

A CRITICAL EXAMINATION OF MULTIDIMENSIONALITY WITHIN THE HYPOMANIC  
PERSONALITY SCALE

BY

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THESIS

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## ABSTRACT

The Hypomanic Personality Scale (HPS) is a psychometric assessment that identifies bipolar spectrum psychopathology and risk for bipolar disorders. Despite its conceptualization as a unidimensional scale, several studies have attempted to derive an underlying multidimensional structure of the HPS. Given the lack of consensus between these models, and the interest in elucidating the multidimensional structure of bipolar spectrum psychopathology, we attempted to replicate previous multidimensional models of the HPS with a large undergraduate and adult sample ( $n = 5002$ ). We were unable to successfully replicate these prior models and derived, instead, two competing models of the underlying factor structure of the HPS. However, these models were limited by factors of unequal sizes and questionable content validity. We examined the associations of our two models with questionnaire and interview measures of affect and psychopathology. Ultimately, we concluded that the HPS is best employed in its original, unidimensional form. We recommend that the creation of a multidimensional assessment of bipolar spectrum psychopathology should follow from the development of a theoretically driven, comprehensive multidimensional model, rather than from parsing apart a useful, but largely unidimensional measure, such as the HPS.

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*For my loving family and my husband-to-be.*

*You support me through climbing mountains, both literal and figural. There is no one else with  
whom I would rather share the view.*

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## **INTRODUCTION**

Our current diagnostic systems typically classify bipolar disorders categorically. However, research suggests that bipolar psychopathology may be better conceptualized as a continuum ranging from subclinical impairment to severe clinical presentations (Akiskal, 2002; Angst & Marneros, 2001). Clinical and epidemiological research indicate that traditional diagnostic criteria may be too restrictive to capture the full range of bipolar spectrum symptoms and impairment (Vieta & Phillips, 2007). Merikangas et al. (2007) demonstrated that the commonly cited 2.1% lifetime prevalence rate for bipolar disorders fails to capture subclinical manifestations that still result in significant impairment and convey risk for clinical psychopathology. Angst and colleagues (2003) suggested that the total prevalence of clinical and subclinical bipolar spectrum psychopathology may be as high as 23.7%. Thus, it appears that bipolar symptoms and impairment extend beyond the boundaries of current categorical delineations such as the Diagnostic and Statistical Manual diagnoses (DSM-5; American Psychiatric Association, 2013).

### **Psychometric Assessment of Bipolar Spectrum Psychopathology**

Psychometric inventories provide a promising method for capturing bipolar spectrum psychopathology (Altman, 1998; Haeffel & Howard, 2010; Phelps & Ghaemi, 2006; Poon et al., 2012). The Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986) is a self-report measure consisting of 48 dichotomous items to assess mild, manic, trait-like functioning. Items tap hypomanic and hyperthymic characteristics, including upbeat mood (e.g., “I often get so happy and energetic that I am almost giddy.”), exaggerated self-perception (e.g., “There are so many fields I could succeed in that it seems a shame to have to pick one.”), impulsivity (e.g., “I have often persuaded groups of friends to do something really adventurous or crazy.”), and

hypersociability (e.g., “At social gatherings, I am usually the ‘life of the party.’”). The HPS has good psychometric properties, with internal consistency reliability of .87 and test-retest reliability of .81 over a 15-week interval (Eckblad & Chapman, 1986) and .85 across a 2 to 12-week interval (Walsh et al., 2015).

Numerous cross-sectional and longitudinal studies indicate that the HPS identifies individuals with bipolar symptoms and elevated risk for the development of bipolar disorders. For example, Eckblad and Chapman (1986) reported that 31 of 40 participants in their high HPS scoring group met criteria for a hypomanic episode, compared to none of the 40 control participants. Furthermore, six of the remaining nine individuals in the high HPS group who did not meet full criteria for hypomania reported usually feeling euphoric or energetic. Kwapil et al.’s (2000) 13-year follow-up of Eckblad and Chapman’s sample reported that high HPS scorers exceeded control participants on rates of hypomanic episodes at longitudinal reassessment (28% versus 3%). Meyer and Hautzinger (2003) similarly found in their German undergraduate sample that high scorers on the HPS had elevated rates of bipolar I disorder compared to their control group (20.8% vs. 1.3%), but that high scores on the HPS did not predict psychopathology outside of the bipolar spectrum. Walsh et al. (2012; 2015) found that higher HPS scores were associated with increased rates of bipolar disorders and bipolar spectrum symptoms at both an initial assessment and a three-year follow-up. Thus, the HPS appears to be a promising measure of subclinical manifestations of bipolar spectrum psychopathology and risk for bipolar disorders.

### **Multidimensional Models of Bipolar Spectrum Psychopathology**

Current models suggest that bipolar spectrum psychopathology may be best understood as a multidimensional construct. Following Widiger and Clark’s (2000) dimensional approach, a number of studies have suggested different multidimensional models of the bipolar spectrum.

Baek et al. (2018) identified six key features of bipolar I and bipolar II disorders using factor analysis: cyclicity, depression, atypical vegetative symptoms, elation, psychotic/irritable mania, and comorbidity dimensions. Rossi et al. (2000) found five domains: activation-euphoric, depressive, psychomotor retardation, hostility-destructiveness, and sleep disturbances. Faraone and colleagues (2004) proposed five dimensions: depression, psychosis, sleep disturbance, psychomotor acceleration, and irritability. Qiu and colleagues (2017) used cluster analysis to group eighteen personality and temperament factors into three clusters: low anxiety and stable bipolar cluster, depressive cluster, and hypomanic cluster. Despite the number of factor and cluster analyses pursuing a multidimensional model of bipolar spectrum psychopathology, few have compared their models against others. Furthermore, most of these findings were based upon exploratory analytic procedures, rather than conceptual models.

Ideally, multidimensional approaches to bipolar spectrum psychopathology should arise from a priori models that can then be tested in clinical and nonclinical samples. Development of such models could enhance our understanding of the etiology and onset of bipolar symptoms. Additionally, a multidimensional model could provide a more nuanced approach to tracking the course of different symptoms of bipolar spectrum psychopathology.

### **Assessments of the Factor Structure of the HPS**

Eckblad and Chapman (1986) originally conceptualized hypomanic personality as a unidimensional construct and developed the HPS using rational scale construction methods (e.g., Jackson, 1970) to have high internal consistency. Despite this, several studies have explicitly examined the HPS's underlying factor structure. These studies did not propose a priori models of the multidimensional structure of either bipolar spectrum psychopathology or the HPS. Rather, each study adopted an exploratory approach for examining the scale's factor structure.



Rawlings, Barrantes-Vidal, Claridge, McCreery, and Galanos (2000) examined and compared the factor structure of the HPS in British adults ( $n=1073$ ), Catalan undergraduates ( $n=326$ ), and Australian undergraduates ( $n=158$ ). Rawlings et al. used maximum-likelihood exploratory factor analysis with promax rotation. Each sample yielded four-factor solutions that accounted for 33.0% of the British sample's variance, 25.1% of the variance in the Catalan sample, and 31.5% of the variance in the Australian sample. The authors reported that factor retention was based upon scree plots; however, for each sample, nine or more factors had eigenvalues greater than 1.0 and each sample's scree plot appeared to level off after the first factor. Though the four-factor structures shared some similarity, they did not overlap enough to identify a consistent factor structure across the samples. Additionally, a number of items did not load onto any factor. No further cross-validation of these factors was performed. Thus, these analyses, which were limited by the relatively small number of participants in two of the samples, did not identify a consistent underlying factor structure of the HPS.

Schalet, Durbin, and Revelle (2011) examined the cluster structure of the HPS in an American undergraduate sample ( $n=818$ ). They performed hierarchical cluster analyses using ICLUST (Revelle, 2019) followed by exploratory factor analyses. Their analyses yielded a one-cluster model, though they noted three "identifiable" sub-clusters. They identified these clusters as *Mood Volatility*, including negative and unpredictable moods and cognitions that characterize hypomanic personality (15 items loading above .5); *Excitement*, including energetic and highly cheerful mood (8 items loading above .5); and *Social Vitality*, including social potency and vivaciousness (22 items loading above .3). Three items (items 12, 24, and 28) were excluded from these analyses for weakening the model. Their factor analysis yielded a three-factor model accounting for 31% of the variance with eigenvalues of 11.1, 4.3, and 2.7. Schalet and colleagues

also compared their models to Rawling et al.'s (2000) British sample's four-factor model and found low factor congruence. Although Schalet, Durbin, and Revelle recommended use of HPS subscales in future research, they did not discuss the extent to which their factors mapped onto a priori models of bipolar psychopathology or how well the HPS subscales provided content coverage of the domains their analyses reported.

Schalet, Durbin, and Revelle's (2011) three-cluster model of the HPS has been employed in research examining the correlations between bipolar-related symptoms and measures of affect and personality. Watson and Naragon-Gainey (2014) used a non-clinical sample to assess the associations of bipolar spectrum psychopathology (as measured by the total HPS score and Schalet et al.'s three subscales) with Five Factor model of personality. They replicated Schalet et al.'s findings that *Social Vitality* was strongly correlated with extraversion and moderately correlated with openness to experience. They cautioned that the *Social Vitality* subscale may therefore tap extraversion more than hypomanic personality. Stanton et al. (2017) used the HPS total score as well as the three-cluster structure to assess the association of bipolar spectrum psychopathology with narcissism and personality traits in non-clinical participants. They found that the *Social Vitality* subscale was more strongly correlated with measures of narcissism than with the other two HPS subscales. The authors warned that due to the significant overlap between *Social Vitality* and narcissism, this subscale may lack construct validity.

In an effort to clarify the discrepant models of the HPS factor structure, Stanton, McArtor, and Watson (2019) conducted an exploratory factor analysis examining the structure of the HPS in comparison with previous factor models. They assessed Amazon Mechanical Turk (MTurk) participants ( $n=737$ ) from the United States, Canada, the United Kingdom, Australia, and Ireland who reported currently receiving outpatient mental health treatment, including either

therapy or medication. Participants completed the HPS using a five-point Likert scale response format, rather than the original dichotomous response format. Using exploratory factor analysis with promax rotation, they identified a five-factor structure, although they also analyzed three and four-factor models. They labeled the five factors as *Modesty*, involving items of self-perception as an ordinary person (five items loading above .4); *Charisma*, involving items of social confidence and perceived leadership ability (eight items loading above .4); *Activation*, characterized by items of excessive energy (nine items loading above .4); *Intellectual Confidence*, related to items of perceived intelligence (seven items loading above .4); and *Lability*, involving items of affective variability (seven items loading at or above .4). Twelve items of the 48 items did not load well into any factor and were excluded from the model. They considered factor congruence to the previous studies through confirmatory factor analysis. Compared to Rawlings et al.'s (2000) four-factor structure, strong negative congruence coefficients were reported between Intellect and Rawlings et al.'s Factor 2 (-.90) and between *Charisma* and Rawlings et al.'s third factor (-.81). There were no other strong factor congruence coefficients reported between the five-factor model proposed by Stanton, McArtor, and Watson and those proposed by Rawlings et al. (2000) or Schalet et al. (2011). Stanton, McArtor, and Watson concluded that use of HPS subscales is meaningful as total scores do not give a full picture of functioning, though their model has yet to be cross-validated or replicated in an additional sample.

### **Goals and Hypotheses of the Present Studies**

The previous attempts to identify an underlying factor structure in the HPS appear to have arrived at contrasting outcomes in terms of the number of factors and their specific natures. It is unclear the extent to which this represents limitations of those studies (e.g., small samples,

change in scoring procedures, exclusion of a significant number of items), problems arising from attempts to discern a multidimensional structure from an intentionally unidimensional measure, or lack of a multidimensional structure underlying bipolar spectrum psychopathology. Therefore, Study 1 aimed to examine whether there is an identifiable underlying factor structure of the HPS in a large sample of young adults and attempted to replicate prior published models. Study 2 aimed to examine the correlates of any underlying factor structure with interview and questionnaire measures of personality, affect, and bipolar spectrum psychopathology.

## STUDY 1

### Methods

#### *Participants*

Data was obtained from a large participants pool ( $n=5002$ ) consisting of undergraduates at the University of North Carolina at Greensboro (UNCG) and the University of Illinois at Urbana-Champaign (UIUC), and online participants recruited through MTurk. All participants provided informed consent and the studies were approved by the Institutional Review Boards at UNCG and UIUC in compliance with APA ethical standards. Demographic characteristics of the sample were:  $M$  age = 20.5 years,  $SD$  = 5.8; 73% female; 57% White, 21% Black, 9% Asian/Pacific Islander, 7% Hispanic, 4% other, and 2% declined to report.

#### *Materials and Procedures*

The HPS is a self-report questionnaire with 48 true-false items that assess hypomanic personality traits. Higher scores on the HPS indicate increased presence of hypomanic traits. Participants completed the HPS either as part of mass screenings or other studies. Participants completed the HPS and demographic questionnaires via Qualtrics survey software.

#### *Data Analysis*

Analyses were conducted in Mplus (Muthén & Muthén, 2017) and R (R Core Team, 2017) using the package psych (Revelle, 2019). In order to examine an underlying factor structure of the HPS, we conducted parallel analysis to identify the number of identifiable components and factors in our sample. In order to cross-validate the factor structure findings, we split our sample into two equal sized groups ( $n=2501$ ). Note that we randomly assigned participants to each group by gender to ensure equal gender composition. The resulting groups were also comparable for age and for reported racial/ethnic identities (Table 1). To determine

whether groups could be appropriately combined and analyzed as a whole, parallel analysis with oblimin rotation was conducted on both Groups 1 and 2. Tucker's congruence coefficient (Tucker, 1951) was calculated to compare the likeness of the factor interpretations. This method has been suggested as preferable to conducting confirmatory factor analysis given our data's large sample size (Lorenzo-Seva & ten Berge, 2006) and the likelihood of personality items, such as those in the HPS, to crossload on multiple factors. If the underlying factor structures of Groups 1 and 2 were found to be comparable, remaining analyses would be conducted on the full, combined sample for greater power. Confirmatory factor analysis of Group 1's model fit upon Group 2 was also evaluated for thoroughness.

Following evaluation on independent samples, we employed several methods to determine which models to evaluate and how many factors to extract. First, eigenvalues and their associated proportion of variance explained were calculated. Following the procedures laid out in Auerswald and Moshagen (2019), we examined the number of factors to extract using a parallel analysis using the 95<sup>th</sup> percentile of random principal components analysis (PCA) sample-generated eigenvalues as reference values. Additionally, we examined the eigenvalues generated in the parallel analysis as well as the scree plot to determine the number of factors relevant to our model. We chose to examine seven different models of the HPS. Our a priori theory indicated that a single factor would best fit the data given the HPS's development as a measure with strong internal consistency. Additionally, we chose to examine three-, four-, and five- factor models, as employed by the publications described above. Lastly, as our parallel analysis suggested seven factors, we ultimately decided to examine and compare models with 1-7 factors. The exploratory factor analyses were conducted in Mplus software after inconsistencies were noted between R output and Mplus output.

Beyond simply testing factor solutions similar to previously published models, we also attempted to replicate the models proposed by the papers described above. In order to best assess all possible structures of the HPS, we employed the statistical processes of all relevant papers (Rawlings et al., 2000; Stanton et al., 2019; Schalet et al., 2011). Full descriptions can be found in these publications; however, statistical procedures will be detailed briefly here. Rawlings et al. employed maximum-likelihood factor analysis with promax rotation. They used a scree plot to analyze eigenvalues to determine the number of factors worth extracting. Stanton et al. used PCA on polychoric correlation matrices. They first conducted parallel analysis followed by Velicer's (1976) minimum average partial to determine how many factors to extract. Stanton et al. then conducted exploratory factor analysis with promax rotation. Lastly, they used confirmatory factor analysis to evaluate one-, two-, three-, four-, and five-factor structures. Schalet et al. used the ICLUST package to conduct hierarchical cluster analysis on a tetrachoric correlation matrix. Schalet et al. ran these analyses with both average and maximum beta criterion. Additionally, they analyzed full 48-item HPS data and re-ran these analyses after deleting three items due to drop in beta values in their cluster structure. Ultimately, they conducted an exploratory factor analysis using Very Simple Structure (VSS) on both the 48- and 45-item HPS scales. They employed ordinary least squares, maximum-likelihood, principal axis, and generalized least squares methods with both promax and oblimin rotations.

## **Results**

Descriptive statistics for performance of Groups 1, 2, and the total sample on the HPS are available in Table 8.

### ***Group Parallel Analyses and Sample Congruence Testing***

Parallel analysis exploratory factor analysis on Group 1 suggested a model with seven components (Table 9). The resulting scree plot indicated one strong central factor or component with an elbow occurring after seven factors or components. Parallel analysis on Group 2 yielded similar results with a seven-component suggested structure and comparable scree plot (Table 10). Tucker's congruence coefficients (Tucker, 1951) for the seven factors are reported in Table 2. Following Tucker's guidelines, factors with a congruence of .98-1.00 are considered *excellent*, .92-.98 are *good*, .82-.92 are *borderline*, .68-.82 are *poor*, and all lower values are considered *terrible*. The first five factors between these groups displayed congruence coefficients ranging from .91-.99. However, the sixth and seventh factors seem to be comprised of reversed items between Groups 1 and 2, with good and poor agreement between the factors, respectively. Despite this reversal of the sixth and seventh factors, the factor structures of these groups represented comparable results. Therefore, we combined our samples into  $n=5002$  for all remaining analyses.

### ***Full Sample Parallel Analysis and Exploratory Factor Analyses***

Consistent with procedures in Rawlings et al. (2000) and Stanton et al. (2019), parallel analysis for the full sample was conducted. Our results similarly suggested a model with seven components and a scree plot with a clear central factor and six more relevant factors or components (Figure 1).

The indices of Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) were considered in regard to model fit. Fit indices and summaries of exploratory factor analyses for 1-



7 factors are represented in Table 3. As advised by Hu and Bentler (1999), models with SRMR values  $<.09$  and RMSEA values  $<.06$  were retained. Our 2-7 factor models all met this cut-off.

Given our goal of understanding whether an underlying HPS factor structure could be functionally used to measure dimensional ratings of bipolar spectrum psychopathology, we felt it important to consider both the number of items that were excluded in these factor structures due to insufficient loadings ( $<.3$ ) as well as the number of items that crossloaded between factors. To build a psychometric assessment with sufficient construct validity, it is necessary to ensure all dimensions of bipolar spectrum psychopathology are adequately and equally represented across items. Ideally, the subscales should contain roughly equal numbers of items and items should load on only one dimension to reduce misanalysing results (Costello & Osborne, 2005).

Furthermore, the items comprising a subscale should provide complete coverage (content validity) for the domain. Although fit indices improved with each additional factor included in our model, the number of items insufficiently loading and crossloading also increased. This led to two potential models, depending on how crossloading items were treated. One option is to minimize crossloading items as “the measure in question is unable to discriminate as to whether [the item] belongs to the construct it was intended to measure or to another (i.e., discriminant validity problem)” (Chin, 2010, p. 671). Following this method, the exploratory factor model that contained the fewest insufficiently loading items (two items) and the fewest crossloading items (six items; save for the single factor model where crossloading is not possible) and still met Hu and Bentler’s fit indices cutoff was the two-factor model. Another option regarding crossloading items is to include them within the model and be cautious when analyzing results including those items to avoid making assumptions about what drives higher factor scores. When following this method, the exploratory factor model that contained the fewest insufficiently loading items (one

item), regardless of the number of crossloading items (eleven items), and still met Hu and Bentler's fit indices was the five-factor model. Given that this decision hinges on how to treat crossloading items, both models were examined for thoroughness. A summary of these models can be found in Table 4.

We proceeded by examining the resulting two-factor model. Factor 1 consisted of 22 items that mostly tapped grandiosity, hypersociability, and assertiveness, such as, "I expect that someday I will succeed in several different professions" and, "In unfamiliar settings, I am often so assertive and sociable that I surprise myself." Factor 2 consisted of 18 items that mostly tapped energy and mood, particularly mood lability and intensity, such as, "There have often been times when I had such an excess of energy that I felt little need to sleep at night" and, "I very frequently get into moods where I wish I could be everywhere and do everything at once." Although these two factors were relatively equal in size, they did not contain comparable numbers of items representing each of their component facets (e.g., grandiosity versus hypersociability versus assertiveness within Factor 1). Additionally, certain items that contained multiple ideas, such as mood and grandiosity, were constrained into a single factor. The six items that crossloaded on these factors represented feeling "hyper," difficulty concentrating or indecisiveness, and feeling excited. Therefore, although the two-factor model appeared to best fit our data when compared with 1-7 factor models, it does not appear to be a promising representation of the latent structure of the HPS.

In order to examine the five-factor model of the HPS, it was necessary to include crossloading items. Two items (items 1 and 21) had at least a 0.2 difference between their significant factor loading values and were therefore considered solely in the factor on which they had loaded most strongly. All other crossloading items were considered a part of both factors on

which they had loaded .3 or greater. In this model, Factor 1 consisted of 17 items that assessed excess of energy and included some items of positive mood, such as, “I am frequently so ‘hyper’ that my friends kiddingly ask me what drug I’m taking” and, “I often feel excited and happy for no apparent reason.” Factor 2 consisted of six items assessing ordinariness, such as “I consider myself to be pretty much an average kind of person.” Factor 3 consisted of 15 items tapping hypersociability and grandiosity, such as, “At social gatherings, I am usually the ‘life of the party.’” Factor 4 consisted of nine items assessing goal-directed behavior and grandiosity, such as, “There are so many fields I could succeed in that it seems a shame to have to pick one.” Finally, Factor 5 consisted of eight items of moodiness and mood lability, such as, “I seem to be a person whose mood goes up and down easily.” Item 41, “I do most of my best work during brief periods of intense inspiration,” did not sufficiently load on any factor. As in the two-factor model described above, the five-factor model suffers from forcing multiple constructs to be expressed within a single factor. Although Factors 2 and 5 include distinct factor structures, one could argue that ordinariness represents the inverse of grandiosity. Additionally, the five factors represented are unequal in size. These inconsistencies represent flaws in the five-factor model that may limit its utility for capturing the structure bipolar spectrum psychopathology. Table 7 presents the associations between our two-factor and five-factor models with the models described by Rawlings et al. (2000), Schalet et al. (2011), and Stanton et al. (2019).

There is a clear lack of consensus between the models of the present study and previous findings and, as described above, the two best-fitting models identified in our large sample are still flawed. Additionally, the four- and five-factor models proposed by Rawlings et al.’s (2000) or Stanton et al.’s (2019) publications did not correspond to the factor structure in our data. Though the HPS fulfills its role in identifying and predicting bipolar spectrum experiences, it

does not seem adequately suited for a dimensional measure of bipolar spectrum psychopathology.

### ***ICLUST Analyses***

We next attempted to replicate the analyses reported by Schalet et al. (2011). Hierarchical cluster analysis through ICLUST was conducted on data from our full sample. Effort was made to follow Schalet et al.'s analytical sequence as closely as possible. When methods were uncertain, the authors contacted Drs. Schalet and Revelle for clarification. For instance, when statistical anomalies emerged in the ICLUST solutions, an unweighted-beta solution was suggested and applied (B. D. Schalet, personal communication, August 28, 2019).

ICLUST analysis was first conducted with a maximum-beta criterion applied to the tetrachoric correlation matrix. This, as it had in Schalet et al.'s (2011) work, resulted in a one-cluster solution (Figure 2,  $\alpha=.87$ ,  $\beta=.61$ ). Schalet et al. proceeded to repeat this analysis with an average-beta criterion. Our analysis resulted in a two-cluster solution (Figure 3), with cluster one including 26 items representing mostly the same items as Factor 2 in our two-factor model above ( $\alpha=.85$ ,  $\beta=.65$ ) and cluster two including 22 items similar to Factor 1 in our two-factor model ( $\alpha=.79$ ,  $\beta=.47$ ). This cluster solution therefore presented many of the same shortcomings that were found in our two-factor exploratory factor solution; however, this model did not exclude any items for insufficient loadings or crossloading on multiple factors.

Next, Schalet et al. (2011) excluded "poor fitting items, marked by steep reductions in beta" (p. 508). They identified four such items, but ultimately only excluded three: items 12 ("I sometimes have felt that nothing can happen to me until I do what I am meant to do in life."), 24 ("When I feel very excited and happy, I almost always know the reason why."), and 28 ("I frequently write down the thoughts and insights that come to me when I am thinking especially

creatively.”). Following Schalet et al., we excluded these three items. Schalet et al.’s maximum-beta ICLUST analysis on this 45-item sample resulted in a three-cluster solution. Our analysis resulted in a two-cluster solution (Figure 4), with cluster one including 37 items tapping mood, racing thoughts, hyperactivity, and grandiosity ( $\alpha=.87$ ,  $\beta=.61$ ) and cluster two including 8 items tapping ordinariness, scored inversely ( $\alpha=.60$ ,  $\beta=.36$ ).

Following Schalet et al. (2011), the next analyses were conducted on both the 48-item (Figure 5) and 45-item (Figure 6) data samples. VSS was used to determine ideal number of factors to extract. Ordinary least squares was conducted with promax and then oblimin rotations and four factoring methods were compared: principal components, ordinary least squares, maximum likelihood estimation, and principal axis. All rotations peaked at either three or four factors when the 48-item scale was analyzed. When these analyses were repeated on the 45-item scale, again, each solution peaked at three or four factors. Having previously analyzed both a three- and four- factor solution (Table 3), we again examined how this fit compared to our previously identified two-factor model. Though fit indices did become more optimal with inclusion of each factor, the number of items excluded due to insufficient loadings and the number of crossloading items increased from eight (two-factor model) to 15 (three-factor model) to 23 (four-factor model), suggesting that these models could not be appropriately applied to the current version of the HPS or used in practice to identify dimensions of bipolar spectrum psychopathology.

## **Discussion**

Previous studies examining the structure of the HPS have produced inconsistent and conflicting results. Our examination of previously published models found several areas of concern. These included the proposal of unbalanced subscales, suggesting possible limits to

content and construct validity; a high number of items excluded from proposed subscales, suggesting that the effectiveness of the scale may be compromised and new validity studies would be warranted; and disparate methodological practices, suggesting that results from data analyses may be inflated or inaccurate. Most concerning, however, was the lack of agreement between these studies of whether a one-, three-, four-, or five- factor model best captured the structure of the HPS.

In our attempt to identify an underlying factor structure of the HPS, we too found that no model represented an ideal fit. Though parallel analysis and scree plots suggested seven factors, the number of items that would be excluded from the model due to insufficient loadings or crossloadings again suggested that the HPS's utility may be undermined and additional analyses assessing a briefer measure (not to be confused with the published short form, see Meads & Bentall [2008], which has already been evaluated, see Sperry et al. [2015]) would be necessary before the assessment could be reliably used. This same predicament was present in our three-, four-, five-, and six-factor solutions as well. The fit indices we considered (notably RMSEA and SRMR, but also CFI and TLI) were too low in our single factor model to detect Type I and Type II errors, according to Hu & Bentler (1999). These indices were at an appropriate level in our two-factor and five-factor solutions. We therefore advocated that these models best fit the data. However, each factor within these solutions appeared to represent a variety of symptom and impairment domains, which we fully examine in Study 2. Furthermore, our attempts to reproduce the analyses and models proposed by prior publications failed to suggest a clear and replicable underlying factor structure of the HPS.

## STUDY 2

### Introduction

Having discerned two possible factor structures of the HPS, we compared these factors with questionnaire and interview measures of affect, psychopathology, and personality. We strove to understand whether these factor scores offered predictive validity regarding bipolar-related clinical and broader spectrum outcomes.

### Methods

#### *Participants and Materials*

Study 2 employed four subsamples of participants from Study 1 who had completed questionnaire and interview measures as part of previous studies. Note that all of the participants completed the HPS. The HPS items were intermixed with Chapman and Chapman's (1983) Infrequency Scale in order to screen invalid responders. Following Chapman and Chapman, participants who endorsed more than two infrequency items were omitted from the analyses.

Subsample A (391 women, 131 men,  $M$  age = 19.68,  $SD$  = 3.29; from Kwapil et al., 2013) completed the NEO-PI-3 (Costa & McCrae, 2010), a 240-item questionnaire that assesses the Five Factor model of personality. Subsample B (484 women, 171 men,  $M$  age = 19.67,  $SD$  = 3.33; from Walsh et al., 2012) completed the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego Autoquestionnaire version (TEMPS-A; Akiskal et al., 2005), which contains 50 self-report items assessing cyclothymic, dysthymic, irritable, and hyperthymic temperaments. Subsample C (852 women, 266 men, 3 no answer,  $M$  age = 19.19,  $SD$  = 2.81) completed the UPPS Impulsivity Scale (Whiteside et al., 2005). The UPPS-P is a 45-item multidimensional assessment of impulsivity that measures negative urgency, lack of premeditation, lack of perseverance, sensation seeking, and positive urgency. Subsample D (95 women, 41 men, 9 no

answer,  $M$  age = 19.67,  $SD$  = 3.45; from Walsh et al., 2012) completed the Beck Depression Inventory (BDI; Beck et al., 1961), which contains 21 items assessing depressive symptoms. Subsample D was also administered a structured diagnostic interview assessing mood episodes and disorders, hyperthymic temperament, borderline personality disorder traits, and functioning. The interview battery included the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (SCID-IV; First et al., 2002). Additionally, participants were assessed by Akiskal's (2004) criteria for broader bipolar spectrum psychopathology. Participants were also asked a series of Likert-based questions (scored 1-5) regarding grandiose beliefs (e.g., how likely they were to become famous, how likely they were to be featured on the cover of a magazine, how ambitious they were, how creative they were, the extent they felt that there were "odd or different" from their peers, and whether they considered themselves to be leaders or followers). Finally, the participants' global assessment of functioning was assessed through the Diagnostic and Statistical Manual, Fourth Edition, Text Revision Axis V (GAF; American Psychiatric Association, 2000). Detailed information about this interview protocol is provided by Walsh et al. (2012).

### ***Data Analysis***

Data analysis was conducted in R and IBM SPSS Statistics for Windows, Version 27.0 (IBM Corp., 2020).

## **Results**

### ***Correlation Analyses***

Table 5 includes Pearson correlation coefficients for each of the factors of the two- and five-factor models detailed above. In our two-factor model, Factor 1 represented grandiosity, hypersociability, and assertiveness. Factor 1 was positively associated with hyperthymic



temperament and extraversion (large effect size), positive urgency (medium effect size), and all grandiosity-related ratings (medium effect size). It was also inversely associated with dysthymic temperament (medium effect size). Factor 2 in the two-factor model represented energy and mood items. Factor 2 was positively associated with cyclothymic and combined cyclothymic/irritable temperaments (large effect size) as well as irritable temperament, neuroticism, positive urgency, and oddity (grandiosity scale; all medium effect sizes). Higher factor scores on Factor 2 were associated with lower GAF scores (medium effect size).

In our five-factor model, Factor 1 included items regarding excess of energy and some indicating positive mood. Factor 1 was associated with positive urgency, hyperthymic, cyclothymic, combined cyclothymic/irritable temperaments, and oddity (grandiosity scale; all medium effect sizes). Factor 2 of the five-factor model tapped ordinariness and was positively associated with openness to experience, and with three of the grandiosity ratings regarding the likelihood of being famous, the likelihood of being featured on the cover of a magazine, and oddity (all medium effect sizes). Factor 3 of the five-factor model represented hypersociability and grandiosity. Unsurprisingly, it showed positive associations with all of Eckblad and Chapman's (1986) grandiosity questions (medium to large effect sizes). Additionally, Factor 3 was positively associated with hyperthymic temperament and extraversion (large effect size), and negatively associated with dysthymic temperament (medium effect size). Factor 4 of the five-factor model tapped goal-directed behavior and grandiosity. Again, this factor was associated with all grandiosity-related questions. Factor 4 was also associated with hyperthymic temperament and extraversion (medium effect size). Finally, Factor 5 consisted of moodiness and mood lability. This factor was positively associated with cyclothymic, irritable, combined cyclothymic/irritable temperaments, and neuroticism (large effect sizes). Furthermore, Factor 5

was associated with higher scores on positive urgency and the BDI and lower GAF scores (medium effect sizes).

### ***Odds Ratios***

In order to determine the predictive validity of our two- and five-factor HPS models, we conducted binary logistic regressions with factor scores as the independent variable and past major depressive episode, major depressive diagnosis, hypo/manic episode or hyperthymic temperament, DSM-IV bipolar diagnoses, or Akiskal's broader bipolar spectrum diagnoses as dependent variables, respectively (Table 6). Our two- and five-factor model subscales showed specificity in detecting increased likelihood of bipolar symptoms compared to depressive symptoms, but no odds ratios for any bipolar-related outcomes exceeded 2.0 indicating that these were small effects.

### **Discussion**

Associations between the two- and five-factor HPS models with interview and questionnaire measures of affect, psychopathology, and personality yielded results consistent with our expectations. For instance, it is unsurprising that factors of hypersociability and grandiosity (Factor 1 of the two-factor model and Factor 3 of the five-factor model) showed strong positive associations with hyperthymic temperament, negative associations with dysthymic temperament, and positive associations with ratings of extraversion and Eckblad and Chapman's (1986) questions of grandiose beliefs. Factors of affect and mood lability (Factor 2 of the two-factor model and Factor 5 of the five-factor model) showed positive associations with cyclothymic and irritable temperaments, neuroticism, higher BDI scores, and lower GAF ratings.

Participants who have higher factor scores on mood-related factors tend to have slightly higher likelihoods of being diagnosed with bipolar spectrum disorders. This is to be expected

given that these items are themselves more indicative of pathological outcomes. Otherwise, scores on the HPS factors represent similar odds ratios to scores of the HPS total scores. The claims made by authors of other models, and echoed by voices such as Watson and Naragon-Gainey (2014), surrounding the importance of assessing subscales independently on the HPS total are not represented by our data. It seems the HPS as a cohesive scale provides as much predictive power for risk of bipolar spectrum disorders as the factors separately.

## GENERAL DISCUSSION

The HPS has proven itself a useful psychometric assessment for bipolar spectrum psychopathology and risk for bipolar disorders. Both in its derivation study and in replication and longitudinal studies, the HPS has shown promising rates of detecting bipolar spectrum psychopathology in clinical and non-clinical samples. Additionally, its brevity makes it a valuable tool for clinical and research use. It was not, however, explicitly designed for assessing multiple dimensions of bipolar spectrum psychopathology.

Researchers have increasingly considered bipolar symptoms and impairment to be multidimensional (e.g., Faraone et al., 2004; Swann et al. 2001). However, a comprehensive model of this has not been developed and a multidimensional psychometric assessment has not been disseminated. To this end, several research teams, as outlined above, attempted to discern an underlying factor structure for bipolar spectrum psychopathology from the HPS. Given Eckblad and Chapman's attempt to create a scale with a strong unidimensional nature and high internal consistency, this is a problematic venture from the outset – as demonstrated by inconsistent findings to date. However, the high level of interest and use of some of the proposed models of the HPS suggested that clarity on this topic would be helpful in advancing correct usage of the scale. Note that this does not dismiss the notion that bipolar spectrum psychopathology has a multidimensional structure, but rather raises concerns about whether such a structure can be meaningfully extracted from a pre-existing measure, such as the HPS.

Researchers of bipolar spectrum psychopathology and its underlying dimensions are left, therefore, in a quagmire. Although we believe the two-factor model and the five-factor described above do indeed fit the HPS more effectively than any other evaluated model, they do not do so in a usable fashion. We do not, therefore, suggest the utilization of any subscales of the HPS for

the derivation of meaningful information. Although the scale as a whole appears effective for detecting bipolar spectrum psychopathology and risk for bipolar disorders (e.g., Kwapil et al., 2000; Walsh et al., 2015), it does not seem to adequately, equally, nor validly capture underlying dimensions of bipolar spectrum symptoms and impairment. Furthermore, we view the logic of trying to conceptualize the multidimensionality of bipolar spectrum psychopathology by disentangling a relatively homogenous scale to be misguided. We hereby strive not for future top-down analyses of pre-existing scales, but for a ground-up establishment of a model of the dimensions of bipolar spectrum psychopathology. We propose that this model be the foundation of a future scale to be established using psychometrically-valid techniques aimed at creating the best assessment, rather than the quickest, and that the HPS is not that assessment.

## TABLES

**Table 1***Demographic Information for Groups 1 and 2*

Demographics	Group 1	Group 2
Racial/Ethnic Identity by %		
White	57.5	58.9
African-American	21.0	21.4
Hispanic	6.3	6.4
Asian/Pacific Islander	8.4	8.6
Native American	.6	.6
Other	4.0	4.1
Gender Identity by %		
Female	72.1	72.1
Male	27.2	27.2
Age	20.53 years (5.83)	20.50 years (5.87)

**Table 2***Tucker Congruence Coefficients for Groups 1 and 2 Parallel Analyses*

Factors	Group 1 Factor 1	Group 1 Factor 2	Group 1 Factor 3	Group 1 Factor 4	Group 1 Factor 5	Group 1 Factor 6	Group 1 Factor 7
Group 2 Factor 1	.99	-.02	.14	.08	.10	.23	.09
Group 2 Factor 2	.05	.94	.17	.36	-.02	-.03	.05
Group 2 Factor 3	.10	.16	.93	.02	.08	.26	.34
Group 2 Factor 4	.02	.16	.04	.93	.18	.29	.11
Group 2 Factor 5	.10	.25	.06	.18	.91	.18	.21
Group 2 Factor 6	.25	.00	.45	.29	-.26	.38	-.76
Group 2 Factor 7	.28	.20	.20	.36	-.03	.93	.15

*Note.* Tucker's guidelines dictate that factors with a congruence coefficient of .98-1.00 are considered *excellent*, .92-.98 are *good*, .82-.92 are *borderline*, .68-.82 are *poor*, and all lower values are considered *terrible*.

**Table 3***Exploratory Factor Analyses of Hypomanic Personality Scale, 1-7 Factors*

Factors	# of Items Insufficiently Loading (<.3)	# of Items Crossloading	SRMR	RMSEA	CFI	TLI
1 Factor	6	N/A	.109	.069	.678	.663
2 Factors	2	6	.075	.052	.823	.806
3 Factors	1	14	.057	.041	.895	.880
4 Factors	3	20	.042	.031	.941	.930
5 Factors	1	11	.034	.026	.963	.953
6 Factors	2	9	.031	.024	.970	.960
7 Factors	3	16	.029	.022	.975	.965



**Table 4**  
*Summary of Two-Factor and Five-Factor Hypomanic Personality Scale Models*

Factors	Content
<i>Two-Factor Model</i>	
Factor 1	Grandiosity, hypersociability, assertiveness
Factor 2	Energy, mood
<i>Five-Factor Model</i>	
Factor 1	Excess of energy, positive mood
Factor 2	Ordinariness (reverse-scored)
Factor 3	Hypersociability, grandiosity
Factor 4	Goal-directed behavior, grandiosity
Factor 5	Moodiness, mood lability

Table 5

*Correlation Analyses with the Two-Factor and Five-Factor Hypomanic Personality Scale Models*

Variables	Full HPS	Two-Factor Model		Five-Factor Model				
		1	2	1	2	3	4	5
UPPS-P								
Lack of premeditation	.30***	.28***	.27***	.29***	.21***	.24***	.06*	.20***
Urgency	.15***	.05	.20***	.13***	.09**	.04	.01	.28***
Sensation seeking	.24***	.27***	.17***	.22***	.15***	.24***	.17***	.01
Lack of perseverance	.00	-.09**	.10***	.05	.06*	-.12***	-.14***	.17***
Positive urgency	.45***	.31***	.48***	.42***	.18***	.25***	.15**	.43***
TEMPS-A								
Hyperthymic	.46***	.61***	.25***	.38***	.13**	.59***	.49***	-.03
Dysthymic	-.14***	-.32***	.08*	-.03	-.13**	-.37***	-.19***	.21***
Cyclothymic	.45***	.22***	.58***	.43***	.17***	.17***	.27***	.64***
Irritable	.25***	.06	.35***	.19***	.13**	.06	.09*	.52***
Cyclothymic/Irritable	.46***	.19***	.59***	.40***	.20***	.16***	.22***	.72***
NEO-PI-3								
Neuroticism	.11*	-.17***	.36***	.17***	.06	-.23***	-.11*	.57***
Extraversion	.46***	.57***	.29***	.40***	.17***	.53***	.33***	.05
Openness to experience	.31***	.28***	.24***	.24***	.30***	.24***	.27***	.16***
Agreeableness	-.24***	-.24***	-.17***	-.14**	-.15***	-.26***	-.15***	-.21***
Conscientiousness	-.11**	.01	-.24***	-.16***	-.12**	.06	.09*	-.29***
Grandiosity Measures								
Famous	.39***	.39***	.08	.12	.30**	.52***	.47***	.07
Ambition	.31**	.33***	.17	.19*	.25**	.36***	.34***	.10
Creative	.35***	.36***	.06	.15	.28**	.45***	.44***	-.04
Leader	.40***	.33***	.14	.15	.21*	.51***	.43***	.17
Magazine	.45***	.42***	.23*	.25**	.42***	.44***	.52***	.17
Odd	.49***	.41***	.32***	.36***	.46***	.37***	.46***	.25**
Other Psychopathology								
BDI	.12	.02	.21**	.11	.09	-.02	.09	.35***
Global functioning	-.25**	-.14	-.36***	-.28***	-.15	-.07	-.15	-.40***

Note. All coefficients represent Pearson r correlations. Medium effect sizes ( $f^2$ ) in **bold**, large effect sizes in **bold** and *italics*.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

**Table 6**

*Odds Ratios of Psychopathological Outcomes with Two-Factor and Five-Factor Models of the Hypomanic Personality Scale*

Factors	Past Major Depressive Episode		Major Depressive Disorder		Past Hypo/manic Episode and Hyperthymic Temperament		DSM-IV Bipolar Diagnosis		Akiskal's Broader Bipolar Diagnosis	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
Two-Factor Model:										
Factor 1	1.00	(.94, 1.06)	.95	(.88, 1.01)	1.25	(1.15, 1.37)	1.11	(1.02, 1.21)	1.14	(1.05, 1.24)
Factor 2	1.03	(.98, 1.10)	.96	(.90, 1.03)	1.26	(1.14, 1.39)	1.27	(1.10, 1.46)	1.31	(1.14, 1.50)
Five-Factor Model:										
Factor 1	1.01	(.94, 1.09)	.93	(.86, 1.02)	1.34	(1.18, 1.52)	1.25	(1.07, 1.46)	1.31	(1.13, 1.52)
Factor 2	1.01	(.80, 1.27)	.93	(.71, 1.21)	1.96	(1.49, 2.59)	1.37	(.99, 1.88)	1.38	(1.04, 1.83)
Factor 3	1.01	(.92, 1.11)	.93	(.83, 1.03)	1.36	(1.20, 1.55)	1.16	(1.01, 1.33)	1.21	(1.06, 1.37)
Factor 4	1.00	(.86, 1.16)	.83	(.69, 1.00)	1.72	(1.38, 2.16)	1.38	(1.07, 1.78)	1.52	(1.20, 1.94)
Factor 5	1.15	(.99, 1.33)	.96	(.81, 1.13)	1.45	(1.20, 1.74)	1.80	(1.29, 2.50)	1.71	(1.31, 2.24)

*Note.* OR = Odds Ratio, CI = 95% Confidence Interval.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

**Table 7***Correlation Analyses between All Models of the Hypomanic Personality Scale*

Rawlings et al.					Schalet et al.			Stanton et al.				
Factors	Factor 1	Factor 2	Factor 3	Factor 4	Social Vitality	Mood Volatility	Excitement	Modesty	Charisma	Activation	Intellectual Confidence	Lability
Two- Factor Model:												
Factor 1	.56	.66	.83	.49	.94	.46	.68	.58	.83	.67	.56	.66
Factor 2	.97	.63	.46	.30	.44	.92	.78	.20	.35	.82	.97	.63
Five- Factor Model:												
Factor 1	.89	.62	.56	.24	.49	.78	.89	.22	.43	.93	.89	.62
Factor 2	.29	.25	.28	.85	.51	.31	.27	.71	.28	.19	.29	.25
Factor 3	.37	.57	.81	.40	.95	.32	.45	.47	.90	.45	.37	.57
Factor 4	.43	.86	.36	.42	.69	.49	.38	.53	.40	.43	.43	.86
Factor 5	.83	.36	.19	.33	.23	.89	.39	.13	.14	.42	.83	.36

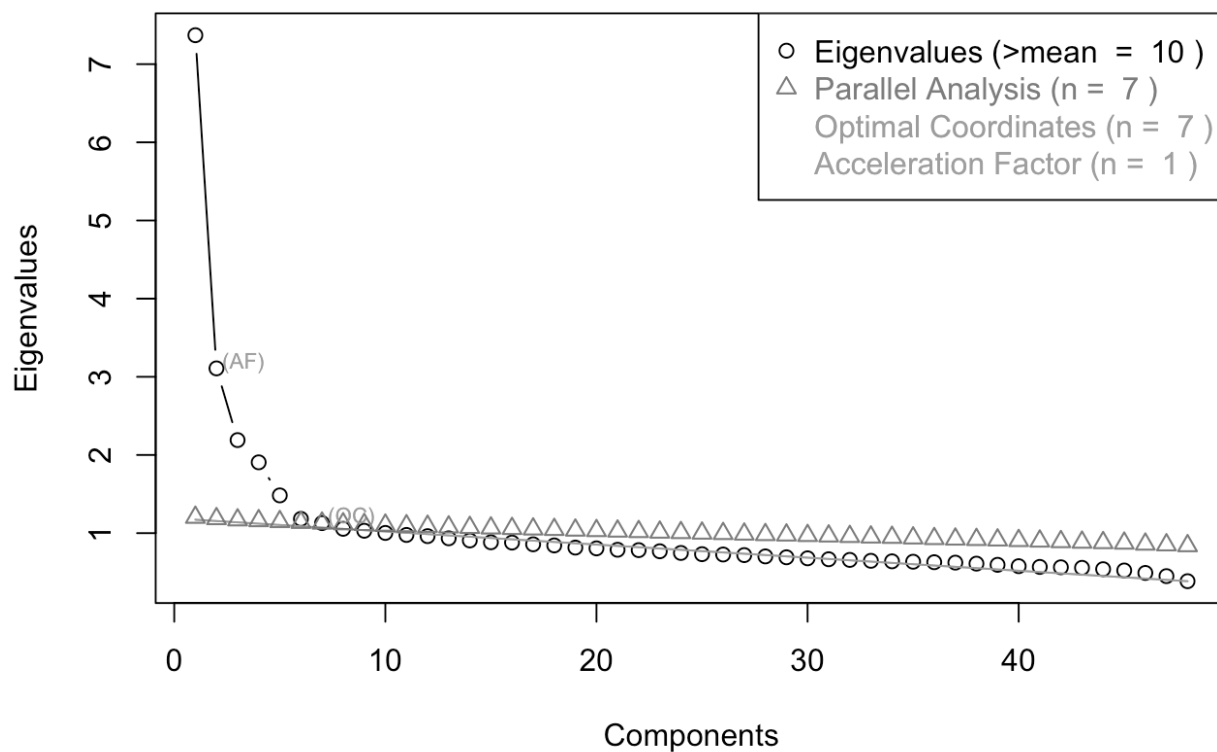
*Note.* All coefficients represent Pearson r correlations and all are significant at  $p < .001$ .

# FIGURE

**Figure 1**

*Parallel Analysis Scree Plot on Combined Group Data*

## Non Graphical Solutions to Scree Test



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## APPENDIX A: SUPPLEMENTAL TEXT

### *Profile Agreements Between Models of the Hypomanic Personality Scale*

Subscales of the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986) proposed by Schalet, Durbin, and Revelle (2011) and Stanton, McArtor, and Watson (2019) were also compared to the Five Factor model of personality, as measured by the NEO-PI-3. Schalet and colleagues assessed personality with the Big Five Mini-Markers (MM; Saucier, 1994), and Stanton and colleagues used the Personality Inventory for *DSM-5* (PID-5; Krueger et al., 2012). Despite all asserting to measure the Five Factor or Big Five model of personality, these measures differ in levels of parsimony. The NEO-PI-3 and PID-5 have demonstrated similar clinical utility (Heath et al., 2018) but the MM shows less homogeneity from Costa and McCrae's model (Mooradian & Nezlek, 1995). Therefore, to compare all three models' fits with the Five Factor model, double-entry  $q$  correlations ( $r_{ICC}$ ) were calculated as a means to assess profile agreement at a facet level (see McCrae [2008] for a comparison of profile comparison techniques). Supplemental tables 11-14 display the profile agreement  $r_{ICC}$  scores for our two-factor and five-factor HPS model with the proposed models by Rawlings et al., Schalet et al., and Stanton et al.

When comparing the profile similarities of our two-factor HPS model with the Five Factor model of personality, many strong similarities between proposed factors emerged. Factor 1 of our two-factor model (grandiosity, hypersociability, and assertiveness) showed strong agreement with Factor 3 of our five-factor model (hypersociability, grandiosity,  $r_{ICC} = .987$ ), Rawlings et al.'s Factor 3 ( $r_{ICC} = .974$ ), Schalet et al.'s *Social Vitality* ( $r_{ICC} = .986$ ), and Stanton et al.'s *Charisma* ( $r_{ICC} = .982$ ). Factor 2 of our two-factor model (energy, mood) displayed strong profile agreement with Factor 1 (excess of energy, positive mood;  $r_{ICC} = .987$ ) and Factor 5

(moodiness, mood lability;  $r_{ICC} = .994$ ) of our five-factor model, Schalet et al.'s *Mood Volatility* ( $r_{ICC} = .963$ ), and Stanton et al.'s *Lability* ( $r_{ICC} = .869$ ).

When examining the profile agreements with our five-factor HPS model, there were again clear similarities between our factors and those derived from other models (this is not entirely surprising given that the factors contained overlapping items in many cases). Factor 1 of our five-factor model (excess of energy, positive mood), was similar to Factor 2 of our two-factor model, Schalet et al.'s *Excitement* ( $r_{ICC} = .938$ ), and Stanton et al.'s *Activation* ( $r_{ICC} = .947$ ). Factor 2 (ordinariness) showed strong profile agreement with Rawlings et al.'s Factor 4 ( $r_{ICC} = .961$ ). Factor 3 (hypersociability, grandiosity), in addition to its agreement with Factor 1 of our two-factor model, showed strong similarity with Rawlings et al.'s Factor 3 ( $r_{ICC} = .950$ ), Schalet et al.'s *Social Vitality* ( $r_{ICC} = .996$ ), and Stanton et al.'s *Charisma* ( $r_{ICC} = .987$ ). Factor 4 (goal-directed behavior, grandiosity), showed strong profile similarity with Rawlings et al.'s Factor 2 ( $r_{ICC} = .970$ ), and Stanton et al.'s *Intellectual Confidence* ( $r_{ICC} = .962$ ). Factor 5 (moodiness, mood lability) was similar to Schalet et al.'s *Mood Volatility* ( $r_{ICC} = .959$ ) and Stanton et al.'s *Lability* ( $r_{ICC} = .995$ ).

We also found almost no profile similarity between factors measuring mood lability and factors measuring grandiosity and social behaviors. This was apparent in both our two-factor and five-factor models as well as our peers' models.

## Discussion

Though our models of the HPS do not share ideally congruent factors with those of Rawlings et al. (2000), Schalet et al. (2011), and Stanton et al. (2019), there is still a predictable level of overlap between certain well-articulated dimensions of the HPS and the Five Factor model of personality. What we describe as hypersociability and grandiosity in our Factor 1 (two-

factor) and Factor 3 (five-factor) seem to be articulated Rawlings et al.'s Factor 3, Schalet et al.'s *Social Vitality*, and Stanton et al.'s *Charisma*. Our Factor 2 (two-factor) and Factor 5 (five-factor), which were comprised of affect and mood lability items, performed similarly to Rawlings et al.'s Factor 1, Schalet et al.'s *Mood Volatility*, and Stanton et al.'s *Lability*. Our Factor 4 (five-factor model), which we described as goal-directed behavior and grandiosity, displayed similar profiles to Rawlings et al.'s Factor 2, Schalet et al.'s *Social Vitality*, and Stanton et al.'s *Charisma* and *Intellectual Confidence*. These patterns suggest that, naming conventions aside, dimensions including an increase in social behaviors, inflated self-esteem, high arousal positive and negative affect, lability between these affective poles, and increased devotion to perceived goals represent important dimensions of bipolar spectrum psychopathology.

## APPENDIX B: SUPPLEMENTAL TABLES

**Table 8**

*Groups 1, 2, and Total Sample Descriptive Statistics of the Hypomanic Personality Scale*

Groups	<i>n</i>	Mean	Standard Deviation	Range	Cronbach's $\alpha$
Group 1	2501	18.6	8.5	0-45	.88
Group 2	2501	18.6	8.6	0-47	.88
Total	5002	18.6	8.6	0-47	.88



**Table 9***Group 1 Eigenvalues*

Components	Value	Variance Accounted For	Cumulative Variance Accounted For
1	11.42	23.79%	23.79%
2	4.31	8.98%	32.77%
3	3.03	6.31%	39.08%
4	2.40	5.00%	44.08%
5	1.75	3.65%	47.73%
6	1.28	2.67%	50.40%
7	1.24	2.58%	52.98%

**Table 10***Group 2 Eigenvalues*

Components	Value	Variance Accounted For	Cumulative Variance Accounted For
1	11.60	24.17%	24.17%
2	4.53	9.44%	33.61%
3	2.91	6.06%	39.67%
4	2.41	5.02%	44.69%
5	1.81	3.77%	48.46%
6	1.34	2.79%	51.25%
7	1.25	2.60%	53.85%

**Table 11**

*Profile Agreement Between the Five Factor Model of Personality and the Two-Factor and Five-Factor Hypomanic Personality Scale Models*

Factors	Factor 1 (Two-Factor)	Factor 2 (Two-Factor)	Factor 1 (Five-Factor)	Factor 2 (Five-Factor)	Factor 3 (Five-Factor)	Factor 4 (Five-Factor)	Factor 5 (Five-Factor)
Factor 1 (Two-Factor)	1	.43**	.71**	.56**	.99**	.88**	-0.01
Factor 2 (Two-Factor)		1	.90**	.66**	.32*	.39**	.86**
Factor 1 (Five-Factor)			1	.74**	.61**	.67**	.57**
Factor 2 (Five-Factor)				1	.52**	.62**	.43**
Factor 3 (Five-Factor)					1	.88**	-0.10
Factor 4 (Five-Factor)						1	-0.01
Factor 5 (Five-Factor)							1

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

**Table 12**

*Profile Agreement between the Five Factor Model of Personality and the Two-Factor, Five-Factor, and Rawlings et al.'s Hypomanic Personality Scale Models*

Factors	Factor 1 (Rawlings et al.)	Factor 2 (Rawlings et al.)	Factor 3 (Rawlings et al.)	Factor 4 (Rawlings et al.)
Factor 1 (Two-Factor)	.37**	.84**	.97**	.65**
Factor 2 (Two-Factor)	.99**	.50**	.48**	.59**
Factor 1 (Five-Factor)	.87**	.75**	.76**	.72**
Factor 2 (Five-Factor)	.62**	.70**	.58**	.96**
Factor 3 (Five-Factor)	.26*	.82**	.95**	.62**
Factor 4 (Five-Factor)	.32*	.97**	.83**	.75**
Factor 5 (Five-Factor)	.89**	0.12	0.04	.34**

\* $p < .05$ . \*\* $p < .01$ .

**Table 13**

*Profile Agreement between the Five Factor Model of Personality and the Two-Factor, Five-Factor, and Schalet et al.'s Hypomanic Personality Scale Models*

Factors	Social Vitality (Schalet et al.)	Mood Volatility (Schalet et al.)	Excitement (Schalet et al.)
Factor 1 (Two-Factor)	.99**	.23	.79**
Factor 2 (Two-Factor)	.32*	.96**	.73**
Factor 1 (Five-Factor)	.61**	.76**	.94**
Factor 2 (Five-Factor)	.54**	.58**	.64**
Factor 3 (Five-Factor)	1.00**	.13	.72**
Factor 4 (Five-Factor)	.89**	.21	.73**
Factor 5 (Five-Factor)	-.09	.96**	.32*

\* $p < .05$ . \*\* $p < .01$ .

**Table 14**

*Profile Agreement between the Five Factor Model of Personality and the Two-Factor, Five-Factor, and Stanton et al. 's Hypomanic Personality Scale Models*

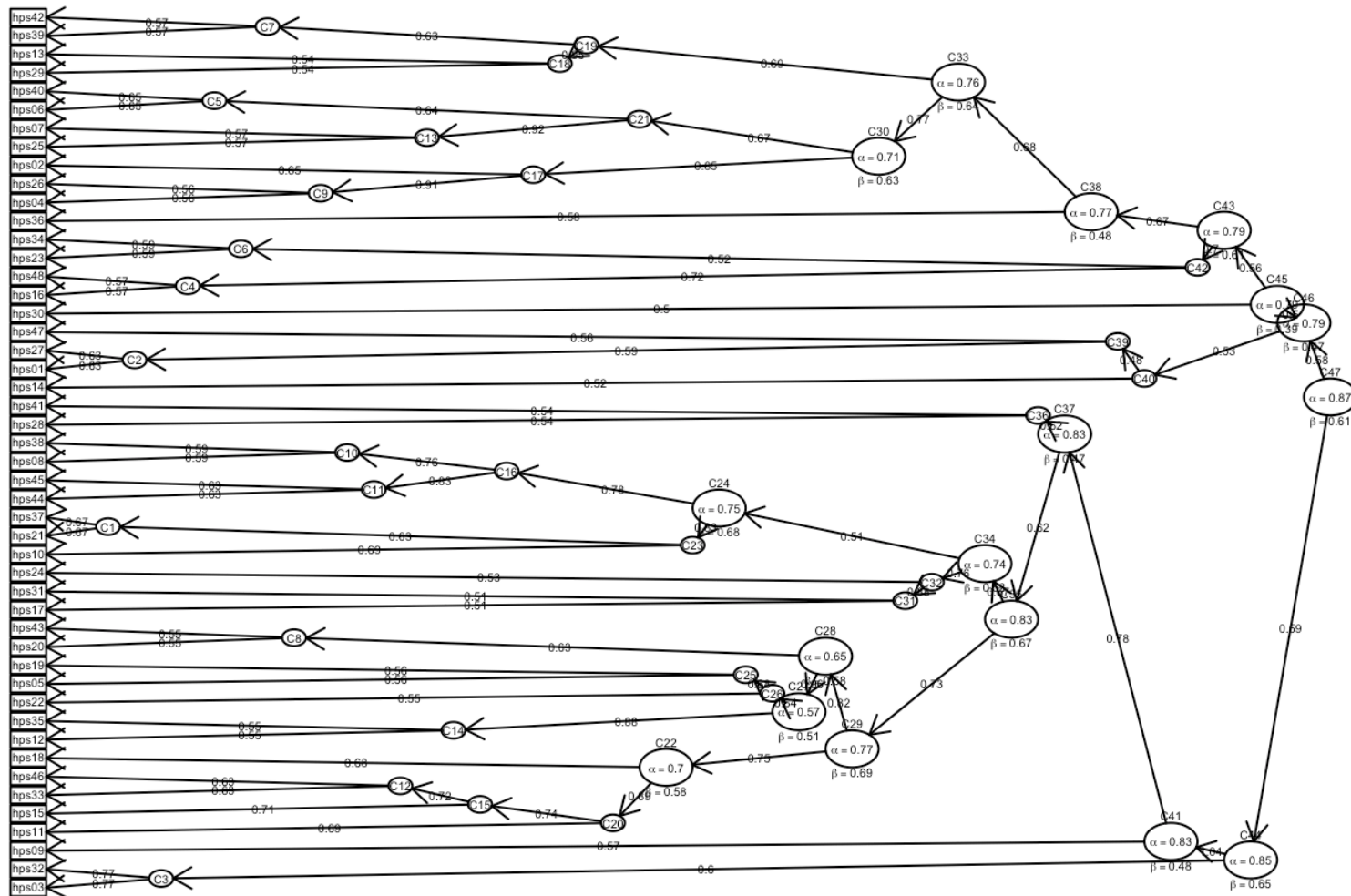
Factors	Modesty (Stanton et al.)	Charisma (Stanton et al.)	Activation (Stanton et al.)	Intellectual Confidence (Stanton et al.)	Lability (Stanton et al.)
Factor 1 (Two-Factor)	.82*	.98**	.78**	.82**	.00
Factor 2 (Two-Factor)	.24	.32*	.75**	.55**	.87**
Factor 1 (Five-Factor)	.53**	.63**	.95**	.78**	.59**
Factor 2 (Five-Factor)	.71**	.53**	.63**	.73**	.47**
Factor 3 (Five-Factor)	.83**	.99**	.70**	.79**	-.10
Factor 4 (Five-Factor)	.89**	.86**	.72**	.96**	-.01
Factor 5 (Five-Factor)	-.11	-.12	.35*	.17	1.00**

\* $p < .05$ . \*\* $p < .01$ .

## APPENDIX C: SUPPLEMENTAL FIGURES

Figure 2

*ICLUST Solution, Average Beta Criterion, Full 48-Item Hypomanic Personality Scale*



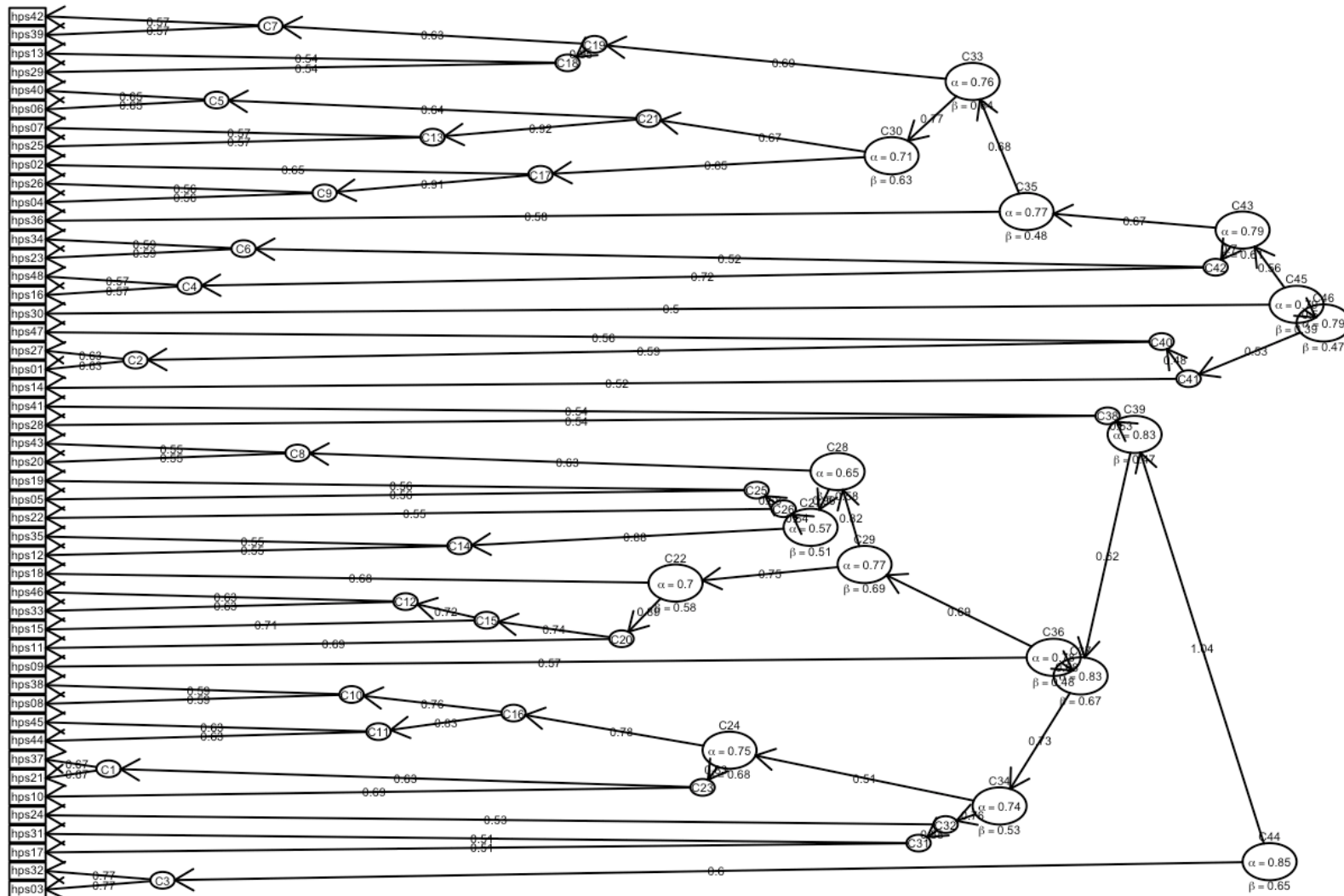
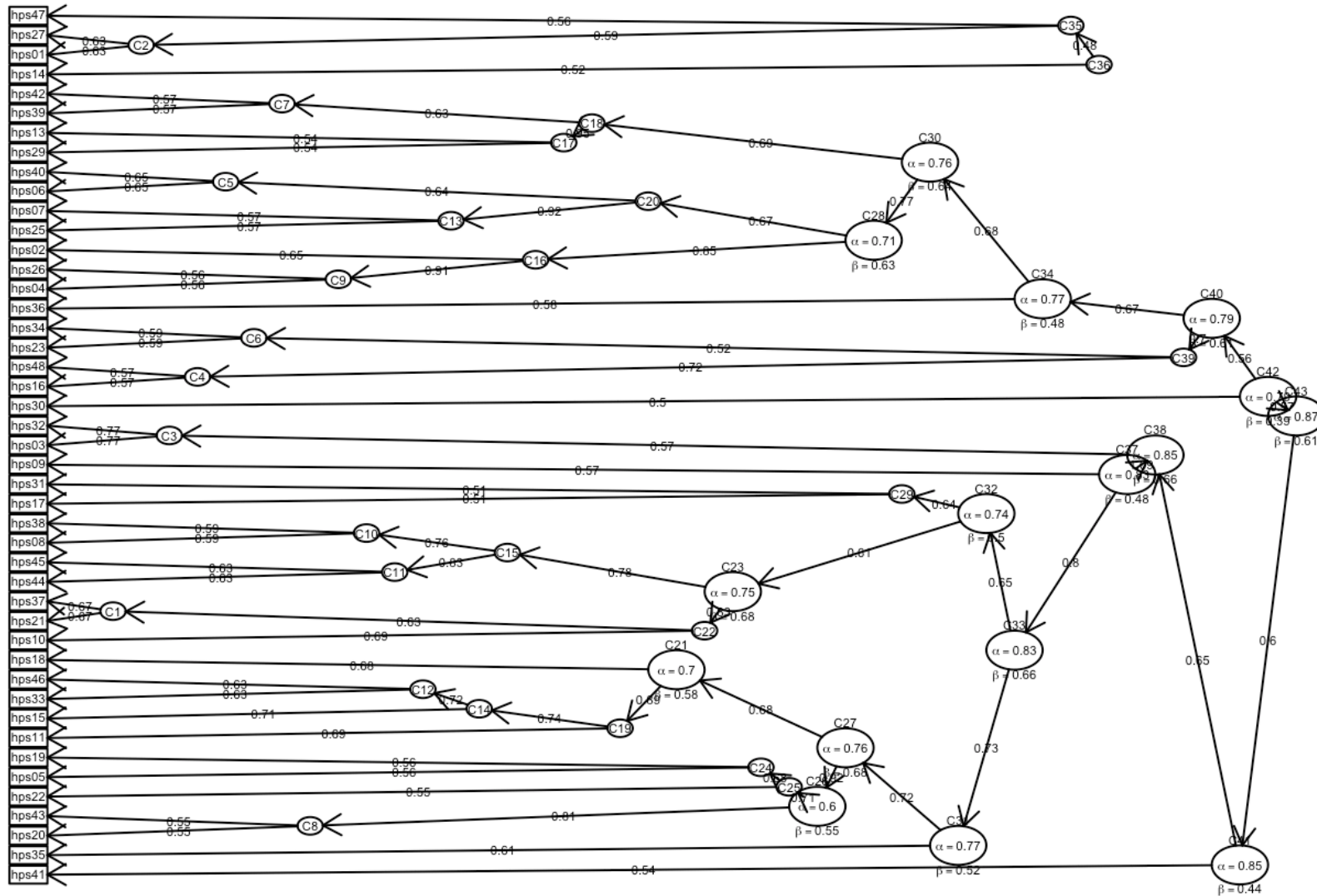




Figure 4

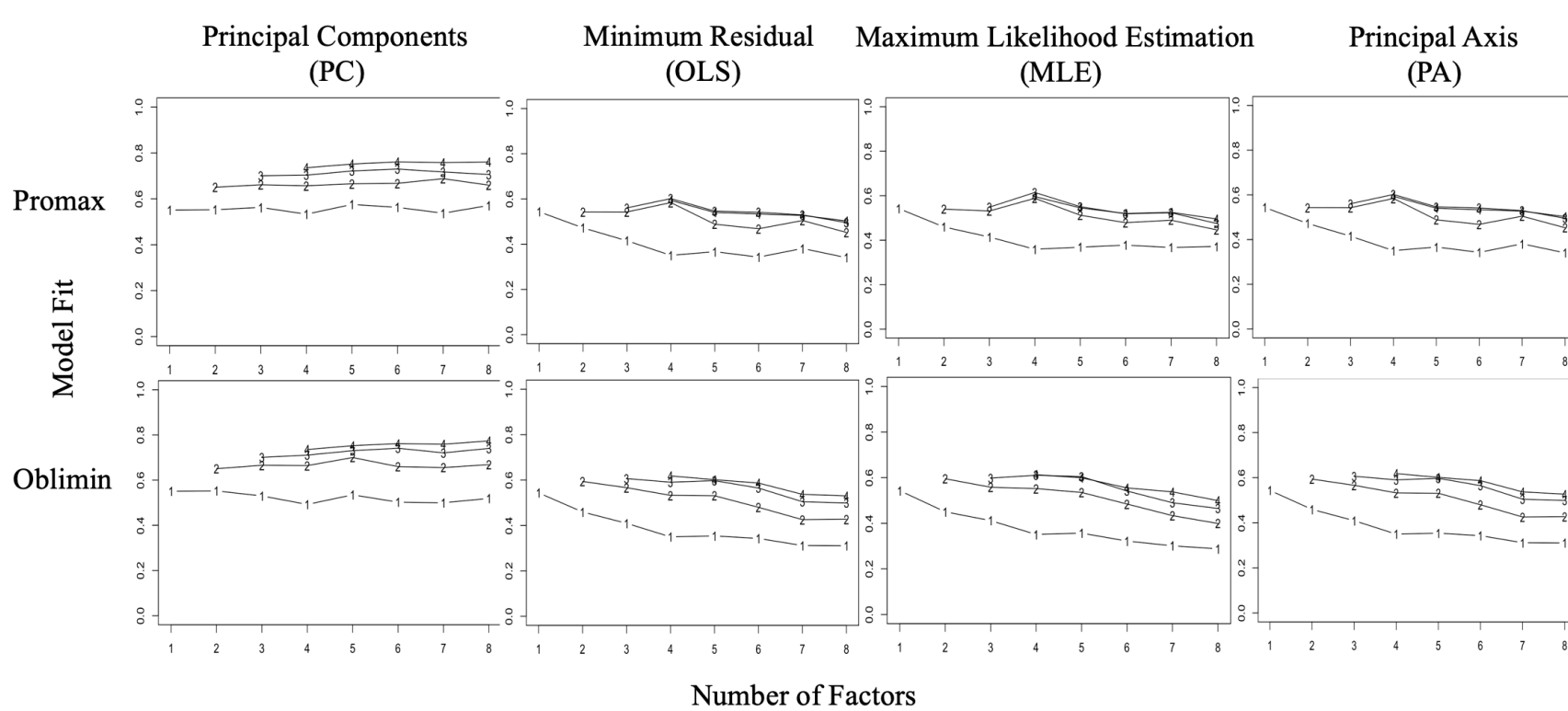
*ICLUST Solution, Maximum Beta Criterion, Modified 45-Item Hypomanic Personality Scale*



### Very Simple Structure (VSS) Analysis of the 48-item Hypomanic Personality Scale

**Figure 6**

*Very Simple Structure (VSS) Analysis of the 45-item Hypomanic Personality Scale*



#### APPENDIX D: SUPPLEMENTAL REFERENCES

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