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Examination of the structure of psychopathology using latent class analysis

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Abstract

Several recent studies using factor analytic methods find that the structure of psychopathology reflects broad internalizing and externalizing dimensions, with the internalizing dimension being further divided into fear and distress disorders. Although these variable-centered studies have provided important insights into the structure of psychopathology, they provide limited information about the classification of individual cases. The present study examines patterns of lifetime internalizing and externalizing psychopathology in participants from the Oregon Adolescent Depression Project using latent class analysis that classifies individuals rather than variables. A 4-class solution best fits the data. The largest class (62.5%) included individuals with relatively little psychopathology; 1 class (16.4%) was largely characterized by internalizing disorders, 1 class (16.9%), largely characterized by externalizing disorders; and the final class (4.2%), characterized by both internalizing and externalizing disorders. The validity of the classes was further examined using data on psychiatric morbidity, temperament, and family aggregation of psychopathology. Classes differed on indices of positive, negative, and disinhibited temperament in ways that were consistent with theoretical predictions. Patterns of familial aggregation of psychopathology demonstrated relative specificity of transmission of different disorders. Overall, the findings support conclusions from studies of dimensional models of internalizing and externalizing disorders, and extend them to person-centered approaches to classification.

Several studies on the structure of internalizing and externalizing psychopathology conducted over the last decade have largely relied on variable-centered methodologies such as factor analysis for investigating structural associations among various forms of psychopathology [1-6]. In many of these studies, the authors concluded that the best fitting model was a higher order internalizing factor with 2 facets, reflecting distress and fear disorders, and a single externalizing factor [1-3,5]. Exceptions to this general pattern, however, have been reported. In 1 instance, the best-fitting model included distress, fear, and externalizing factors but not a higher order internalizing factor [6], whereas another study found that the best-fitting model included single factors for internalizing and externalizing disorders [4]. Similar findings have also been reported in studies of children and adolescents [7,8], suggesting continuity in structure across development. In each of the studies that reported higher order internalizing and externalizing factors, moderate associations between factors were noted, suggesting significant covariation among internalizing disorders, among externalizing disorders, and across internalizing and externalizing disorders.

Variable-centered studies, including those that use factor analytic methodologies, describe how disorders are organized with respect to one another. Findings from such studies are often cited by those who argue for a diagnostic system that emphasizes dimensions underlying psychopathology. The current instantiation of psychiatric diagnosis, however, parallels medical diagnosis whereby the identification of

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collections of symptoms that reflect an individual-specific etiology and course of illness is emphasized. Because diagnostic concepts are intended to classify the individual person, methods used to derive disorder classifications should ideally parallel this goal. One person-centered approach could be to categorize individuals based on internalizing and externalizing dimension severities. In practice, however, this approach would be problematic because it is presently unclear how many categories would be necessary to describe the individual or what levels of severity would warrant categorization. An alternative approach would be to use classification methods that are designed to identify relatively homogenous subsamples from a heterogeneous larger population. One such person-oriented approach is latent class analysis (LCA). Results of these analyses provide more individual-specific profiles that may elucidate disease-related processes by empirically identifying relatively homogenous subpopulations from the observed samples based on observed variables. There have been relatively few attempts to use LCA to inform the structure of psychopathology. Kessler et al [9] examined an LCA of 19 disorders in the National Comorbidity Survey Replication (NCS-R) and found that a 7-class solution best fits the data. A more recent reanalysis of the NCS-R and the original National Comorbidity Survey (NCS) data [10], using more recently developed fit indices, found that a 5-class solution best fits the data. In this solution, there was 1 class with few disorders, pathological classes with largely distress, fear, and externalizing disorders, and a multimorbid disorder class with both internalizing and externalizing disorders. Thus, these results strongly paralleled the results found in factor analytic studies.

In addition to choosing a methodological approach that is theoretically consistent with the goals of classification, it is also important to consider the validity of the classification system. With few exceptions (eg, [11-13]), the validity of dimensional and latent class models of psychopathology derived from factor analytic studies remains largely untested. Previous work has demonstrated that relative to healthy controls, individuals with specific internalizing disorders report higher levels of negative emotionality [14-17] and that individuals with externalizing disorders report higher levels of disinhibition [18-20]. Findings for positive emotionality, particularly with respect to the internalizing domain of psychopathology, are more equivocal. Relative to healthy controls, individuals with depressive disorders have lower levels of positive emotionality [14,16,17,21]; however, individuals with some anxiety disorders (particularly social phobia) and those with schizophrenia also report lower levels of positive emotionality [15,22]. Watson and Naragon-Gainey [36] have recently argued for the relative, but not absolute, specificity of positive emotionality to depression compared with social phobia and schizophrenia.

Evidence for validity of models of psychopathology may also be informed by data on familial history of disorders. Some family studies find evidence for independent transmission of different types of internalizing disorders [23,24], whereas others find evidence for shared transmission [25,26]. Family studies of externalizing disorders are similarly characterized by conflicting data, with some studies supporting independent transmission of disorders [27-29] and others supporting shared transmission [30,31]. Fewer studies have examined familial aggregation of disorders across the internalizing-externalizing dimensions. Those that have examined this issue have also produced equivocal results, with some finding independent [32] and others finding common [31] transmission of internalizing and externalizing disorders.

The present study examines the structure of psychopathology using LCA. This method clusters individuals based on probability profiles of observed variables. In the present research, these observed variables consist of specific *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*)–defined internalizing and externalizing disorders. Our expectations for the number and description of classes are informed by evidence from factor analytic studies. We anticipate the emergence of 2 classes that broadly reflect internalizing disorders and externalizing domains and a third class of individuals with little psychopathology. Although factor analytic studies often converge on distress and fear disorders as lower order facets of the internalizing dimensions, the higher order internalizing factor is usually almost perfectly correlated with a lower order latent factor defined by distress disorders [1-3,5,6] and is thus redundant. Consequently, we do not anticipate the emergence of individual classes corresponding to distress and fear disorders. Furthermore, as factor analytic studies identify moderate associations between internalizing and externalizing disorders, we also anticipate the emergence of a fourth class with high rates of disorders from both broadband dimensions.

After the identification of the class solution that best fits the data, we then compare classes on rates of specific disorders; demographic features; psychiatric morbidity; temperament; and family history of depressive, anxiety, and substance use disorders (SUDs). Based on the literature on the epidemiology of internalizing disorders, we anticipate that classes characterized by internalizing disorders will be comprised largely of women [33]. Likewise, based on the epidemiology of externalizing disorders, we anticipate that classes characterized by externalizing disorders will be comprised largely of men [34]. Based on data on relationships between temperament and psychopathology, we anticipate that when compared with the class defined by low levels of psychopathology, the following will be observed: (*a*) classes characterized by internalizing and externalizing disorders will demonstrate higher levels of negative emotionality, (*b*) classes characterized by internalizing disorders will demonstrate lower levels of positive emotionality, and (*c*) classes characterized by externalizing disorders will demonstrate higher levels of disinhibition [18,35,36]. Lastly, we anticipate modest specificity of familial aggregation [25,30,31] with classes characterized by internalizing disorders having stronger associations with