



PROJECT MUSE®

Examining the Foundational Assumptions of the Hierarchical Taxonomy of Psychopathology

Awais Aftab, MD, Aidan G. C. Wright, PhD, Craig Rodriguez-Seijas, Benjamin L. Hankin, PhD, Lee Anna Clark, PhD, Miriam K. Forbes, PhD, Eiko I. Fried, PhD, Christopher J. Hopwood, PhD, Robert F. Krueger, PhD, Kristian E. Markon, PhD, Holly F. Levin-Aspenson, PhD, Darren Haywood, PhD, David Preece, PhD, Roman Kotov, PhD, Colin G. DeYoung, PhD



Philosophy, Psychiatry, & Psychology, Online Advanced Publication, (Article)

Published by Johns Hopkins University Press

DOI: <https://doi.org/10.1353/ppp.0.a985726>

This is a preprint article. When the final version of this article launches, this URL will be automatically redirected.

➔ For additional information about this preprint article

<https://muse.jhu.edu/article/985726/summary>

EXAMINING THE FOUNDATIONAL ASSUMPTIONS OF THE HIERARCHICAL TAXONOMY OF PSYCHOPATHOLOGY



ABSTRACT: The Hierarchical Taxonomy of Psychopathology (HiTOP) emerged to address critical shortcomings inherent to traditional psychiatric classification systems such as the *Diagnostic and Statistical Manual of Mental Disorders* and *International Classification of Diseases*, notably their categorical structure, high comorbidity across categories, and within-diagnosis heterogeneity. HiTOP adopts an empirically derived, dimensional, and hierarchical approach, organizing psychopathological phenomena based on their patterns of observed covariation. This paper explores essential conceptual and philosophical considerations around HiTOP, examining its theoretical assumptions about dimensionality and hierarchy, the nature and interpretation of latent variables, the notion of psychopathology, considerations around validity, and the role of epistemic and non-epistemic values in shaping scientific objectivity. HiTOP is a descriptive model based on quantitative evidence (such as taxometric and factor-analytic approaches), but it is also a nosological project that exists within a particular sociocultural and historical context. As an illustration

* Awais Aftab, awaisaftab@gmail.com

Department of Psychiatry, Case Western Reserve University School of Medicine, United States
The authors report no conflict of interests.

Article submitted on July 13, 2025
Revision submitted on October 27, 2025
Accepted on November 3, 2025

AWAIS AFTAB, MD, AIDAN
G. C. WRIGHT, PHD, CRAIG
RODRIGUEZ-SEIJAS, PHD, BEN-
JAMIN L. HANKIN, PHD, LEE
ANNA CLARK, PHD, MIRIAM
K. FORBES, PHD, EIKO I.
FRIED, PHD, CHRISTOPHER J.
HOPWOOD, PHD, ROBERT F.
KRUEGER, PHD, KRISTIAN E.
MARKON, PHD, HOLLY F. LEVIN-
ASPENSON, PHD, DARREN HAY-
WOOD, PHD, DAVID PREECE,
PHD, ROMAN KOTOV, PHD, &
COLIN G. DEYOUNG, PHD*

of the role of values, the applicability of HiTOP to marginalized minority populations is discussed, highlighting ongoing efforts toward ensuring inclusivity and representational equity. By addressing these conceptual foundations, this paper lays groundwork essential for future philosophical inquiry, empirical research, and practical applications of the HiTOP framework.

KEYWORDS: Psychiatric Nosology; Dimensional Classification; Latent Variables; Quantitative Evidence; Epistemic Values

THE HIERARCHICAL TAXONOMY of Psychopathology (HiTOP) consortium emerged in 2015 as an initiative to create a classification scheme that addresses fundamental limitations in traditional psychiatric classification systems by creating a model based on psychometric analyses and validity evidence (Kotov et al.,

2017). HiTOP represents a significant departure from conventional diagnostic approaches—such as the *Diagnostic and Statistical Manual of Mental Disorders* (DSM; American Psychiatric Association, 2022) and the *International Classification of Diseases* (ICD; World Health Organization, 2019). It embraces a dimensional and hierarchical framework for understanding psychopathology, with an explicit emphasis on creating a taxonomy of symptoms based on quantitative structural evidence. By contrast, traditional approaches rely on classification schemas inherited from clinical descriptive traditions, shaped by clinical consensus and validity evidence, and are based on the assumption that mental disorders are best organized as polythetic categories regardless of whether those categories are statistically coherent. HiTOP's development was motivated by several critical limitations of traditional diagnostic systems: Their categorical rather than continuous nature (which is increasingly challenged by research findings), inadequate handling of diagnostic co-occurrence, within-diagnosis heterogeneity, and the frequent use of “Other Specified/Unspecified” diagnoses. These limitations have impeded progress in psychiatric research and present obstacles in clinical practice. The HiTOP model is structured hierarchically, organizing psychopathology from narrow to broad dimensions based on patterns of statistical covariation. At its most granular level, the model encompasses specific symptom components and maladaptive traits. (The term “symptom” here is used to encompass both subjective experiences and observable signs.) Symptoms and traits cluster into syndromes and subfactors, which in turn aggregate into broader spectra. At the highest level, these spectra are organized into super-spectra, including a general psychopathology factor (“p factor”).

In this paper, we elaborate important conceptual and philosophical considerations relevant to HiTOP. Prior publications from the HiTOP consortium have mainly focused on the HiTOP structural model, relevant psychometric data, validity evidence, and clinical application. Conceptual assumptions have received some attention in previous HiTOP publications (Kotov et al., 2021; DeYoung et al., 2022a, 2022b; Forbes et al., 2024), yet foundational questions—especially

those informed by the philosophy of psychopathology—remain under examined. This paper offers a structured overview of the theoretical assumptions and guiding principles that underpin the HiTOP model. In particular, we discuss the assumptions that psychopathology is dimensional and hierarchically arranged, the nature of latent variables in the framework, the role of values in the HiTOP consortium's approach, and the notion of psychopathology as it exists in the HiTOP model. We hope that this effort stimulates others to continue this undertaking. This paper is written by a subset of members of the HiTOP consortium. Therefore, it offers an insider perspective on the assumptions and values guiding HiTOP and how they can be understood, but it is not our intention to settle these questions definitively. Instead, we hope to lay the groundwork for future efforts examining philosophical aspects of HiTOP, both within and outside the consortium. The philosophical and practical issues addressed in this paper are matters of active debate.

WHAT DOES THE HiTOP MODEL REPRESENT?

The most fundamental goal of HiTOP is to accurately describe patterns of covariation among features of mental illness. This stems from an assumption that better description of psychopathology will allow us to study and treat it better, just as better descriptions of organisms using the Linnaean system helped pave the way for research that led to the theory of evolution. HiTOP is descriptive in the sense that it focuses on the quantitative structure of covariance among psychopathological phenomena. It is important to clarify at the outset that the official HiTOP model (1) is a heuristic, visual model rather than a causal or even strictly statistical model. It is based on statistical evidence, but it is not intended to depict any particular mathematical model. Thus, it is not a latent variable model in the usual sense, despite synthesizing much evidence from latent variable models. Although HiTOP constructs can be operationalized as latent variables, the official HiTOP model is expository scaffolding, not a fitted statistical model; it represents patterns of covariation in

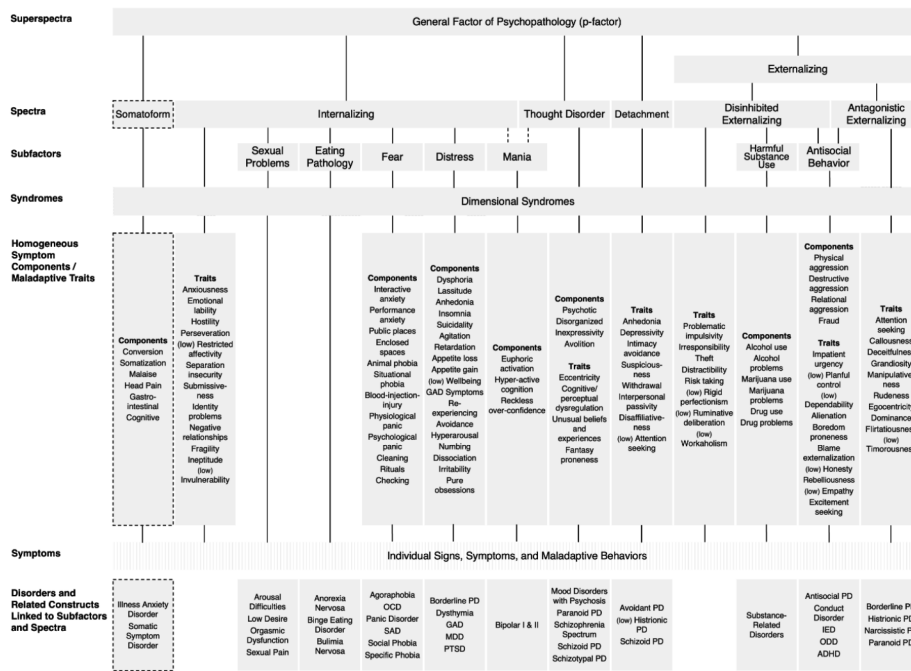


FIGURE 1.

psychopathology hierarchically without specifying exact mathematical values or operations for the covariance relations among constructs.

The HiTOP consortium relies primarily on quantitative evidence. Doing so is assumed to minimize decisions driven by special interests of stakeholders, ideological traditions, or socio-political influences (Krueger et al., 2018). The consortium aims for transparency in its evaluation of available evidence and seeks to mitigate future bias by establishing systematic criteria for evidence evaluation through a revisions protocol and dedicated revisions workgroup (Forbes et al., 2024). HiTOP constructs for which available evidence is uncertain or subject to disagreement are acknowledged as preliminary. A primary example is the somatoform spectrum, which is preliminarily included in HiTOP as a distinct higher-order spectrum, although it is unclear whether it should be a sub-spectrum in the internalizing spectrum instead. Woodling, Wygant, Umlauf, and Marek (2022) and Watson et al. (2022) have reviewed the extant evidence, concluding it leans towards the former. Constructs with very limited evidence are

not included despite being present in traditional diagnostic systems. The model must balance stability and flexibility: stable enough to support research and clinical applications, while also adaptable enough to incorporate new findings in a timely fashion.

The base of the HiTOP model is made up of clinical symptoms and traits (with the distinction between symptoms and traits considered to be primarily one of temporal extent—traits are general tendencies exhibited over time, whereas symptoms are manifest during a specified time period; DeYoung et al., 2022a). These features form the building blocks of the HiTOP model and the resulting HiTOP profile for any individual. So far, the symptom components and maladaptive traits included in HiTOP have been identified from structural analyses of instruments with reasonably comprehensive coverage of various domains of psychopathology (Kotov et al., 2017), such as the Minnesota Multiphasic Personality Inventory-2 Restructured Form, Structured Clinical Interview for DSM-IV Axis I Disorders, Composite International Diagnostic Interview, Brief Psychiatric Rat-

ing Scale, Positive and Negative Syndrome Scale, Personality Assessment Inventory, Externalizing Spectrum Inventory, and Achenbach System of Empirically Based Assessment. Impairment and disability are not included in the core model. Instead, assessment of impairment is recommended in addition to assessment of HiTOP dimensions (Ruggero et al., 2019).

HiTOP's core model is not etiologically guided, nor does it reveal the causes and mechanisms involved in psychopathological states and associated disability. It is an aspirational goal that knowledge about etiology or mechanisms will stem from ascertaining a research-supported descriptive structural model first (Patrick & Lenzenweger, 2023). The strategy used by the HiTOP consortium has been first to delineate a phenotypic model based on psychometric evidence and then examine its external validity using validators standardized by the DSM-5 steering committee, informally known as Kendler-Kupfer criteria (Kendler, 2013; Zachar et al., 2019). Reviewing the validity evidence for HiTOP spectra has been a primary focus in the following publications: Kotov et al. (2020), Krueger et al. (2021), Jonas et al. (2024), Kotov et al., 2024, and Watson et al. (2022). The validators include antecedent (familial aggregation and/or co-aggregation; sociodemographic and cultural factors; environmental risk factors; prior psychiatric history), concurrent (cognitive, emotional, temperamental, and personality correlates; biological markers; patterns of comorbidity), and predictive (diagnostic stability; course of illness; and response to treatment) validators.

Statistical continuity does not necessarily imply causal continuity. A statistically homogeneous dimensional distribution may still ultimately arise from distinct subgroups of etiological mechanisms. The idea that low, middle, and high ends of a dimensional trait might involve different mechanisms has exemplars in both psychology and medicine. An illustrative example is that of IQ and intellectual disability. For individuals in the middle range of IQ and mild intellectual disability, typical variation reflects genetic influences and environmental factors such as education and socioeconomic status. Severe intellectual disability, however, is often caused by distinct mechanisms

such as specific genetic mutations or chromosomal abnormalities, such as Down syndrome, or early-life brain injuries (Reichenberg et al., 2016). Such causal differences in various ranges of psychopathology dimensions have not yet been demonstrated to be widespread, but if such differences exist, they can still be compatible with HiTOP, because variation in a psychopathological domain can be captured reliably on a dimension even if there are discontinuities in underlying causes. For example, certain cases of psychotic disorders are associated with genetic mutations of large effect, but this fact is not incompatible with a dimensional characterization of psychotic disorders (Legge et al., 2021). Unlike the distribution of IQ, it is notable here that the whole range of the p factor appears to be part of the same underlying continuum affected by the same genetic factors, such that genetic variants associated with the p factor in the mild range are also associated with p factor in the moderate and severe range (and vice versa) (Liu et al., 2024). However, molecular genetic evidence indicates that the p factor is not strongly associated with specific genetic variants, relative to spectrum-level constructs, which may indicate that the p factor is more of an emergent property than indicative of causal etiology (Grotzinger et al., 2022). This finding further illustrates that HiTOP constructs are not intended to indicate a particular causal model, in the same way that IQ is not a causal construct.

CONSIDERATIONS AROUND DIAGNOSTIC VALIDITY IN HiTOP

Robins and Guze (1970) proposed five criteria (“phases”) for “diagnostic validity”: clinical description, lab studies, differentiation, follow-up, and family studies. Kendler (1980, 1990) expanded this to eight criteria, explicitly using the term “validators.” Validators were intended to demonstrate that diagnostic categories described real syndromes with predictive power. The DSM-5 Steering Committee listed eleven validators, divided into antecedent, concurrent, and predictive categories. The committee also designated certain validators as high priority. Because validators do not necessarily converge neatly, how to aggregate

validator evidence is a difficult scientific and philosophical question (Solomon, 2022; Solomon & Kendler, 2021). Historically, committees have relied on informal judgments about the “bulk of the evidence.” Solomon and Kendler (2021) outline five possible aggregation methods: informal aggregation, weighted aggregation, formal aggregation, accepting underdetermination, and including values. None resolves the problem of validity definitively. The HiTOP revisions protocol does not distinguish between validators as higher versus lower priority and gives an overall rating for the strength of evidence for each validator supporting a revision proposal based on individual studies’ scores calculated to weight the strength of the evidence from each study (Forbes et al., 2024).

Zautra (2025) identified four distinct validity conceptions, each linked to a major framework: The first is diagnostic validity, the standard that grew out of Robins and Guze’s influential work in the 1970s and that remains central to the DSM. The second is structure-first psychometric validity, as exemplified by the HiTOP project. The remaining two conceptions are network psychometric validity (represented by the network approach to psychopathology) and etio-pathophysiological validity (embodied in the National Institute of Mental Health’s Research Domain Criteria initiative).

Zautra describes structure-first psychometric validity used by HiTOP as a “three-stage validation process.” The first and most critical stage is the evaluation of structural validity. This concerns the extent to which a construct explains the empirically observed covariance among signs and symptoms of psychopathology. Structural evidence typically comes from exploratory and confirmatory factor-analytic studies, with an emphasis on latent variable models. These models generate factor loadings (paths between measured variables and latent constructs) and the models are then judged by parsimony, interpretability, replicability, and/or the overall goodness of fit (Forbes et al., 2021; Waldman et al., 2023). The second stage addresses external validity, the degree to which evidence for a given HiTOP construct aligns with diagnostic validators discussed previously. The third stage involves evaluation of reliability as well as clinical utility and predictive utility.

Although the HiTOP consortium has not used the term “structure-first psychometric validity,” Zautra is correct about structural evidence as the first step of validation, followed by evaluation of external validity. Evaluation of reliability is included within assessment of structural validity (not deferred to a third step) and clinical utility is not formally considered a step of the validation process by the HiTOP consortium, although it is recognized as important and taken seriously (Conway, Kotov, Krueger, & Caspi, 2023), hence the validation process is better described as a two-stage rather than three-stage process.

Zautra also notes some unexpected points of convergence between validation efforts of different approaches, with which we concur. HiTOP, despite its criticism of DSM-style categories, adopts external validators from the Robins and Guze tradition. HiTOP also continues to rely on expert curation. Although revisions to the HiTOP model prioritize systematic evaluation of quantitative evidence by a set of transparent criteria and processes, decisions about what to include and how to interpret evidence ultimately still depend on decisions made by committees of specialists.

HiTOP AND SCIENTIFIC OBJECTIVITY

HiTOP has been described in official publications as a “quantitative nosology based on consensus of evidence” (Kotov et al., 2021), which can easily be interpreted as a claim that HiTOP is a “purely empirical” or “atheoretical” nosology based only on data. This would make it a project operating within a logical positivist philosophical worldview (Ray, 2017). However, such a claim is neither accurate nor viable from the perspective of contemporary philosophy of science (Douglas, 2014; Reiss & Sprenger, 2020); it is also not the intent of the HiTOP consortium, which has made clear that its use of the term “atheoretical” refers only to its avoidance of using etiological theory to shape the taxonomy (DeYoung et al., 2022b).

“Naive scientific realism” seeks to describe the world independent of human observation or interpretation. However, all observations are influenced by theoretical assumptions. Scientists always operate within a paradigm—a set of shared

assumptions, methods, and standards that guide their research. Scientific “objectivity” is therefore always also an outcome of the theoretical frameworks and social contexts in which knowledge is produced (Sadler, 2005). HiTOP is neither purely empirical nor devoid of assumptions. Assumptions of dimensionality and hierarchy are two key explicit assumptions of the HiTOP model, but there are also implicit theoretical assumptions that come with the emphasis on statistical methods such as factor analysis and historical decisions regarding what belongs in the domain of psychopathology. These assumptions are discussed in detail in this paper and highlight the theory-laden nature of HiTOP. Scientific objectivity is not a matter of accurately reflecting an independent reality with a “view from nowhere.” A philosophically mature conception of scientific objectivity frames it as an outcome of the theoretical frameworks and social contexts in which scientific knowledge is produced (Longino, 2022). Scientific objectivity is an aspiration to produce knowledge that would be agreed upon by any potential researcher who shared a sufficiently commensurate set of measurement tools and foundational assumptions.

HiTOP exists in a particular historical context of theory and discovery. It inherits a long tradition of dimensional models of psychopathology (e.g., Moore, 1930; Wittenborn, 1931; Lorr, 1954; Plant, 1921; Spitzer, Fleiss, Burdock, & Hardesty, 1964), is shaped by the scientific and clinical limitations of preceding nosological efforts such as DSM and ICD, and contrasts with other contemporary approaches such as the Research Domain Criteria (Kozak & Cuthbert, 2016) and Psychodynamic Diagnostic Manual (Lingiardi & McWilliams, 2017). The primary reliance on psychometric evidence as a guiding principle is shaped by the view that the DSM and ICD have relied too much on clinical viewpoints and consideration of pragmatic needs and have prioritized the understanding of mental disorders as polythetic categories at the expense of statistical coherence.

In the philosophy of science, values are often divided into epistemic and non-epistemic. The division is philosophically contested (Douglas, 2009; Longino, 1990), but serves as a useful guide for our discussion. Epistemic values pertain directly

to the pursuit of scientific knowledge and include features such as empirical adequacy, predictive power, internal consistency, and parsimony. Non-epistemic values, in contrast, are ethical, clinical, social, political, and cultural values that influence or guide scientific practice. Examples would include ensuring that research does not harm vulnerable individuals or that classifications are not simply valid but also acceptable to clinicians and usefully guide clinical practice. The value-free ideal suggests that science should be free from the influence of social, ethical, and political values, relying solely on epistemic values. However, philosophical debates in recent decades have questioned this ideal. Philosophers of science have argued that values are an inherent part of scientific practice and that it is neither possible nor desirable to aim for science to be entirely value-free (Douglas, 2014; Reiss & Sprenger, 2020). Scientific “objectivity” is achieved through the social processes that produce knowledge (Longino, 2002), and scientific methods are judged by their ability to withstand and incorporate diverse critical perspectives (Sadler, 2005). Perspectives from marginalized groups sometimes offer unique epistemic advantages, revealing biases and assumptions that might be invisible from dominant perspectives (Haraway, 1988; Harding, 2015).

WHAT CONSTITUTES “PSYCHOPATHOLOGY” IN HiTOP?

HiTOP does not have an official working definition of “psychopathology.” The consortium has been concerned primarily with structural organization, but not so much with defining mental disorder or psychopathology. Historically, HiTOP takes the scope of psychopathology to encompass clinical features that have traditionally been the focus of clinical and research attention. In other words, HiTOP has implicitly assumed that “psychopathology” is what clinicians and researchers have studied so far under this rubric. Conceptions of psychopathology in clinical practice and research are highly heterogeneous and historically contingent (Aftab & Ryznar, 2021). For instance, Zachar noted that gradual expansion of the domain of psychopathology has resulted in an “im-

perfect community” of conditions that are alike in many ways, but without one way in which they are all alike (Zachar, 2014). Similarly, Radden and Tsou (2024) commented that “through a different historical or cultural lens, the assembled variations known today as mental disorders would likely appear incoherent and arbitrary.” The domain of clinically recognized psychopathological states resists a unifying philosophical conception, and HiTOP is no different.

The terms psychopathology and mental disorders are often used synonymously, although there are distinctive connotations to each term. “Mental disorder” corresponds with official diagnostic manuals such as the DSM and ICD. The DSM-5-TR, for instance, defines mental disorder as “a syndrome characterized by clinically significant disturbance in an individual’s cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities.” The fundamental elements of this definition—clinical significance, dysfunction, and distress/disability—have remained unchanged from the DSM-III in 1980. However, these elements are not defined within the DSM, leaving them to be interpreted by clinicians. Psychopathology, in contrast, is a more fluid term lacking an official definition. It is closely related to the near-synonymous and now less favored term “abnormal psychology.” The term “psychopathology” generally refers to psychological dysfunctions in aggregate as well as to the scientific study of such phenomena. The concept of “dysfunction” is closely related to that of “psychopathology,” yet there is no professional consensus on how “dysfunction” is best understood; views range from understanding dysfunction as maladaptive patterns of behavior (in relation to the individual’s own goals and needs) to failure of evolved mechanisms. It also remains unclear whether psychological dysfunction can be cleanly separated from daily life functional impairment, the way it can be for many cases of biological dysfunction. In the absence of impairment, we have no agreed-upon way to determine whether a psychological difference is a manifestation of a dysfunction.

The HiTOP model has a particular focus on the statistical structure of covariation among psychopathological phenomena, with considerations of dysfunction, harm/disability, and clinical significance bracketed away. Any complete theoretical account of psychopathology has to address these additional concerns. For example, symptom covariation doesn’t commit one to whether symptoms are functional or dysfunctional (with reference to some specific definition of *dysfunction*), a manifestation of difference or disorder, adaptive or maladaptive, or harmful or beneficial. Any effort to define exactly what constitutes psychopathology must grapple with the degree to which these concepts are entwined with pragmatic, sociocultural, and sociopolitical considerations. Disorder status as it currently exists in clinical practice is not simply a fact of nature (Stein et al., 2024). It depends on consensual judgments of abnormality, atypicality, and harm.

HiTOP’s core model addresses only some components of the mental disorder concept. Different symptom profiles in HiTOP could acquire the status of being pathological once they satisfy certain conditions outlined in a specific theory of psychopathology. For instance, in Wakefield’s (2007) harmful dysfunction account, symptoms are dysfunctional if they are the result of a failure of an evolutionary mechanism to perform its selection function—arguably an unknowable criterion. In the DSM, the notion of dysfunction is considered commonsensical and folk-psychological (Aftab & Rashed, 2021); that is, clinical presentations acquire the status of psychopathological when they meet our everyday and clinical judgments of what is excessive, out of proportion, lacking meaningful connections, persisting beyond expected socio-cultural norms, and so on. Other philosophical approaches include disease defined by statistical deviation from species-typical functioning (Boorse, 1977), homeostatic property clusters that cause impairment (Tsou 2021), behaviors that are counter to an individual’s self-maintenance and adaptation needs (Nielsen & Ward, 2020), and persistent failure to move toward one’s goals (DeYoung & Krueger, 2023). As an illustrative example, HiTOP is even compatible with a toy model of social constructionism (Glackin, 2019) in which all it takes for something to be psychopathological is a

particular sort of social attitude. Even though the “social attitude” conception of psychopathology isn’t intended to represent an actual position held by practitioners in the field of psychopathology, the relevant point here for conceptual illustration is that it is not strictly incompatible with HiTOP’s core model, which only describes patterns of symptom covariation.

Although HiTOP as a statistically informed model is agnostic regarding notions of psychopathology, a theoretical account of psychopathology can nonetheless be enriched by taking the implications of the HiTOP model seriously. For instance, the HiTOP model suggests a continuity between dimensions of personality (the Big Five) and dimensions of psychopathology (HiTOP spectra) (Kotov et al., 2017; Widiger et al., 2019), and this alignment provides an opportunity for theories of psychopathology seeking to explain them in terms of shared mechanisms (Clark, 2005). For an example of such a theory of psychopathology, see the cybernetic theory of psychopathology by DeYoung and Krueger (2018, 2023).

LATENT VARIABLES AND HiTOP

Because the HiTOP framework is built on research-based evidence regarding the covariation of domains of psychopathology, it relies heavily on statistical methods that have been designed to interrogate such patterns of covariation, including factor analysis and principal components analysis. Factor analysis, both exploratory and confirmatory, has been especially prominent in HiTOP’s evidence base, and these methods entail a reliance on latent variables. The interpretation of latent variable models has been contentious historically, which makes it important to address. The term “latent variable” is often used to describe any construct that is studied without being measured directly. However, in the context of statistical modeling of the sort used in developing the HiTOP model, its meaning is more specific and more circumscribed. A latent variable is defined mathematically as the shared variance of its indicators. Thus, it is simply a representation of a portion of the variance of a set of observed (measured) variables that is causally agnostic (DeYoung & Krueger, 2020).

A reflective construct is commonly understood as a latent (indirectly observed) variable that is “reflected” in the observed measurements. The indicators are (partly) manifestations of the construct. For example, the construct of “neuroticism” is thought to be reflected in various observable or reportable behaviors such as worry, irritability, self-criticism, vulnerability to stress, etc. Different indicators of neuroticism tend to show significant intercorrelations. Changes in neuroticism accompany corresponding changes across multiple indicators simultaneously. And finally, various indicators of neuroticism are to some degree interchangeable—different combinations of indicators can provide valid measurement of neuroticism, as long as the sample of indicators is sufficiently representative of the breadth of the neuroticism construct. Factor analysis and structural equation modeling (SEM) adopt the convention of illustrating these reflective relations via arrows that point from the latent variables to the indicators and represent regression paths (but not necessarily causal pathways).

Formative constructs, in contrast, are created or “formed” by their indicators. In these cases, the indicators combine to define or produce the construct, rather than being reflective of it. Socioeconomic status serves as a classic, albeit controversial, example of a formative construct. Indicators such as income, education level, and occupational status collectively create or form a person’s socioeconomic status, without regard to the degree to which these indicators are related to each other. Changing one indicator (e.g., income) affects the overall construct value (one’s socioeconomic status). When formative variables are diagrammed, the arrows point from the indicators to the formative construct. However, such diagrams are not properly considered equivalent to latent variable diagrams with the arrows reversed. As has been explained in detail elsewhere (DeYoung & Krueger, 2020; Jonas and Markon, 2016), formative constructs are not latent variables (representations of shared variance). When researchers claim to build a formative latent variable (a model where multiple observed variables point to a latent variable), they are not actually fitting such a model. In SEM, a model with arrows pointing from observed measures to a latent con-

struct is mathematically unidentified unless that latent construct also has arrows pointing from it to some putative outcome variable(s). When that is the case, the latent variable in question is actually a reflective latent variable defined by the outcome variable(s) to which the arrows point. Formative variables can be created only by summing or averaging indicators, not as latent variables.

The HiTOP model is intended to be as agnostic as possible about the nature of latent variables and does not assume that a latent variable represents a single common cause, or even a set of common causes. Although some of the mathematicians who developed latent variable approaches (e.g., Spearman and Jöreskog) were explicitly interested in uncovering the underlying causes affecting the variables they measured, nothing about the mathematics of factor analysis or SEM necessitates a causal interpretation of the factor per se. All that is implied by a latent variable is that it can be used to represent—in a statistical or informatic sense—an observed variable or set of observed variables, as defined by some criterion of accuracy (e.g., model fit). A latent variable is a proxy for a defined indicator or set of indicators, that operates with some error of prediction or representation (Markon & Jonas, 2016; Markon, 2023). That a latent variable can be estimated from the covariation among indicators does require the assumption of some causal process at work among the indicators. However, the causal processes giving rise to a set of indicators may be 1) common causes (processes that influence some or all indicators similarly), 2) the result of mutualism in which the narrower constructs measured by each indicator interact causally with each other (van der Maas et al., 2006), or 3) some combination of the two. (Mutualism applied to psychopathology says that symptoms and lower-order traits co-activate and reinforce each other: for example, chronic worry → insomnia → fatigue → poor concentration → more worry; or social withdrawal → diminished positive affect → anhedonia → more withdrawal. These feedback loops generate the observed covariation as an emergent property of the system's network dynamics.)

Confusion arises in part because latent variable models are often depicted using the same visual

vocabulary of circles, boxes, and arrows that are used in causal models. However, just like in regression, the arrows in mathematical SEM diagrams represent statistical associations, which are not necessarily causal influences. Statistical models can be used to make strong causal inferences only when the data are derived from methods that allow such causal inference (e.g., through random assignment and manipulation of independent variables, genetically informative designs, or designs involving instrumental variables), and it is important not to confuse statistical models with causal models (DeYoung & Krueger, 2020; Fried, 2020). Reflective latent variable models, in which factors have paths leading to their indicators, are often described as if they were causal models (Edwards & Bagozzi, 2000), but they need not be interpreted that way, and typically are not in HiTOP publications. The indicators reflect the latent variables only in the sense that some of their variance is contained in or represented by the latent variable (Jonas & Markon, 2016; Markon & Jonas, 2016).

Latent variables can be considered most broadly as organizing principles for patterns of covariation in data (Borsboom, 2023). In the way they are used in HiTOP, they can be considered more specifically as dispositions. However, it is important to emphasize that a disposition need not be conceived as an unobservable entity internal to the person. Rather, a disposition is simply a tendency to act or function in some way and can be measured for a given individual without implying anything about the causal source(s) of that disposition. To interpret latent variable models in causal terms—an interpretation not inherent to the HiTOP model—then one could think of these tendencies or dispositions as causes of the indicators in the model, in a limited sense. This is not merely tautological because one can then reason from knowledge of a general tendency of a person (e.g., the tendency toward internalizing problems) to the conclusion that that person is more likely than others to have problems that fall within the same broad class (e.g., sexual dysfunction) now or in the future, even if one has never observed that particular problem in that person (Funder, 1991). This is a very weak form of causal inference

because it merely states that a general tendency toward a class of states increases the likelihood of being in any state in that class. HiTOP does not currently support stronger causal interpretation. Thus, HiTOP remains a descriptive system without claims about the underlying causes of indicator covariation.

Nonetheless, identifying accurate correlational structures can make identifying causal structures easier (Jonas & Markon, 2016). Therefore, HiTOP assumedly serves as an important step toward explaining the etiology of psychopathology (supported by validity evidence for HiTOP spectra: Jonas et al., 2024; Kotov et al., 2020; Kotov et al., 2024; Krueger et al., 2021; Watson et al., 2022). If a latent variable model accurately represents patterns of covariation in symptoms appearing in the population, then it accurately represents its target. Factor analyses typically attempt to maximize simple structure (in which each observed variable has a high loading for one factor but low loadings for the other factors). Other criteria for factor structure could be used, with mathematically equivalent results, but the parsimony of simple structure is assumed to make factors easier to interpret and to make meaningful correlates of factors easier to identify. Indeed, evidence suggests that organizing symptoms factor-analytically and targeting simple structure yields stronger associations (e.g., with task-derived cognitive variables) compared with organizing them according to traditional diagnostic constructs (Fox et al., 2024; Kotov et al., 2022). At some point, etiology may be incorporated into HiTOP, but for now there is insufficient etiological evidence to arrive at the degree of consensus necessary for inclusion.

Factor models assume that a particular set of mathematical constraints can be used to describe the data accurately (which is not the same as imposing causal structure), and these can be inappropriate if the model does not accurately represent real-world patterns. Different statistical models are appropriate for different data, each imposing different assumptions and biases, and standard factor models may be inappropriate depending on the data. Importantly, HiTOP does not rely exclusively on factor analysis (although the revision protocol does prioritize it; Forbes et al., 2024)

and welcomes any method that can shed light on the distributions and covariance of symptoms. No model is perfect; each imposes assumptions and biases of one kind or another when working with real data. Hence, further diversification of the statistical models used to generate HiTOP's evidence base could be beneficial.

The debate over the reality of latent variables is often linked to the issue of taking a realist versus anti-realist philosophical stance. Scientific realism and anti-realism are philosophical positions on the nature of unobservable entities posited by scientific theories. Do unobservable entities posited by theories with good empirical support—such as quarks, dark matter, or the g-factor of intelligence—actually exist and correspond to something in the real world? Realism is committed to the reality of unobservables, whereas anti-realism eschews such commitments and maintains that talk of unobservables is a convenient instrument that allows us to create empirically adequate models of observables. New scientific theories will posit their own unobservables that may do a better job at explanation and prediction, and the history of science is full of now-discarded unobservables (such as phlogiston, caloric, and ether).

It has been argued that realism about latent variables corresponds to the view that traits like neuroticism exist as hidden causes of consistent patterns of behaviors, whereas anti-realism corresponds to the view that instead of hidden causes or essences, relationships among behavioral indicators arise from direct relationships among them (e.g., mutualism or network theory) (Zachar, 2014; Zachar, Banicki, & Aftab, 2023). This is true to the extent that latent variables are (erroneously) understood only to be causal explanations. It is important to remember that realism and antirealism are claims about hypothesized unobservable entities. Realist/anti-realist attitudes towards latent variables do not strictly apply if no unobservable entity is being posited. If latent variables are strictly understood in a statistical sense—as representing patterns of covariation—and no common causes are invoked, the question of realism or antirealism about the causes doesn't strictly arise. It could potentially be argued that an emphasis on the patterns of covariation is

aligned with structural realism, which is the view that what successful scientific theories capture about reality is mathematical structure and the relational properties rather than unobservable entities (Ladyman, 2023). This connection may be an interesting consideration for philosophical commentators to pursue further.

ASSUMPTIONS OF HIERARCHY AND DIMENSIONALITY

The HiTOP model assumes that psychopathology is best understood hierarchically; it can be described at various levels of specificity/generalizability. Although hierarchical models can statistically fit the data well, many alternative statistical models could potentially fit the same data to the same degree (Greene et al., 2019; Markon, 2019; Mulaik & Quartetti, 1997; Yung, Thissen, & McLeod, 1999). The assumption that phenotypes should be arranged within a hierarchy is untestable using only data on the covariance structure of features of psychopathology (Forbes et al., 2024), but can potentially be adjudicated to some extent through investigation of discriminant validity with external correlates or causes of the phenotypes at different levels of the hierarchy (see two examples where external validity was used to make decisions about optimal level in the hierarchy: Kotov et al., 2016; Michelini et al., 2019). Different hierarchical models can be proposed and empirically compared, but any particular hierarchical model will not be definitive on its own. HiTOP is similar to other hierarchical models that organize dimensional variables based on covariance and breadth. For instance, “neuroticism” as a personality dimension encompasses narrower facets, such as depressiveness and anxiousness, which are empirically distinguishable from each other based on factor models and external validity findings (McCrae, Costa, & Martin, 2005; Samuel & Widiger, 2008). Similarly, the Personality Inventory for DSM-5 (PID-5) represents maladaptive traits hierarchically; its depressivity scale, for example, loads onto both detachment and negative affectivity factors while remaining distinct from traits such as anxiousness (Krueger, Derringer, Markon, Watson, & Skodol, 2012).

The scientific debate between categorical and dimensional approaches, as conventionally stated, centers on whether human variations should be understood as differences of degree (quantitative variations along a continuum) or kind (qualitative, discrete, or typological distinctions). A meta-analysis of taxometric research reported that evidence supporting dimensional models was five times more prevalent than evidence supporting categorical models (Haslam, McGrath, Viechtbauer, & Kuppens, 2020). Mental disorders showed no greater tendency toward categorical structure than did normal variations in personality, response styles, gender, or sexuality. This provides substantial—although not conclusive—support for HiTOP’s assumption that psychopathological phenomena are best understood as continuously distributed within the population. Categorical constructs could be incorporated in the HiTOP model if sufficient psychometric evidence existed to support them. However, distributions of psychopathology indicators conform to dimensional accounts more closely and dimensions are more informative both internally and externally, based on metrics of reliability and criterion-related validity (e.g., Haslam et al., 2020; Markon, Chmielewski, & Miller, 2011).

Hopwood, Morey, and Markon (2023) identified three distinct uses of the term “dimension” in the psychopathology literature: 1) clinical categories operationalized as being on a continuum without regard to their indicators’ patterns of homogeneity or co-occurrence (e.g., symptom counts on depression rating scales or diagnostic prototypes such as borderline personality disorder as being on a spectrum), 2) dimensions operationalized in terms of empirically homogeneous constructs (e.g., factor scores defined by the fit of unidimensional factor models), and 3) empirically distinct constructs within hierarchical contexts characterized by continuity, homogeneity, and structural distinction with evidence of discriminant validity. HiTOP follows the third interpretation with an assumption of continuous, homogeneous, and structurally distinct constructs within a multidimensional framework with evidence of discriminant validity.

Specifically, dimensionality in HiTOP refers to continuous symptom distributions inter-individually *in populations* of individuals. It does not assume anything about symptom presence or change over time *within an individual*. Phase transitions in psychopathology, such as between states of health and illness, are hypothesized by dynamical systems theorists (Scheffer et al., 2024), and are, in theory, compatible with the HiTOP model. Within-individual changes may very well be characterized by discontinuities such as phase transitions, but these can still be consistent with a continuous distribution between individuals; as long as differences between individuals have a continuous distribution, they are compatible with HiTOP in this regard.

DIMENSIONS AND DIAGNOSTIC THRESHOLDS

Diagnostic thresholds serve to convert continuous variables, such as symptom counts, into categorical ones. There are strong practical incentives to approach health problems in terms of categories (e.g., for prevalence estimates) (Clark, Cuthbert, Lewis-Fernández, Narrow, & Reed, 2017). In medicine, dimensional distributions can at times be associated with a continuous but non-linear (e.g., sharp or exponential) change in outcomes and risks. This facilitates the determination of appropriate clinical thresholds and informs the weighting of pros and cons of interventions. For example, specific levels of hemoglobin A1c for diabetes or systolic blood pressure for hypertension are associated with exponential increases in associated health risks, which suggests the use of certain values as diagnostic thresholds. The official definition of essential hypertension is pragmatic and based on the level at which the benefits of intervention are thought to exceed those of inaction, but it is also recognized in the guidelines that each increment of 20 mm Hg in systolic blood pressure or 10 mm Hg in diastolic blood pressure doubles the risk of cardiovascular disease from 115/75 to 185/115 mm Hg (Mancia et al., 2023). The diabetes guidelines also refer to the presence of a non-linear, albeit continuous, relationship: “The diagnostic A1C cut point of 6.5% is associated with an inflection point for retinopathy prevalence,

as are the diagnostic thresholds for FPG and 2-h PG” (American Diabetes Association, 2014).

A body of research has examined whether similar meaningful thresholds exist for psychopathological dimensions. Although a systematic and comprehensive examination of symptom severity and impairment across dimensions of psychopathology is lacking, available research that has been conducted indicates that relationships between symptom severity and impairment across domains such as internalizing and positive psychotic symptoms tend to be linear, without clear cut-offs (Jonas & Markon, 2013; Gotlib, Lewinsohn, & Seeley, 1995; Hetrick et al., 2008; Markon, 2010). For psychotic disorders such as schizophrenia, it is often assumed that a drastic decline in functioning occurs at a certain threshold (Mitteroecker & Merola, 2024), but such a non-linear relationship along the psychosis spectrum has not yet been empirically demonstrated. In the absence of research-based data pointing towards sharp or exponential changes, diagnostic thresholds are often set by expert committees based on clinical consensus, obscuring the fact that these thresholds are somewhat arbitrary and masking the underlying continuity of mental health problems across the population. Without clear natural thresholds, determining the point for diagnosis often becomes an ethical or social decision (Hopwood et al., 2023) that entails, for example, societal attitudes toward mental health, the need to balance care with avoiding stigma, available resources, and a commitment to treating individuals fairly. Thus, the choice of diagnostic cut-points reflects not only scientific considerations but also broader societal values and public health priorities (Aftab, Banicki, Ruffalo, & Frances, 2024; Wakefield, 2007).

HiTOP publications accept the necessity of making categorical distinctions in clinical contexts (Kotov et al., 2022; Ruggero et al., 2019). This mirrors common medical practice, in which dimensional measurements such as blood pressure or cholesterol are parceled into pragmatic categories such as normal, mild, moderate, or severe. These practical cut-points can be tailored to specific clinical contexts. For instance, in primary care settings a more inclusive threshold might identify patients needing further evaluation, whereas de-

cisions about intensive treatments might warrant more conservative thresholds. Some initial work has established screening, diagnostic, and severity ranges for anxiety and depressive symptoms (Stasik-O'Brien et al., 2019). Importantly, HiTOP emphasizes that categories are practical tools rather than absolute distinctions, allowing for flexible clinical decision-making.

HiTOP at present doesn't offer a theoretical account of when psychological and behavioral dimensions are dysfunctional or psychopathological. HiTOP dimensions assumedly range from population typical, but not necessarily optimal, to atypical (including potentially bipolar dimensions in which "population typical" is a mid-point with atypicality extending in each direction), with thresholds and additional criteria being determined by the relevant theory of psychopathology (e.g., harmful evolutionary dysfunction, cybernetic dysfunction, folk judgments, etc.). HiTOP consortium publications suggest that dimensional scores can be used along with assessments of impairment or clinical risk to guide treatment decisions. Many available HiTOP-consistent measures of psychopathology include normative data that allow conversion to standardized T-scores, based on comparisons to representative community samples. These scores can serve as initial benchmarks for clinical decisions, with potential ranges such as 60 to 64 for mild, 65 to 69 for moderate, and 70 and greater for severe presentations. By adding such benchmarks, HiTOP dimensions at any level of the hierarchy can be converted into categories for practical and clinical purposes. Furthermore, whereas the thresholds of DSM categories are fixed by official consensus, diagnostic thresholds for HiTOP dimensions are flexible and context-dependent, with these T-scores serving only as initial benchmarks. T-scores are just one way to quantify severity and thresholds can also potentially be anchored to relevant external criteria, such as degree of functional impairment.

Philosophers have discussed psychiatric kinds in terms of natural kinds and practical kinds. Natural kinds are categories that are thought to reflect the objective structure of the world rather than being imposed by human interests. A natural kind has a set of underlying, stable properties that make its

members similar to each other in a way that supports explanation, prediction, and scientific generalization (Zachar, 2000, 2015). Practical kinds, by contrast, are categories that are scientifically and clinically useful even if they are not grounded in shared essences or underlying mechanisms. Their legitimacy comes from their utility in allowing us to achieve goals of interest, such as organizing knowledge, conducting research, guiding clinical treatment, or predicting outcomes. Practical kinds allow for this by capturing relatively stable patterns at a particular level of description or organization, even when the lower-level makeup is heterogeneous. Current DSM categories are generally considered by philosophical commentators to be practical kinds (Stein et al., 2024). Continued reliance on DSM-defined disorders reinforce the mistaken idea that these diagnostic categories are precise, valid, and explanatory. This outlook stalls efforts to rethink how we classify psychopathology outside the DSM framework, constraining and distorting research (Levin-Aspenson, 2023). A category like schizophrenia is heterogeneous with regards to clinical features as well as mechanisms (i.e., it lacks an essence, as far as we know), but a syndromic description of it captures some regularities that enable the category to be used as a starting point for treatment decisions (while falling short in other ways). The clinical categories that can be generated by making categorical distinctions based on HiTOP constructs are also pragmatic in nature; they are intended to be flexible and to be adjusted based on the specific clinical context and the practical needs. The consortium contends that practical categories derived from HiTOP have the potential to demonstrate greater clinical utility than DSM categories given that they are based on actual patterns of symptom covariation and can be tailored to guide clinical decision-making via flexible thresholds that can be optimized for particular tasks.

HiTOP AND NORMATIVE VALUES

Recognizing the impossibility of value-free science (see the prior section on scientific objectivity) facilitates a productive shift of focus on understanding and managing the influence of values. Epistemic

values play a role in HiTOP regarding theoretical choices and judgments of optimal statistical solutions. Non-epistemic values also play a role: for example, HiTOP publications emphasize a commitment to the goal that the model be applicable to diverse, under-represented, and epistemically marginalized populations (Rodriguez-Seijas et al., 2023), as well as a commitment to making clinical application feasible for practitioners. Core HiTOP publications are, however, clear that HiTOP's primary values are epistemic and take precedence over non-epistemic values in the development of the model.

Thick concepts in science—those that combine descriptive and normative elements—blur the line between facts and values. “Illness,” “health,” and “psychopathology” are examples of thick concepts. Psychopathology, illness, and disorder are often considered to be value-laden concepts, and judgments regarding what symptoms/traits/features are considered pathological are typically not made based on facts alone. Recent debates in the field regarding the status of autism and other neurodevelopmental conditions as psychopathology versus neurodivergence reflect fundamental disagreements around value-laden judgements of pathology (Morris, Michelini, & Wilson, 2025). Scientific concepts are *strongly normative* when evaluative concepts such as harm, suffering, or disability are integral to their very definition. In contrast, *weakly normative* constructs are influenced by the application or operationalization of scientific concepts (Amoretti & Lalumera, 2022). They are not fundamental to the concept's definition. For example, in Wakefield's (2007) harmful dysfunction view of disease, disease is a strongly normative concept, whereas disease defined by statistical deviation from species-typical functioning (Boorse, 1977) is weakly normative. In an analogous manner, classification systems can also be weakly or strongly normative in terms of their goals and the importance given to epistemic vs non-epistemic values. In DSM and ICD, for instance, empirical goals related to reliability and validity are enmeshed with goals related to clinical utility and clinical significance, making it strongly normative. In contrast, HiTOP's core model is weakly normative because its primary goal is to

map patterns of covariation among domains of psychopathology, and non-epistemic values play a secondary role.

HiTOP APPLICABILITY TO MARGINALIZED MINORITY POPULATIONS

The clinical applicability of HiTOP in marginalized populations depends on its ability to reflect their unique experiences accurately, particularly within their sociocultural contexts (Rodriguez-Seijas et al., 2023). Sexual and gender minority individuals face higher levels of social stress due to their stigmatized statuses. These experiences relate to outcomes, such as insecure relationship attachment, unassertive interpersonal behavior, compulsive sexual behavior, and increased substance use. Traditionally, these behaviors are organized within HiTOP's detachment and disinhibited externalizing spectra. However, these behaviors might also be adaptive responses to societal heterosexism and cisnormativity. For instance, social withdrawal and suspiciousness might stem from repeated exposure to discrimination, whereas intimacy avoidance could be linked to internalized negative societal messages about same-sex relationships. Similarly, assessment of antagonistic externalizing behaviors can be affected by racial and ethnic minority status. For instance, the higher rates of detected crime among Black Americans are influenced by over-policing and racial bias (Rodriguez-Seijas et al., 2023). Indicators of the antagonistic externalizing domain, therefore, may function differently across racial and ethnic groups. For example, the likelihood of endorsing an item, such as “I have been arrested,” may be higher for Black individuals due to racism in policing, regardless of antagonistic externalizing level because the sociocultural contexts in which Black Americans exist results in a lack of invariance of this indicator.

These examples highlight several important things. First, clinical features (e.g., items on a rating scale) included in HiTOP could be learned behaviors secondary to environmental context. More broadly, behavioral manifestations across populations are inextricably tied to the social contexts in which those manifestations exist.

The official HiTOP model is agnostic about the mechanisms that generate patterns of symptom covariation. Understanding these patterns within sexual minority, gender minority, racial minority, and any other population requires careful consideration of the sociocultural contexts that shape experiences. Empirical examination of such issues is in early stages but already underway (see Stewart et al. [2024] and Asadi, Suzuki, & Rodriguez-Seijas [2025] as examples). Second, the influence of the social context of symptom interpretation and symptom co-occurrence would likely remain scientifically understudied unless serving diverse and historically marginalized populations is made an explicit priority. As noted earlier, HiTOP has committed to this goal. Accomplishing it requires including experts from diverse backgrounds early in the development process to ensure that the model accurately reflects the experiences of underrepresented groups and avoids perpetuating biases, an illustration of standpoint epistemology and social objectivity. The HiTOP consortium is pursuing this goal through dedicated workgroups (for more details, see <https://www.hitop-system.org>).

CONCLUSION

HiTOP represents a new clinical and research program in the organization of psychopathology that seeks to address limitations of traditional categorical diagnostic systems through an empirically derived hierarchical and dimensional framework. Although primarily descriptive and agnostic regarding the definition and etiology of psychopathology, HiTOP's model offers important advances in organizing and understanding symptom covariation. By explicitly recognizing and articulating the theoretical assumptions, guiding principles, and values shaping this project, this paper hopes to facilitate greater conceptual transparency and methodological rigor. Future scholarship should continue to explore the philosophical foundations of HiTOP, clarify relations between the HiTOP model and philosophical notions of psychopathology, and examine how best to integrate etiological insights as they become available.

ACKNOWLEDGMENTS

This paper is a product of the HiTOP Revisions Workgroup and has been approved by the HiTOP Consortium Research and Publications Board. We would also like to acknowledge Christopher Patrick for his comments on a draft of this article.

REFERENCES

- Aftab, A., & Rashed, M. A. (2021). Mental disorder and social deviance. *International Review of Psychiatry*, 33 (5), 478–485.
- Aftab, A., & Ryznar, E. (2021). Conceptual and historical evolution of psychiatric nosology. *International Review of Psychiatry*, 33 (5), 486–499.
- Aftab, A., Banicki, K., Ruffalo, M. L., & Frances, A. (2024). Psychiatric diagnosis: A clinical guide to navigating diagnostic pluralism. *Journal of Nervous and Mental Disease*, 212 (8), 445–454.
- American Diabetes Association. (2014). Diagnosis and classification of diabetes mellitus. *Diabetes Care*, 37 (Suppl. 1), S81–S90.
- American Psychiatric Association (APA). (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). Washington, DC: American Psychiatric Publishing.
- Amoretti, M. C., & Lalumera, E. (2022). Wherein is the concept of disease normative? From weak normativity to value-conscious naturalism. *Medicine, Health Care and Philosophy*, 25 (1), 47–60.
- Asadi, S., Suzuki, T., & Rodriguez-Seijas, C. (2024). Investigating differential item functioning among borderline personality disorder diagnostic criteria and internalizing/externalizing domains based on sexual orientation. *Journal of Psychopathology and Clinical Science*, 134 (1), 97–111.
- Boorse, C. (1977). Health as a theoretical concept. *Philosophy of Science*, 44 (4), 542–573.
- Borsboom, D. (2023). Psychological constructs as organizing principles. In: van der Ark, L. A., Emons, W. H. M., & Meijer, R. R. (Eds.), *Essays on contemporary psychometrics*. New York: Springer. https://doi.org/10.1007/978-3-031-10370-4_5
- Clark, L. A. (2005). Temperament as a unifying basis for personality and psychopathology. *Journal of Abnormal Psychology*, 114 (4), 505–521.
- Clark, L. A., Cuthbert, B., Lewis-Fernández, R., Narrow, W. E., & Reed, G. M. (2017). Three approaches to understanding and classifying mental disorder: ICD-11, DSM-5, and the National Institute of Mental Health's Research Domain Criteria (RDoC). *Psychological Science in the Public Interest*, 18 (2), 72–145.

- Conway, C. C., Kotov, R., Krueger, R. F., & Caspi, A. (2023). Translating the hierarchical taxonomy of psychopathology (HiTOP) from potential to practice: Ten research questions. *American Psychologist*, 78 (7), 873.
- DeYoung, C. G., & Krueger, R. F. (2018). A cybernetic theory of psychopathology. *Psychological Inquiry*, 29 (3), 117–138.
- DeYoung, C. G., & Krueger, R. F. (2020). To wish impossible things: On the ontological status of latent variables and the prospects for theory in psychology. *Psychological Inquiry*, 31 (4), 289–296.
- DeYoung, C. G., & Krueger, R. F. (2023). A cybernetic perspective on the nature of psychopathology: Transcending conceptions of mental illness as statistical deviance and brain disease. *Journal of Psychopathology and Clinical Science*, 132 (3), 228.
- DeYoung, C. G., Chmielewski, M., Clark, L. A., Condon, D. M., Kotov, R., . . . the HiTOP Normal Personality Workgroup. (2022a). The distinction between symptoms and traits in the Hierarchical Taxonomy of Psychopathology (HiTOP). *Journal of Personality*, 90, 20–33.
- DeYoung, C. G., Kotov, R., Krueger, R. F., Cicero, D. C., Conway, C. C., . . . Wright, A. G. (2022b). Answering questions about the Hierarchical Taxonomy of Psychopathology (HiTOP): Analogies to whales and sharks miss the boat. *Clinical Psychological Science*, 10 (2), 279–284.
- Douglas, H. (2014). Values in social science. In: Cartwright, N., & Montuschi, E. (Eds.), *Philosophy of social science. A new introduction*. Oxford University Press, 162–182.
- Douglas, H. E. (2009). *Science, policy, and the value-free ideal*. Pittsburgh, PA: University of Pittsburgh Press.
- Edwards, J. R., & Bagozzi, R. P. (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods*, 5(2), 155.
- Forbes, M. K., Ringwald, W. R., Allen, T., Cicero, D. C., Clark, L. A., DeYoung, C. G., . . . Wright, A. G. (2024). Principles and procedures for revising the hierarchical taxonomy of psychopathology. *Journal of Psychopathology and Clinical Science*, 133 (1), 4.
- Fox, C. A., Teckentrup, V., Donegan, K. R., Seow, T., Benwell, C., Tervo-Clemmens, B., & Gillan, C. (2024). Cognitive arbitration between candidate dimensions of psychopathology. *PsyArXiv*, 7waey v1: Available from: <https://doi.org/10.31234/osf.io/7waey>
- Fried, E. I. (2020). Lack of theory building and testing impedes progress in the factor and network literature. *Psychological Inquiry*, 31 (4), 271–288.
- Funder, D. C. (1991). Global traits: A neo-Allportian approach to personality. *Psychological Science*, 2 (1), 31–39.
- Glackin, S. N. (2019). Grounded disease: Constructing the social from the biological in medicine. *Philosophical Quarterly*, 69 (275), 258–276.
- Gotlib, I. H., Lewinsohn, P. M., & Seeley, J. R. (1995). Symptoms versus a diagnosis of depression: Differences in psychosocial functioning. *Journal of Consulting and Clinical Psychology*, 63 (1), 90.
- Greene, A. L., Eaton, N. R., Li, K., Forbes, M. K., Krueger, R. F., Markon, K. E., . . . Kotov, R. (2019). Are fit indices used to test psychopathology structure biased? A simulation study. *Journal of Abnormal Psychology*, 128 (7), 740.
- Grotzinger, A. D., Mallard, T. T., Akingbuwa, W. A., Ip, H. F., Adams, M. J., Lewis, C. M., . . . Nivard, M. G. (2022). Genetic architecture of 11 major psychiatric disorders at biobehavioral, functional genomic and molecular genetic levels of analysis. *Nature Genetics*, 54 (5), 548–559.
- Haraway, D. (1988). Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies*, 14 (3), 575–599.
- Harding, S. (2015). *Objectivity and diversity: Another logic of scientific research*. Chicago: University of Chicago Press.
- Haslam, N., McGrath, M. J., Viechtbauer, W., & Kuppens, P. (2020). Dimensions over categories: A meta-analysis of taxometric research. *Psychological Medicine*, 50 (9), 1418–1432.
- Hetrick, S. E., Parker, A. G., Hickie, I. B., Purcell, R., Yung, A. R., & McGorry, P. D. (2008). Early identification and intervention in depressive disorders: Towards a clinical staging model. *Psychotherapy and Psychosomatics*, 77 (5), 263–270.
- Hopwood, C. J., Morey, L. C., & Markon, K. E. (2023). What is a psychopathology dimension? *Clinical Psychology Review*, 106, 102356.
- Jonas, K. G., Cannon, T. D., Docherty, A. R., Dwyer, D., Gur, R. C., Gur, R. E., . . . Kotov, R. (2024). Psychosis superspectrum I: Nosology, etiology, and lifespan development. *Molecular Psychiatry*, 29 (4), 1005–1019.
- Jonas, K. G., & Markon, K. E. (2013). A model of psychosis and its relationship with impairment. *Social Psychiatry and Psychiatric Epidemiology*, 48, 1367–1375.
- Jonas, K. G., & Markon, K. E. (2016). A descriptivist approach to trait conceptualization and inference. *Psychological Review*, 123 (1), 90.
- Kendler, K. S. (1980). The nosologic validity of paranoia (simple delusional disorder): a review. *Archives of General Psychiatry*, 37 (6), 699–706.

- Kendler, K. S. (1990). Toward a scientific psychiatric nosology: Strengths and limitations. *Archives of General Psychiatry*, 47 (10), 969–973.
- Kotov, R., Carpenter, W. T., Cicero, D. C., Correll, C. U., Martin, E. A., Young, J. W., . . . Jonas, K. G. (2024). Psychosis superspectrum II: Neurobiology, treatment, and implications. *Molecular Psychiatry*, 29 (5), 1293–1309.
- Kotov, R., Cicero, D. C., Conway, C. C., DeYoung, C. G., Dombrowski, A., Eaton, N. R., . . . Wright, A. G. (2022). The Hierarchical Taxonomy of Psychopathology (HiTOP) in psychiatric practice and research. *Psychological Medicine*, 52 (9), 1666–1678.
- Kotov, R., Foti, D., Li, K., Bromet, E. J., Hajcak, G., & Ruggero, C. J. (2016). Validating dimensions of psychosis symptomatology: Neural correlates and 20-year outcomes. *Journal of Abnormal Psychology*, 125 (8), 1103.
- Kotov, R., Jonas, K. G., Carpenter, W. T., Dretsch, M. N., Eaton, N. R., Forbes, M. K., . . . HiTOP Utility Workgroup. (2020). Validity and utility of hierarchical taxonomy of psychopathology (HiTOP): I. Psychosis superspectrum. *World Psychiatry*, 19 (2), 151–172.
- Kotov, R., Krueger, R. F., Watson, D., Achenbach, T. M., Althoff, R. R., Bagby, R. M., . . . Zimmerman, M. (2017). The Hierarchical Taxonomy of Psychopathology (HiTOP): A dimensional alternative to traditional nosologies. *Journal of Abnormal Psychology*, 126 (4), 454.
- Kotov, R., Krueger, R. F., Watson, D., Cicero, D. C., Conway, C. C., DeYoung, C. G., . . . Wright, A. G. (2021). The Hierarchical Taxonomy of Psychopathology (HiTOP): A quantitative nosology based on consensus of evidence. *Annual Review of Clinical Psychology*, 17 (1), 83–108.
- Kozak, M. J., & Cuthbert, B. N. (2016). The NIMH research domain criteria initiative: Background, issues, and pragmatics. *Psychophysiology*, 53 (3), 286–297.
- Krueger, R. F., Derringer, J., Markon, K. E., Watson, D., & Skodol, A. E. (2012). Initial construction of a maladaptive personality trait model and inventory for DSM-5. *Psychological Medicine*, 42 (9), 1879–1890.
- Krueger, R. F., Hobbs, K. A., Conway, C. C., Dick, D. M., Dretsch, M. N., Eaton, N. R., . . . HiTOP Utility Workgroup. (2021). Validity and utility of hierarchical taxonomy of psychopathology (HiTOP): II. Externalizing superspectrum. *World Psychiatry*, 20 (2), 171–193.
- Krueger, R. F., Kotov, R., Watson, D., Forbes, M. K., Eaton, N. R., Ruggero, C. J., . . . Zimmermann, J. (2018). Progress in achieving quantitative classification of psychopathology. *World Psychiatry*, 17 (3), 282–293.
- Ladyman, J. (2023). Structural realism. In Zalta, E. N., & Nodelman, U. (Eds.), *The Stanford encyclopedia of philosophy* (Summer 2023 ed.). Available at: <https://plato.stanford.edu/archives/sum2023/entries/structural-realism/>
- Legge, S. E., Santoro, M. L., Periyasamy, S., Okewole, A., Arsalan, A., & Kowalec, K. (2021). Genetic architecture of schizophrenia: A review of major advancements. *Psychological Medicine*, 51 (13), 2168–2177.
- Levin-Aspenson, H. F. (2023). To fully leverage fine-grained clinical phenomena, we have to think beyond DSM-based concepts and the presumption of diagnostic kinds. *Journal of Psychopathology and Clinical Science*, 132 (7), 881–887.
- Lingiardi, V., & McWilliams, N. (Eds.). (2017). *Psychodynamic diagnostic manual* (2nd ed.). New York: Guilford Press.
- Liu, Y., Lichtenstein, P., Kotov, R., Larsson, H., D’Onofrio, B. M., & Pettersson, E. (2024). Exploring the genetic etiology across the continuum of the general psychopathology factor: A Swedish population-based family and twin study. *Molecular Psychiatry*, 29 (10), 2921–2928.
- Longino, H. E. (1990). *Science as social knowledge: Values and objectivity in scientific inquiry*. Princeton, NJ: Princeton University Press.
- Longino, H. E. (2002). *The fate of knowledge*. Princeton, NJ: Princeton University Press.
- Lorr, M. (1954). Rating scales and check lists for the evaluation of psychopathology. *Psychological Bulletin*, 51, 119–127.
- Mancia, G., Kreutz, R., Brunström, M., Burnier, M., Grassi, G., Januszewicz, A., . . . Kjeldsen, S. E. (2023). 2023 ESH Guidelines for the management of arterial hypertension The Task Force for the management of arterial hypertension of the European Society of Hypertension: Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA). *Journal of Hypertension*, 41 (12), 1874–2071.
- Markon, K. E. (2010). How things fall apart: Understanding the nature of internalizing through its relationship with impairment. *Journal of Abnormal Psychology*, 119 (3), 447.
- Markon, K. E. (2019). Bifactor and hierarchical models: Specification, inference, and interpretation. *Annual Review of Clinical Psychology*, 15 (1), 51–69.
- Markon, K. E. (2023). Reliability as Lindley information. *Multivariate Behavioral Research*, 58 (4), 815–842.
- Markon, K. E., Chmielewski, M., & Miller, C. J. (2011). The reliability and validity of discrete and continuous measures of psychopathology. *Psychological Bulletin*, 137, 856–879.

- Markon, K. E., & Jonas, K. G. (2016). Structure as cause and representation: Implications of descriptivist inference for structural modeling across multiple levels of analysis. *Journal of Abnormal Psychology*, 125 (8), 1146–1157. <https://doi.org/10.1037/abn0000206>
- McCrae, R. R., Costa, Jr, P. T., & Martin, T. A. (2005). The NEO-PI-3: A more readable revised NEO personality inventory. *Journal of Personality Assessment*, 84 (3), 261–270.
- Michellini, G., Barch, D. M., Tian, Y., Watson, D., Klein, D. N., & Kotov, R. (2019). Delineating and validating higher-order dimensions of psychopathology in the Adolescent Brain Cognitive Development (ABCD) study. *Translational Psychiatry*, 9 (1), 261.
- Mitteroecker, P., & Merola, G. P. (2024). The cliff edge model of the evolution of schizophrenia: Mathematical, epidemiological, and genetic evidence. *Neuroscience & Biobehavioral Reviews*, 105636.
- Moore, T. V. (1930). The empirical determination of certain syndromes underlying praecox and manic-depressive psychoses. *American Journal of Psychiatry*, 86, 719–738.
- Morris, I., Michellini, G., & Wilson, S. (2025). Moving toward transdiagnostic dimensional models of neurodiversity and mental health (and away from models of psychopathology). *Journal of Psychopathology and Clinical Science*, 134 (5), 483–485.
- Mulaik, S. A., & Quartetti, D. A. (1997). First order or higher order general factor? *Structural Equation Modeling: A Multidisciplinary Journal*, 4 (3), 193–211.
- Nielsen, K., & Ward, T. (2020). Mental disorder as both natural and normative: Developing the normative dimension of the 3e conceptual framework for psychopathology. *Journal of Theoretical and Philosophical Psychology*, 40 (2), 107.
- Patrick, C. J., & Lenzenweger, M. F. (2023). Toward a new, improved paradigm for experimental psychopathology research... Or what we would talk about with Scott over coffee in a Dinkytown Cafe. In *Toward a science of clinical psychology: A tribute to the life and works of Scott O. Lilienfeld* (pp. 175–196). Cham: Springer International.
- Plant, J. S. (1922). Rating scheme for conduct. *American Journal of Psychiatry*, 1, 547–572.
- Radden, J., & Tsou, J. Y. (2024). Mental disorder (illness). In: Zalta, E. N., & Nodelman, U. (Eds.), *The Stanford encyclopedia of philosophy* (Fall 2024 Edition). Metaphysics Research Lab, Stanford University. Available at: <https://plato.stanford.edu/archives/fall2024/entries/mental-disorder/>
- Ray, C. (2017). Logical positivism. In: Newton-Smith, W. H. (Ed.), *A companion to the philosophy of science*. New York: Wiley. <https://doi.org/10.1002/9781405164481.ch37>
- Reichenberg, A., Cederlöf, M., McMillan, A., Trzaskowski, M., Kapra, O., Fruchter, E., . . . Lichtenstein, P. (2016). Discontinuity in the genetic and environmental causes of the intellectual disability spectrum. *Proceedings of the National Academy of Sciences of the United States of America*, 113 (4), 1098–1103.
- Reiss, J., & Sprenger, J. (2020). *Scientific objectivity*. In Zalta, E. N. (Ed.), *The Stanford encyclopedia of philosophy* (Winter 2020 Edition). Metaphysics Research Lab, Stanford University. Available at: <https://plato.stanford.edu/archives/win2020/entries/scientific-objectivity/>
- Robins, E., & Guze, S. B. (1970). Establishment of diagnostic validity in psychiatric illness: Its application to schizophrenia. *American Journal of Psychiatry*, 126 (7), 983–987.
- Rodriguez-Seijas, C., Li, J. J., Balling, C., Brandes, C., Bernat, E., Boness, C. L., . . . Eaton, N. R. (2023). Diversity and the hierarchical taxonomy of psychopathology (HiTOP). *Nature Reviews Psychology*, 2 (8), 483–495.
- Ruggero, C. J., Kotov, R., Hopwood, C. J., First, M., Clark, L. A., Skodol, A. E., . . . Zimmermann, J. (2019). Integrating the Hierarchical Taxonomy of Psychopathology (HiTOP) into clinical practice. *Journal of Consulting and Clinical Psychology*, 87 (12), 1069.
- Ruscio, J., & Ruscio, A. M. (2008). Categories and dimensions: Advancing psychological science through the study of latent structure. *Current Directions in Psychological Science*, 17 (3), 203–207.
- Sadler, J. Z. (2005). *Values and psychiatric diagnosis*. Oxford, UK: Oxford University Press.
- Samuel, D. B., & Widiger, T. A. (2008). A meta-analytic review of the relationships between the five-factor model and DSM-IV-TR personality disorders: A facet level analysis. *Clinical Psychology Review*, 28 (8), 1326–1342.
- Scheffer, M., Bockting, C. L., Borsboom, D., Cools, R., Delecroix, C., Hartmann, J. A., . . . Nelson, B. (2024). A dynamical systems view of psychiatric disorders—Theory: A review. *JAMA Psychiatry*, 81 (6), 618–623.
- Spitzer, R. L., Fleiss, J. L., Burdock, E. I., & Hardesty, A. S. (1964). The Mental Status Schedule: Rationale, reliability and validity. *Comprehensive Psychiatry*, 5 (6), 384–395.
- Solomon, M. (2022). On validators for psychiatric categories. *Philosophy of Medicine*, 3 (1), 1–23.
- Solomon, M., & Kendler, K. S. (2021). The problem of aggregating validators for psychiatric disorders. *Journal of Nervous and Mental Disease*, 209 (1), 9–12.

- Stasik-O'Brien, S. M., Brock, R. L., Chmielewski, M., Naragon-Gainey, K., Koffel, E., McDade-Montez, E., . . . Watson, D. (2019). Clinical utility of the Inventory of Depression and Anxiety Symptoms (IDAS). *Assessment, 26* (5), 944–960.
- Stein, D. J., Nielsen, K., Hartford, A., Gagné Julien, A. M., Glackin, S., Friston, K., . . . Aftab, A. (2024). Philosophy of psychiatry: Theoretical advances and clinical implications. *World Psychiatry, 23* (2), 215–232.
- Stewart, L. C., Asadi, S., Rodriguez-Seijas, C., Wilson, S., Michelini, G., Kotov, R., . . . Olino, T. M. (2024). Measurement invariance of the Child Behavior Checklist (CBCL) across race/ethnicity and sex in the Adolescent Brain and Cognitive Development (ABCD) study. *Psychological Assessment, 36* (8), 441.
- Tsou, J. Y. (2021). *Philosophy of psychiatry*. Cambridge, UK: Cambridge University Press.
- Van Der Maas, H. L., Dolan, C. V., Grasman, R. P., Wicherts, J. M., Huizenga, H. M., & Raijmakers, M. E. (2006). A dynamical model of general intelligence: The positive manifold of intelligence by mutualism. *Psychological Review, 113* (4), 842.
- Wakefield, J. C. (2007). The concept of mental disorder: Diagnostic implications of the harmful dysfunction analysis. *World Psychiatry, 6* (3), 149.
- Watson, D., Levin-Aspenson, H. F., Waszczuk, M. A., Conway, C. C., Dalglish, T., Dretsch, M. N., . . . Zinbarg, R. E. (2022). Validity and utility of Hierarchical Taxonomy of Psychopathology (HiTOP): III. Emotional dysfunction superspectrum. *World Psychiatry, 21* (1), 26–54.
- Widiger, T. A., Sellbom, M., Chmielewski, M., Clark, L. A., DeYoung, C. G., Kotov, R., . . . Wright, A. G. C. (2019). Personality in a hierarchical model of psychopathology. *Clinical Psychological Science, 7*, 77–92.
- Wittenborn, J. R. (1951). Symptom patterns in a group of mental hospital patients. *Journal of Consulting Psychology, 15*, 290–302.
- Woodling, C., Wygant, D. B., Umlauf, R. L., & Marek, R. J. (2022). Somatoform's placement and validity in the hierarchical taxonomy of psychopathology (HiTOP). *Psychiatry Research, 313*, 114593.
- World Health Organization (WHO). (2019). *International classification of diseases for mortality and morbidity statistics* (11th ed.). Geneva: Author. Available at: <https://icd.who.int/>
- Wright, A. G., Krueger, R. F., Hobbs, M. J., Markon, K. E., Eaton, N. R., & Slade, T. (2013). The structure of psychopathology: Toward an expanded quantitative empirical model. *Journal of Abnormal Psychology, 122* (1), 281.
- Yung, Y.-F., Thissen, D., & McLeod, L. D. (1999). On the relationship between the higher-order factor model and the hierarchical factor model. *Psychometrika, 64* (2), 113–128.
- Zachar, P. (2000). Psychiatric disorders are not natural kinds. *Philosophy, Psychiatry, & Psychology, 7* (3), 167–182.
- Zachar, P. (2014). *A metaphysics of psychopathology*. Cambridge, MA: MIT Press.
- Zachar, P. (2015). Psychiatric disorders: Natural kinds made by the world or practical kinds made by us?. *World Psychiatry, 14* (3), 288.
- Zachar, P., Banicki, K., & Aftab, A. (2023) Historical and philosophical considerations in studying psychopathology. In: Krueger, R. F., & Blaney, P. H. (Eds.), *Oxford textbook of psychopathology* (4th ed, p. 33). Oxford, UK: Oxford University Press.
- Zautra, N. (2025). Psychiatry's new validity crisis: The problem of disparate validation. *Philosophy of Science, 92* (3), 646–665.