the patient scored 115. Assuming a test score reliability of 0.95, a 95% confidence interval (CI) was constructed centered on the predicted true score of 114 (see section below “The Predicted True Score”) and using the standard error of estimation (see section “The Family of Standard Errors of Measurement”). The 95% CI ranged from 108–121 (see Table 5.1). This CI includes the estimated premorbid range of ability, namely, above an Index score of 110. Hence the examining clinician concluded there was no objective evidence to infer that anterograde memory function is below that expected on the basis of premorbid estimates, with 95% confidence. The clinician recommends a healthy lifestyle with regular cognitive stimulation and a wait-and-see approach to the diagnosis of early dementia.