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Neuroticism Is Prospectively Associated With 30-Month Changes in Broadband Internalizing Symptoms, but Not Narrowband Positive Affect or Anxious Arousal, in Emerging Adulthood

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Abstract

Elevated levels of Neuroticism/Negative Emotionality (N/NE) and, less consistently, lower levels of Extraversion/Positive Emotionality (E/PE) confer risk for pathological depression and anxiety. To date, most prospective-longitudinal research has narrowly focused on traditional diagnostic categories, creating uncertainty about the precise nature of these prospective associations. Adopting an explicitly hierarchical-dimensional approach, we examined the association between baseline variation in personality and longitudinal changes in broad and narrow internalizing-symptom dimensions in 234 emerging adults followed for 2.5 years, during the transition from older adolescence to early adulthood. N/NE was uniquely associated with increases in broadband internalizing—the core cognitive and affective symptoms that cut across the emotional disorders—and unrelated to the narrower dimensions of positive affect and anxious arousal that differentiate specific internalizing presentations. Variation in E/PE and several other Big Five traits was cross-sectionally but not prospectively related to longitudinal changes in specific internalizing symptoms. Exploratory personality-facet-level analyses provided preliminary evidence of more granular associations between personality and longitudinal changes in internalizing symptoms. These observations enhance the precision of models linking personality to internalizing illness, highlight the centrality of N/NE to increases in transdiagnostic internalizing symptoms during a key developmental chapter, and set the stage for developing more effective prevention and treatment strategies.

Keywords

anxiety, Big Five, depression, emerging adulthood, emotional disorders, Hierarchical Taxonomy of Psychopathology, HiTOP, internalizing illness, personality and temperament

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Anxiety, depression, and other internalizing ("emotional") disorders are the most common family of psychiatric illnesses (Kessler et al., 2012). They consistently

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rank among the top causes of global disability, particularly among young people, and exact a tremendous social and economic toll (Dieleman et al., 2020; Olfson et al., 2019; GBD 2019 Diseases and Injuries Collaborators, 2020). Existing treatments are far from consistently curative, underscoring the urgency of developing a better understanding of the factors that promote the development, maintenance, and recurrence of these often-debilitating illnesses (Craske et al., 2017; Cuijpers et al., 2020; Singewald et al., 2023).

Neuroticism/Negative Emotionality, Extraversion/Positive Emotionality, and Depression

Trait-like variation in temperament and personality is central to most etiological models of internalizing psychopathology (Clark, 2005; Fanous et al., 2002; Klein et al., 2011; Ormel et al., 2013; Shackman et al., 2016). Two major axes of personality—Neuroticism/Negative Emotionality (N/NE) and Extraversion/Positive Emotionality (E/PE)—have attracted the most theoretical attention and show the most robust empirical links in cross-sectional and longitudinal studies with internalizing symptoms (Clark, 2005; Kotov et al., 2010; Naragon-Gainey et al., 2018). Individuals with high levels of N/NE are predisposed to negative emotions, tend to perceive life as a series of punishments or threats (i.e., pessimistic), and are prone to avoidance (Shackman et al., 2016). In contrast, individuals with high levels of E/PE are susceptible to positive emotions; tend to experience the world as a series of opportunities for reward, particularly social reward (i.e., optimistic); and are prone to vigorous approach and engagement with potential rewards (Caspi et al., 2005).

N/NE

Longitudinal research has demonstrated that high-N/NE adolescents and adults are more likely to experience future depressive symptoms and diagnoses (e.g., Hur et al., 2019). During early adulthood and beyond, N/NE predicts both the first onset and recurrence of major depressive disorder (MDD), suggesting that it is a precursor—and not simply a scar or correlate—of depressive episodes (Hayden & Klein, 2001; Kendler et al., 1993; Klein et al., 2011; Spinhoven et al., 2011). A large-scale meta-analysis confirmed that the longitudinal association between N/NE and depression is consistent and substantial (*d*s = 0.50–0.74), endures across the life span, and remains significant after adjusting for baseline symptoms (*d* = 0.33; Jeronimus et al., 2016).

E/PE

Compared with N/NE, there is greater uncertainty about prospective associations between (low) E/PE and depression. A comprehensive meta-analysis documented a substantial association between E/PE and future depression (*d* = −0.54), but this prospective association was markedly diminished when adjusted for baseline symptoms (*d* = −0.16), suggesting that E/PE is a comparatively weak predictor of longitudinal changes in depression (Khazanov & Ruscio, 2016).

N/NE, E/PE, and Anxiety

Relative to depression, less empirical attention has been devoted to understanding the consequences of N/NE and E/PE for longitudinal changes in anxiety. Nevertheless, the Jeronimus et al. (2016) meta-analysis noted above documented robust prospective associations between N/NE and anxiety symptoms (*d* = 0.68) and disorders (*d* = 0.48), even after controlling for baseline symptoms (*d* = 0.38 and 0.18, respectively; Jeronimus et al., 2016). On the other hand, the Khazanov and Ruscio (2016) meta-analysis indicated that longitudinal associations between E/PE and anxiety (*d* = −0.39) are notably weaker after controlling for baseline variation in symptom severity (*d* = −0.18).

Research Centered on *Diagnostic and Statistical Manual of Mental Disorders* Limits Conceptual Precision

There is compelling evidence that high levels of N/NE and potentially low levels of E/PE prospectively predict longitudinal changes in internalizing problems. Yet understanding is limited by the field's heavy empirical and conceptual emphasis on traditional categorical diagnoses. Because they are defined by polythetic criteria, patients diagnosed with MDD and other internalizing disorders from the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*; American Psychiatric Association, 2013) show marked variability in symptom presentations (Olbert et al., 2014). In fact, any two patients diagnosed with MDD typically have little overlap in their symptom profiles (Fried & Nesse, 2015). This heterogeneity makes it impossible to determine which facets of pathological depression and anxiety account for their well-documented longitudinal associations with N/NE and, somewhat less consistently, E/PE (Conway et al., 2019). Furthermore, structural research has established that many internalizing symptoms cut across diagnoses—consistent with rampant comorbidity, overlapping treatment effects,

and shared genetic substrates—whereas other symptoms are more specific (Barlow et al., 2014; Forbes, 2023; Hur et al., 2019; Watson, Forbes, et al., 2022). Traditional *DSM*-centered research cannot resolve whether N/NE is primarily related to the symptoms that bind depression and anxiety together or those that distinguish specific syndromes or syndrome clusters. In sum, evidence linking personality traits to MDD and other isolated diagnoses cannot shed light on the particular features of internalizing psychopathology that underlie such prospective associations, and therefore, existing theoretical models remain underspecified (e.g., Klein et al., 2011).

Building on decades of success in developmental-psychopathology research, hierarchical-dimensional models of internalizing psychopathology set the stage for overcoming this key barrier (Achenbach, 1966, 2020; Kotov et al., 2017, 2021, 2022). The tripartite model of anxiety and depression was the point of departure for much of the psychometric research into the architecture of internalizing symptoms (Mineka et al., 1998). This model posits that a broad ("higher-order") general-distress-symptom dimension characterizes all internalizing problems, whereas narrower ("lower-order") anxious-arousal and positive-affect (PA) dimensions account for differences in presentation across different internalizing problems. Anxious arousal was conceptualized as primarily related to panic, whereas blunted PA[1] was specifically linked to depression and social anxiety (Watson et al., 2012). Ample research in adolescents and adults supports the convergent and discriminant validity of these three dimensions with respect to interviewer-rated diagnoses and self-reported symptoms (Mineka et al., 1998). This work also documented substantial individual differences in the sign and magnitude of longitudinal changes in the three symptom dimensions across the transition from late adolescence to early adulthood (Conway et al., 2017).

Efforts to understand the dimensional architecture of depression and anxiety have continued to evolve over the past 2 decades. The Hierarchical Taxonomy of Psychopathology (HiTOP) consortium synthesized these observations into a unified structural model of psychopathology (Kotov et al., 2017, 2021, 2022). Two features of the HiTOP model differentiate it from the kinds of categorical nosologies that have served as the conceptual foundation for the vast majority of work focused on dispositional risk for internalizing disorders. First, HiTOP constructs are continuous and dimensional, reflecting ample evidence that psychopathology constructs differ in degree, not kind (Haslam et al., 2020). Second, HiTOP is hierarchical. This means that internalizing disorders can be conceptualized and quantified at varying levels of breadth. At the base of the HiTOP framework, specific symptoms form circumscribed symptom components. Anxious arousal, for example, is defined by dizziness, shortness of breath, and faintness (Forbes et al., 2021; Waszczuk et al., 2017; Watson et al., 2007, 2012). These components represent the most granular building blocks of the HiTOP framework and encompass the same symptoms and signs embodied in categorical diagnoses. Symptom components, in turn, covary in predictable ways to form syndromes. Insomnia, for instance, clusters with appetite loss, psychomotor retardation, and anergia to form a "vegetative depression" syndrome (Waszczuk et al., 2017; Watson et al., 2007). Syndromes then coalesce into broader subfactors, such as distress (which accounts for symptoms shared by depression, generalized anxiety, and posttraumatic distress) and fear (which accounts for symptoms shared by panic, social anxiety, and phobias; Watson, Levin-Aspenson, et al., 2022). At the top of the hierarchy, these subfactors form an overarching internalizing spectrum—akin to the tripartite model's broad-band general-distress factor—that represents the symptoms (e.g., distress, perseverative thinking, indecision) that cut across many cases of pathological anxiety and depression.

Viewed from the perspective of HiTOP, prior efforts to document prospective associations between personality and isolated *DSM* diagnoses yield indeterminate inferences. The conventional interpretation is that prospective associations between N/NE and MDD reflect syndrome-specific links ("N/NE confers heightened risk for MDD"), but in fact, such observations could reflect associations with the broader internalizing dimension; the narrower dimensions highlighted by the tripartite model, such as diminished PA; or some combination (Conway et al., 2019). Adopting an explicitly hierarchical-dimensional approach opens the door to resolving these fundamental questions.

Present Study

In this article, we leveraged an explicitly hierarchical-dimensional approach for the overarching goal of understanding the relevance of individual differences in personality—with a theory-driven emphasis on high N/NE and low E/PE—to longitudinal changes in broad (general distress) and narrow (anxious arousal and high PA) internalizing-symptom dimensions in a racially diverse sample of 234 emerging adults followed for 2.5 years, across the transition from late adolescence to early adulthood. To ensure a broad spectrum of dispositional risk, participants were selectively recruited from a pool of 6,594 emerging adults screened for individual differences in N/NE, similar to other prospective-longitudinal studies that focused on the emergence of

internalizing symptoms (e.g., Alloy & Abramson, 1999; Young et al., 2021; Zinbarg et al., 2010). We focused on "emerging adulthood" (≈18–30 years) because it is a time of profound, often stressful transitions; more than half of undergraduate students have reported moderate to severe levels of anxiety and depression, and many have experienced the emergence of clinically significant internalizing symptoms during this often-turbulent developmental chapter (Arnett, 2000; National Academies of Sciences, Engineering, and Medicine, 2021; Shackman et al., 2018; GBD 2019 Diseases and Injuries Collaborators, 2020).

Building on the tripartite model and its recent extensions, we focused primarily on prospective associations between baseline levels of N/NE and E/PE and longitudinal changes in general distress—the core cognitive (e.g., difficulty concentrating) and affective (e.g., worry) symptoms that cut across the emotional disorders—and the narrower dimensions of high PA[2] and anxious arousal thought to differentiate specific internalizing presentations across the transition to adulthood (Watson et al., 2008, 2012). From a developmental perspective, we conceptualized this transition as spanning a period of years, not weeks or months (Arnett, 2000). Likewise, from the perspective of personality traits, we anticipated that the moderating effects of N/NE and E/PE on the course of internalizing symptoms would accrue gradually and primarily be discernible at the scale of years. On an exploratory basis, we examined the predictive value of other Big Five traits (e.g., Conscientiousness), more granular facets of N/NE and E/PE (e.g., sociability), and longitudinal changes and dispositional predictors of other narrowband internalizing symptom components (e.g., social anxiety). We anticipated that higher levels of N/NE at baseline would be associated with larger increases or smaller decreases in all internalizing dimensions across the 30-month longitudinal follow-up when baseline symptoms were controlled. In contrast, we hypothesized that lower levels of E/PE at baseline would be more narrowly associated with longitudinal decreases in high PA (i.e., well-being). Given the dearth of published longitudinal data, we made no specific predictions regarding longitudinal changes in other narrowband symptom components.

Adopting a hierarchical-dimensional perspective on the longitudinal course of depression and anxiety is important because of the potential gains in precision for both etiological models and risk assessment. It could be that (elevated) N/NE shows consistent, robust, and relatively nonspecific associations with future internalizing symptoms because it represents a common root cause or vulnerability ("diathesis") for the pervasively elevated distress and dysphoria that defines the internalizing spectrum (Barlow et al., 2014; Hur et al., 2019; Ormel et al., 2013). Typically, this inference is assumed but not explicitly tested. Likewise, it could be that (attenuated) E/PE shows comparatively inconsistent and weak associations with longitudinal changes in internalizing symptoms because it narrowly confers risk for deficits in high PA—a possibility that has not previously been tested. In short, the present study has the potential to inform the development of more precise models of how emotional traits promote the development of internalizing symptoms in emerging adulthood, with implications for the design of more effective transdiagnostic intervention strategies for older adolescents and young adults (Gruber et al., 2023; Sauer-Zavala & Barlow, 2021).

Transparency and Openness

Processed data, analysis code, and supplemental material are freely available at https://osf.io/xvgr5/. We report below how we determined our sample size, all data exclusions, and all measures involved in this study. We report how we determined our sample size, all data exclusions, and all measures in the study. This study was not preregistered. All procedures were approved by the University of Maryland Institutional Review Board (Protocol No. 659385-28).

Method

Overview and general procedures

In the present study, we leveraged previously unpublished data collected as part of a larger 30-month prospective-longitudinal study focused on the development of internalizing illness in emerging adults. The general study design was inspired by Alloy and Abramson's (1999) seminal 30-month Temple–Wisconsin study of depression in university students and reflected a compromise between the scientific goal of tracking the participants for as long as possible—to enable greater opportunity for meaningful change in the severity of internalizing symptoms—and practical considerations, including the need to screen, enroll, and perform multiple waves of follow-up assessments within the constraints of a 5-year grant and 4-year baccalaureate degree program.

We used well-established measures of N/NE to screen 6,594 young adults (57.1% female, 42.9% male; 59.0% White, 19.0% Asian, 9.9% African American, 6.3% Hispanic, 5.8% multiracial/other; age: M = 19.2 years, SD = 1.1; Hur, DeYoung, et al., 2020; Shackman et al., 2018). Screening data were stratified into quartiles (top quartile, middle quartiles, bottom quartile) separately for men and women. Individuals who met preliminary

inclusion criteria were independently and randomly recruited from each of the resulting six strata. Given the focus of the larger study, approximately half the participants were recruited from the top quartile, and the remainder were split between the middle and bottom quartiles (i.e., 50% high, 25% medium, and 25% low). This enabled us to sample a wide range of internalizing risk without gaps or discontinuities while balancing the inclusion of men and women. Simulation work suggests that this oversampling ("enrichment") approach does not bias statistical tests to a degree that would compromise their validity (Hauner et al., 2014).

At enrollment, all participants were first-year university students in good physical health with normal or corrected-to-normal color vision and access to a personal smartphone. All reported the absence of lifetime neurological or pervasive developmental disorders, MRI contraindications, or prior experience with aversive electrical stimulation. All were free from lifetime psychotic and bipolar disorders; a current *DSM-5* "blue ribbon" mood, anxiety, or trauma disorder (past 2 months); severe substance abuse (i.e., associated with physical disability, hospitalization, or inpatient treatment); active suicidality; and ongoing psychiatric treatment as determined by an experienced master's-level diagnostician using the Structured Clinical Interview for DSM-5 (First et al., 2015). To maximize the range of risk, participants with a current other-specified internalizing diagnosis and/or a lifetime history of internalizing disorders were not excluded, consistent with prior studies of this kind (Alloy & Abramson, 1999). At the initial laboratory session (0 months), participants provided informed written consent and completed self-report measures of personality and internalizing symptoms. Symptoms were reassessed 6, 24, and 30 months later. Big Five domains were reassessed 6 months after the initial visit. Follow-up assessments were conducted in the laboratory or online according to participant preference.

We created composite personality and internalizing measures that were aggregated across adjacent assessments, minimizing error and occasion-specific ("state") fluctuations in responding (Chmielewski & Watson, 2009; Gell et al., 2023; Nikolaidis et al., 2022). We averaged the 0- and 6-month personality assessments to form "baseline" composites for the Big Five domains. A parallel approach was used for the internalizing symptoms, which were separately averaged across the 0- and 6-month (baseline) and the 24- and 30-month assessments ("follow-up"). The decision to focus our analyses on aggregate measures was motivated by a combination of conceptual and methodological considerations. From a conceptual perspective, we aimed to understand the prospective relevance of dispositional risk to change in internalizing symptoms across the transition from late adolescence to early adulthood—a transition that spans years, not weeks or months (Arnett, 2000). Shorter-term fluctuations (e.g., 0–6 months) in internalizing are not central to our aims. In light of this goal, it was methodologically appealing to aggregate the two natural pairs of assessments—baseline (0–6 months) and follow-up (24–30 months)—enhancing reliability and statistical power (Tiego et al., 2023).

Participants

A total of 258 participants met preliminary inclusion criteria and provided informed written consent. Of these participants, 234 successfully completed all aspects of the baseline assessment—including a diagnostic interview, self-report measures, and MRI assessment—and were deemed eligible for longitudinal follow-up (50.0% female; 61.1% White, 17.9% Asian, 9.0% African American, 4.7% Hispanic, 0.4% Native Hawaiian or other Pacific Islander, 6.8% multiracial/other; age: $M = 18.8$ years, $SD = 0.4$). The remaining 24 were deemed ineligible because of the baseline diagnostic interview (e.g., current or recent internalizing illness) or withdrew from the study.

Power analysis

Sample size was determined a priori as part of the award that supported data collection (R01-MH107444) using benchmark (i.e., analysis independent) effect sizes. The target sample size ($N = 240$) was chosen to afford acceptable power and precision given available resources (Schönbrodt & Perugini, 2013). At the time of study design, G-power (Version 3.1.9.2; Faul et al., 2007) indicated more than 99% power to detect a generic medium-sized effect ($r = .30$) with up to 20% planned attrition ($N = 192$ usable data sets) using $\alpha = .05$ (two-tailed).

Measures

Internalizing symptoms. Internalizing symptoms were assessed using the Inventory of Depression and Anxiety Symptoms (IDAS; Version 1; Watson et al., 2007). The IDAS includes 11 specific symptom scales: Appetite Gain, Appetite Loss, Dysphoria, Ill Temper, Insomnia, Lassitude, Panic, Social Anxiety, Suicidality, Traumatic Intrusions, and Well-Being. The Panic and Well-Being scales map onto the narrow tripartite dimensions of anxious arousal and high PA, respectively (Watson et al., 2007). The IDAS also includes two broader scales: General Depression (which contains items drawn from several specific IDAS scales) and Dysphoria (which does not).

To maximize independence of measures, we used the latter scale to index the broadband internalizing dimension (Watson et al., 2007, 2012). The IDAS developers suggested that the Dysphoria scale captures "a large, nonspecific factor representing the core affective and cognitive symptoms of depression and anxiety" (Watson et al., 2012, p. 399), making it a strong marker of the tripartite model's general distress construct. Variation in Dysphoria is a sensitive and specific marker of *DSM* internalizing diagnoses (Stasik-O'Brien et al., 2019). Participants used a scale from 1 (*not at all*) to 5 (*extremely*) to rate themselves on a total of 64 items; item responses were averaged to compute mean scale scores. For the present study, the IDAS time frame was modified to cover past-month symptoms. As noted earlier, IDAS dimensions were separately averaged across the two early assessments (0 and 6 months) to form baseline composites and across the two late assessments (24 and 30 months) to form follow-up composites. Cronbach's α and ω internal-consistency reliability was .91/.93, .94/.96, and .89/.91 at baseline and .93/.95, .95/.96, and .90/.93 at follow-up for the Dysphoria, Well-Being, and Panic composites, respectively.

Personality. Trait-like individual differences in personality were assessed using the Big Five Inventory–2 (BFI-2; Soto & John, 2017). Participants used a scale from 1 (*disagree strongly*) to 5 (*agree strongly*) to rate themselves on 60 items that tap into the five major axes of normal-range personality: N/NE, E/PE, Open-Mindedness, Agreeableness, and Conscientiousness. Scale scores were computed by computing the mean of relevant items. Paralleling the approach used for the internalizing-symptom dimensions, we averaged personality traits across months 0 and 6 to create baseline personality composites. At baseline, Cronbach's α and ω reliability was .94/.96, .90/.93, .86/.89, .89/.92, and .86/.91 for the N/NE, E/PE, Agreeableness, Conscientiousness, and Open-Mindedness composites, respectively. Each Big Five domain encompassed three four-item facets, which we examined in exploratory analyses.

Analytic strategy

The central aim of the present study was to understand the degree to which variation in N/NE and E/PE is associated with longitudinal changes in broadband (general distress) and narrowband (anxious arousal and high PA) internalizing symptoms across the transition from late adolescence (baseline) to early adulthood (follow-up). To that end, we used latent-change-score (LCS) models, a form of structural equation modeling (Kievit et al., 2018; Klopack & Wickrama, 2020; McArdle, 2001; McArdle & Nesselroade, 1994). LCS models were implemented using the *lavaan* package for R and robust maximum likelihood estimation, which accounts for potential nonnormality (R Core Team, 2020; Rosseel, 2012). Data missingness was addressed using full information maximum likelihood estimation (Allison, 2003). Personality data (BFI-2) were unavailable for a single participant at Month 6. Symptom data (IDAS) were unavailable for one, five, and six participants at Months 6, 24, and 30, respectively.

To examine patterns of symptom change, we specified a univariate LCS model that accounted for variation in follow-up internalizing symptoms as a function of baseline internalizing symptoms and an LCS factor. The LCS factor accounts for deviations between baseline and follow-up symptom scores; the intercept represents the average change in symptoms and the variance indicating the degree of between-person variability in change. The model also included an association between baseline internalizing and the LCS factor, representing the degree to which change over time is associated with the severity of initial internalizing symptoms.

To examine prospective associations between baseline variation in personality and longitudinal change in internalizing symptoms, we specified conditional LCS models—separately for each symptom dimension—in which baseline internalizing and the change factor were regressed on all Big Five domains simultaneously. This approach has the advantage of estimating the degree to which each personality domain is uniquely associated with both baseline levels (cross-sectional) and changes (longitudinal) in internalizing outcomes over and above the variance shared with the remaining Big Five domains.

Results

Descriptive statistics

Table 1 provides descriptive statistics for the three primary internalizing outcomes. Baseline levels of Dysphoria (i.e., general distress), Well-Being (i.e., high PA), and Panic (i.e., anxious arousal) were well aligned with normative levels in university and nationally representative samples (Nelson et al., 2018; Watson et al., 2012). At baseline, 46%, 19%, and 12% of the sample exceeded liberal, moderate, and conservative empirically based thresholds, respectively, for a probable internalizing-disorder diagnosis (Stasik-O'Brien et al., 2019). Although none of the participants met *DSM-5* (American Psychiatric Association, 2013) criteria for depression or anxiety disorders at enrollment, these observations suggest a relatively high prevalence of

Table 1. Descriptive Statistics for Primary Internalizing Outcomes and Personality Dimensions

		1	2	3	4	5	6	7	8	9	10	*M* (*SD*)	*N*
1	Dysphoria, baseline											2.03 (0.68)	234
2	Dysphoria, follow-up	0.62										2.08 (0.77)	230
3	Well-Being,[a] baseline	−0.46	−0.38									3.06 (0.43)	234
4	Well-Being,[a] follow-up	−0.22	−0.47	0.60								3.05 (0.46)	230
5	Panic,[b] baseline	0.70	0.46	−0.23	−0.06							1.30 (0.40)	234
6	Panic,[b] follow-up	0.54	0.64	−0.18	−0.13	0.65						1.29 (0.43)	230
7	N/NE, baseline	0.75	0.56	−0.50	−0.26	0.46	0.35					33.24 (10.19)	234
8	E/PE, baseline	−0.42	−0.27	0.49	0.31	−0.30	−0.20	−0.42				38.88 (9.95)	234
9	Conscientiousness, baseline	−0.40	−0.36	0.36	0.24	−0.28	−0.29	−0.35	0.25			41.41 (8.17)	234
10	Agreeableness, baseline	−0.37	−0.33	0.38	0.28	−0.26	−0.23	−0.44	0.25	0.30		44.33 (7.19)	234
11	Open-Mindedness, baseline	0.07	0.03	0.17	0.20	−0.01	0.05	0.04	0.18	0.06	0.18	45.63 (7.23)	234

Note: Correlations were computed using pairwise deletion. E/PE = Extraversion/Positive Emotionality; N/NE = Neuroticism/Negative Emotionality; IDAS = Inventory of Depression and Anxiety Symptoms.
[a]The IDAS Well-Being scale is conceptualized as an indicator of high positive affect.
[b]IDAS Panic is conceptualized as an indicator of anxious-arousal symptoms.

subclinical internalizing symptoms or other-specified presentations that do not fit neatly into the (somewhat arbitrary) boundaries of categorical *DSM-5* diagnoses.

Table 1 shows that the average observed levels of internalizing symptoms were relatively stable from baseline to follow-up. The Cohen's *d* effect sizes (based on standard deviations of baseline scores) were 0.08, −0.03, and −0.03 for Dysphoria, Well-Being, and Panic, respectively. Nevertheless, Figure 1 shows that there were marked individual differences in the sign and slope of longitudinal change.

Unconditional LCS models

A series of univariate LCS models was used to estimate average symptom changes from baseline to follow-up, individual differences in longitudinal change, and the degree to which change was associated with baseline symptoms. Table 2 presents the resulting parameter estimates. None of the LCS factor intercepts significantly differed from 0, indicating negligible mean changes. Consistent with the results depicted in Figure 1, LCS factor variance was substantial and statistically significant ($p < .001$) for all of the primary internalizing outcomes, indicating meaningful individual differences in the sign and degree of longitudinal symptom change.[3,4] For three internalizing dimensions, there were moderate negative associations between baseline symptoms and the degree of longitudinal change (rs = −.21 to −.39), indicating that emerging adults with more severe symptoms at baseline tended to show smaller increases (or larger decreases), consistent with regression to the mean.

On an exploratory basis, we examined to what extent change in one symptom dimension over time was correlated with change in the others over the same span. We fit a series of bivariate LCS models to the data and examined the correlations across LCS factors. Results indicated that longitudinal changes in broadband Dysphoria were robustly associated with changes in the narrower Well-Being ($r = −.40$, $p < .001$) and Panic facets ($r = .46$, $p < .001$) in the expected directions. In

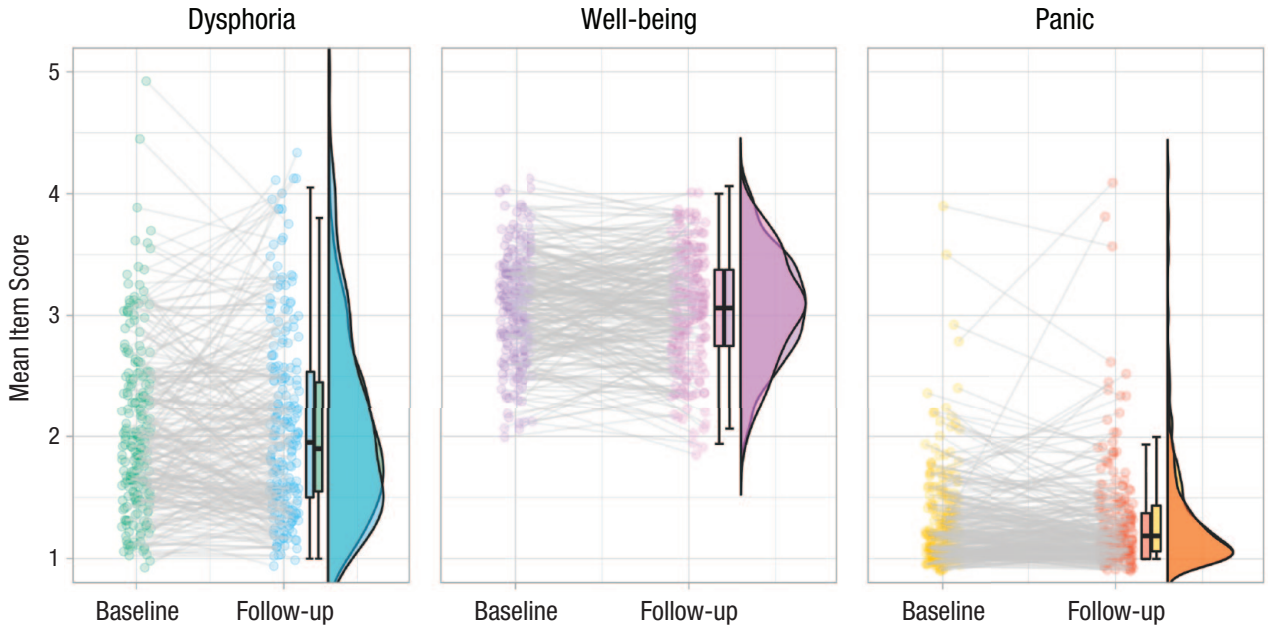

Fig. 1. Change in observed internalizing symptoms across the transition from late adolescence to early adulthood. Individual internalizing symptoms were rated using a 5-point Likert scale. Dots depict mean scale scores at baseline or follow-up for individual participants. Gray lines depict the sign and magnitude of intraindividual longitudinal changes. Box plots indicate the median and interquartile range. Half-violin ("bean") plots show the corresponding smoothed distributions. Baseline measures represent the average of the 0- and 6-month assessments. Follow-up measures represent the average of the 24- and 30-month assessments.

contrast, the correlation among Well-Being and Panic change factors was notably smaller, indicating weaker coupling (r = −.14, p = .04). This pattern of results affirms how longitudinally independent these symptom dimensions can be and underscores the importance of taking a multidimensional perspective that goes beyond monolithic *DSM* diagnoses. It also closely mirrors a prior longitudinal study of young adults that reported moderate codevelopment of broadband general distress and PA (r = .27) and general distress and anxious arousal (r = .59) but virtually no codevelopment of the narrowband PA and anxious arousal dimensions (r = −.02; Conway et al., 2017).

Conditional LCS models

We used a series of conditional LCS models to quantify cross-sectional (baseline) and prospective-longitudinal associations between personality and internalizing symptoms. Here, baseline symptoms and the LCS factor were simultaneously regressed on all Big Five personality domains. Table 3 shows that N/NE had statistically significant and robust cross-sectional associations with the three internalizing dimensions, particularly broadband Dysphoria (β = 0.64). E/PE showed a moderate cross-sectional association with Well-Being (i.e., high PA; β = 0.29) and modest cross-sectional links with Dysphoria and Panic (i.e., anxious arousal; βs = −0.12 and −0.11, respectively). Conscientiousness showed statistically significant cross-sectional associations with all three internalizing dimensions in the expected direction, albeit to a much smaller degree than N/NE (βs = −0.14 to 0.15). Agreeableness and Open-Mindedness were generally unrelated to the severity of baseline internalizing symptoms. The total variance in baseline symptoms collectively explained by the Big Five traits was 60%, 39%, and 24% for Dysphoria, Well-Being, and Panic, respectively.

Regarding the longitudinal change in symptoms over the 30-month follow-up period, baseline levels of N/NE were significantly associated with longitudinal increases in broadband Dysphoria (β = 0.24)—but not the narrowband Well-Being (β = 0.06) or Panic (β = 0.02) symptom dimensions—after adjusting for the other four personality domains (Table 3). In contrast, E/PE (βs = 0.01–0.02) and the other Big Five personality traits had negligible associations with longitudinal changes in Dysphoria, Well-Being, and Panic. The variance explained in change factors by the Big Five explained 6%, 2%, and 3% of the variance in Dysphoria, Well-Being, and Panic changes, respectively.

Exploratory analyses of N/NE and E/PE personality facets

We used a series of conditional LCS models to explore the relevance of narrower personality facets. For N/NE, we simultaneously regressed the Dysphoria LCS factor

Table 2. Parameter Estimates From Univariate Unconditional Latent Change Score Models of Primary Internalizing Outcomes

Parameter	Dysphoria	Well-Being[a]	Panic[b]
Covariance of change factor with baseline symptoms	−0.135*** (0.033)	−0.067*** (0.011)	−0.048*** (0.015)
Correlation of change factor with baseline symptoms	−0.21***	−0.39***	−0.34***
Change factor intercept	0.050 (0.042)	−0.010 (0.026)	−0.011 (0.023)
Standardized change factor intercept	0.08	−0.03	−0.03
Baseline symptom mean	2.031*** (0.044)	3.063*** (0.028)	1.304*** (0.026)
Change factor variance	0.402*** (0.057)	0.157*** (0.017)	0.124*** (0.031)
Baseline symptom variance	0.455*** (0.054)	0.185*** (0.015)	0.160*** (0.037)

Note: Except where noted otherwise, parameter estimates are unstandardized. Standard errors are in parentheses. IDAS = Inventory of Depression and Anxiety Symptoms.
[a]The IDAS Well-Being scale is conceptualized as an indicator of high positive affect.
[b]IDAS Panic is conceptualized as an indicator of anxious-arousal symptoms.
***$p < .001$.

on the three facets captured by the BFI-2: Depression, Anxiety, and Emotional Volatility (Table 4). Results indicated that the Depression and Emotional Volatility facets (βs ≈ 0.18) but not the Anxiety facet (β = −0.02) have moderate longitudinal associations with Dysphoria. These facets may be primarily responsible for the prospective link between broadband N/NE and Dysphoria.

We detected significant prospective associations between two of the three E/PE facets—Sociability (β = 0.21) and Energy Level (β = −0.23)—and longitudinal changes in Dysphoria (Table 5). Energy Level also showed a significant association with changes in Well-Being (i.e., high PA; β = 0.17). These observations are broadly consistent with prior cross-sectional work (e.g.,

Table 3. Regressions of Primary Outcomes on Baseline Personality Domains in the Latent Change Score Model

	Baseline symptoms				LCS factor (representing symptom change)			
	b	*SE*	*p*	β	*b*	*SE*	*p*	β
Dysphoria								
N/NE	**0.042**	**0.004**	**< .001**	**0.64**	**0.015**	**0.006**	**.018**	**0.24**
E/PE	**−0.009**	**0.004**	**.025**	**−0.12**	0.002	0.005	.729	0.02
Conscientiousness	**−0.012**	**0.003**	**.001**	**−0.14**	−0.010	0.006	.088	−0.13
Agreeableness	−0.003	0.004	.523	−0.03	−0.008	0.007	.261	−0.09
Open-Mindedness	0.007	0.004	.082	0.08	0.001	0.005	.869	0.01
Well-Being[a]								
N/NE	**−0.012**	**0.003**	**< .001**	**−0.28**	0.002	0.003	.434	0.06
E/PE	**0.014**	**0.003**	**< .001**	**0.29**	0.001	0.003	.777	0.02
Conscientiousness	**0.008**	**0.003**	**.013**	**0.15**	0.002	0.003	.595	0.04
Agreeableness	0.007	0.004	.063	0.12	0.004	0.004	.320	0.07
Open-Mindedness	0.006	0.003	.073	0.10	0.006	0.003	.082	0.11
Panic[b]								
N/NE	**0.014**	**0.003**	**< .001**	**0.35**	0.001	0.002	.748	0.02
E/PE	−0.005	0.003	.052	−0.11	0.000	0.002	.907	0.01
Conscientiousness	**−0.006**	**0.003**	**.035**	**−0.11**	−0.005	0.003	.100	−0.12
Agreeableness	−0.003	0.004	.495	−0.05	−0.003	0.004	.424	−0.06
Open-Mindedness	0.001	0.004	.872	0.01	0.004	0.003	.274	0.07

Note: Bold parameter estimates are statistically significant ($p < .05$). LCS = latent change score; E/PE = Extraversion/Positive Emotionality; N/NE = Neuroticism/Negative Emotionality; IDAS = Inventory of Depression and Anxiety Symptoms.
[a]The IDAS Well-Being scale is conceptualized as an indicator of high positive affect.
[b]IDAS Panic is conceptualized as an indicator of anxious-arousal symptoms.

Table 4. Regressions of Symptom Outcomes on Baseline Neuroticism/Negative Emotionality Facets

	Baseline symptoms				LCS factor (representing symptom change)			
	b	*SE*	*p*	β	*b*	*SE*	*p*	β
Dysphoria								
Depression	**0.097**	**0.012**	**< .001**	**0.551**	0.029	0.017	.090	0.175
Anxiety	**0.024**	**0.010**	**.017**	**0.131**	−0.003	0.015	.841	−0.018
Emotional Volatility	**0.029**	**0.010**	**.004**	**0.167**	**0.029**	**0.014**	**.042**	**0.178**
Well-Being								
Depression	**−0.074**	**0.008**	**< .001**	**−0.657**	−0.019	0.010	.055	−0.180
Anxiety	0.005	0.010	.653	0.040	0.008	0.008	.290	0.080
Emotional Volatility	0.006	0.009	.497	0.055	0.012	0.008	.162	0.115
Panic								
Depression	**0.034**	**0.009**	**< .001**	**0.322**	0.014	0.009	.092	0.158
Anxiety	0.009	0.007	.179	0.084	−0.011	0.008	.172	−0.113
Emotional Volatility	0.012	0.008	.122	0.113	0.005	0.007	.473	0.057

Note: Bold parameter estimates are statistically significant ($p < .05$). LCS = latent change score.

Watson, Stanton, et al., 2019) and a prior longitudinal study in community-dwelling adults (Khoo et al., 2020). They provide preliminary evidence that specific facets of E/PE have predictive validity for the longitudinal development of broadband internalizing symptoms, prospective associations that are not evident at the broader domain level (E/PE).

For comparable results for the other Big Five facets and for secondary symptom outcomes, see Tables S5.1 through S5.5 in the Supplemental Material available online.

Exploratory analyses of secondary internalizing outcomes

For the results from exploratory analyses of the eight other narrow-bandwidth internalizing dimensions captured by the IDAS, see Table S6 in the Supplemental Material. We regressed each of the eight IDAS symptom dimensions on all five personality domains simultaneously. Higher N/NE was associated with significant longitudinal increases in Appetite Gain and Lassitude (i.e., weariness and fatigue), higher E/PE was associated with

Table 5. Regressions of Symptom Outcomes on Baseline Extraversion/Positive Emotionality Facets

	Baseline symptoms				LCS factor (representing symptom change)			
	b	*SE*	*p*	β	*B*	*SE*	*p*	β
Dysphoria								
Sociability	0.014	0.013	.275	0.087	**0.033**	**0.015**	**.026**	**0.210**
Assertiveness	**−0.037**	**0.013**	**.004**	**−0.192**	−0.015	0.017	.395	−0.080
Energy Level	**−0.094**	**0.017**	**< .001**	**−0.441**	**−0.047**	**0.019**	**.013**	**−0.234**
Well-Being								
Sociability	−0.003	0.008	.766	−0.024	−0.010	0.008	.224	−0.102
Assertiveness	0.015	0.009	.079	0.122	0.002	0.010	.828	0.020
Energy Level	**0.073**	**0.009**	**< .001**	**0.536**	**0.022**	**0.010**	**.028**	**0.174**
Panic								
Sociability	−0.001	0.009	.937	−0.007	0.012	0.008	.151	0.135
Assertiveness	−0.009	0.009	.279	−0.080	−0.008	0.011	.464	−0.079
Energy Level	**−0.037**	**0.010**	**< .001**	**−0.297**	−0.012	0.008	.133	−0.109

Note. Bold parameter estimates are statistically significant ($p < .05$). LCS = latent change score.

significant longitudinal increases in Appetite Gain and decreases in Social Anxiety and Suicidality, and higher Conscientiousness significantly predicted decreases in Ill-Temper (i.e., anger, hostility).

Discussion

Meta-analyses have shown that elevated levels of N/NE and, somewhat less consistently, lower levels of E/PE confer risk for future pathological depression and anxiety. Yet the vast majority of prospective-longitudinal research has narrowly focused on traditional diagnostic categories, creating uncertainty about the precise nature of these prospective associations. Here, we leveraged an explicitly hierarchical-dimensional approach to understand the relevance of individual differences in N/NE and E/PE to longitudinal changes in broad and narrow internalizing symptoms in a racially diverse sample followed across the transition from late adolescence to early adulthood.

Nature of internalizing change in emerging adulthood

We found negligible changes—less than one-tenth of a standard deviation—in average levels of broadband general distress, high PA, and anxious-arousal symptoms over the 2.5-year follow-up period. These observations indicate that most internalizing symptoms do not rise or fall much *on average* among emerging adults. This result is generally consistent with prior epidemiologic research that showed increases in some internalizing indicators (e.g., depression diagnoses) but not others (e.g., social anxiety, specific phobias) during this developmental chapter (e.g., Copeland et al., 2014; Costello et al., 2011; Kessler et al., 2005; Rohde et al., 2013). Nevertheless, we observed marked individual differences in the degree and direction of change across all three primary symptom outcomes (Fig. 1).

N/NE uniquely predicts increases in broadband internalizing symptoms in emerging adults

Prior studies have linked elevated levels of N/NE to the future development, chronicity, and recurrence of *DSM*-diagnosed depression and anxiety disorders (Hur et al., 2019). The present findings extend and refine these observations. N/NE was prospectively associated with longitudinal increases in the general distress (β = 0.24)—the core cognitive and affective symptoms that cut across the emotional disorders and best define HiTOP's internalizing spectrum—even after adjusting for other Big Five domains and baseline symptoms. The magnitude of this association is consistent with prior work in young and middle-age adults, underscoring N/NE's unique prognostic value for internalizing psychopathology (Goldstein et al., 2020; Hayden & Klein, 2001; Newton-Howes et al., 2015; Wilson et al., 2014). In contrast, N/NE showed negligible associations with longitudinal changes in narrowband anxious-arousal and high-PA symptoms. Nevertheless, exploratory analyses did demonstrate that baseline variation in N/NE is associated with longitudinal increases in lassitude (i.e., weariness and fatigue) and appetite gain, narrow symptom dimensions that have received comparatively little conceptual and empirical attention (see Table S6 in the Supplemental Material).

On balance, this general pattern of results reinforces the hypothesis that N/NE represents a common root cause or shared vulnerability (diathesis) for the chronically elevated distress and dysphoria that cuts across the internalizing spectrum of disorders (Barlow et al., 2014; Hur et al., 2019; Ormel et al., 2013). This conclusion is consistent with work that demonstrated the clinical efficacy of the unified protocol for the transdiagnostic treatment of emotional disorders and other emerging "broad-spectrum" interventions that target N/NE (Barlow et al., 2017; Dalgleish et al., 2020; Sauer-Zavala & Barlow, 2021).

E/PE is unrelated to longitudinal changes in primary internalizing outcomes

E/PE was positively associated with high PA at baseline, over and above other Big Five domains (β = 0.29) but, contrary to expectations, was not associated with longitudinal changes in high PA (β = 0.02). E/PE was also unrelated to changes in anxious-arousal (β = 0.01) or general-distress symptoms (β = 0.02). These observations run counter to claims that low levels of E/PE confer heightened risk for the future development and maintenance of depression (Klein et al., 2011). Previous longitudinal research on E/PE and internalizing outcomes has been mixed. Our study joins a number of others in finding an effect size close to 0 (Khazanov & Ruscio, 2016). The present results extend this work by clarifying E/PE's associations with symptom dimensions at various levels of the internalizing domain.

Inconsistent E/PE associations across longitudinal studies undoubtedly reflect a variety of substantive differences, including variation in sample demographics, assessment instruments, follow-up duration, and analytic strategy. Although different questionnaire assessments of E/PE are robustly correlated at the domain level, they show notable differences in their coverage of specific facets of E/PE (Soto & John, 2017; Watson,

Nus, & Wu, 2019). The results of our exploratory analyses demonstrate that variation in Energy Level and other facets of E/PE captured by the BFI-2 questionnaire are significant predictors of change in broadband internalizing symptoms and high PA in emerging adulthood (Table 5), consistent with cross-sectional evidence (Watson, Stanton, et al., 2019). In fact, the magnitude of these prospective associations was numerically greater than those found for N/NE facets (Table 4). These preliminary observations reinforce the possibility that seemingly subtle differences in the choice of personality assessment can have important consequences for understanding dispositional risk, a point previously made by Watson, Stanton, et al. (2019). A key challenge for the future will be to determine the reproducibility of these associations in other populations. More broadly, these observations highlight the potential value—for prediction, etiological understanding, and intervention—of going beyond the Big Five domains and systematically examining more granular measures of dispositional risk (Goldstein et al., 2022; Goldstein et al., 2020; Mõttus et al., 2020; Watson, Stanton, et al., 2019).

Exploratory analyses raise the possibility that low E/PE confers risk for social anxiety

Exploratory analyses of the eight other narrowband symptom dimensions captured by the IDAS provide preliminary evidence that diminished levels of E/PE at baseline are uniquely associated with longitudinal increases in social-anxiety symptoms in emerging adulthood (see Table S6 in the Supplemental Material). N/NE showed a trend-level association (p = .06). Taken with ample cross-sectional evidence that social anxiety is marked by diminished reactivity to positive experiences (e.g., Kashdan, 2007; Watson, Stanton, et al., 2019), this prospective observation motivates the hypothesis that lower levels of E (social engagement and motivation) and PE (emotional reactivity to social and nonsocial reward) causally contribute to the development of social anxiety and suggests the potential therapeutic value of targeting E/PE in individuals at risk for developing with pathological social anxiety, for example, using emerging digital coaching approaches (Stieger et al., 2021).

Other Big Five traits are unrelated to longitudinal changes in primary internalizing outcomes

Like E/PE, higher levels of Conscientiousness were associated with lower levels of internalizing symptoms at baseline (βs = −0.14, −0.29, and −0.11 for general distress, high PA, and anxious arousal, respectively). These findings are consistent with a prior cross-sectional work (Kotov et al., 2010). Agreeableness and Open-Mindedness evinced no meaningful associations with baseline internalizing symptoms, which is also consistent with prior meta-analytic findings. Individual differences in Conscientiousness, Agreeableness, and Openness were all unrelated to longitudinal changes in internalizing symptoms.

Future challenges

Despite a number of strengths, the present study was not without limitations. First, we focused on an ethnoracially diverse sample of emerging adults. A key challenge for future research will be to expand prospective-longitudinal work to include samples that better represent the full demographic diversity of the population, including other developmental periods and people who are in treatment, at high risk for suicide, and/or have a history of psychosis and bipolar disorder. Second, because the sample was part of larger study focused on risk for the development or recurrence of internalizing illness, individuals with a current internalizing diagnosis were excluded. This design choice undoubtedly restricted the range of baseline symptoms and might have led to attenuated estimates of symptom change across emerging adulthood, relative to what one would expect to see in the general population. From this perspective, it is possible that we underestimated the association between N/NE and increases in general distress and other internalizing symptoms. Third, as is typical of many studies in this area, the assessments of internalizing and personality both relied on self-report, leading to shared measurement variance and potentially inflated association estimates. An important avenue for future research will be to extend this work to encompass other informants. Fourth, the IDAS covers only a subset of the internalizing domain's narrow symptom components. We look forward to future work, perhaps based on the HiTOP consortium's forthcoming omnibus measurement system (Watson, Forbes, et al., 2022), that can more comprehensively map longitudinal personality-symptom associations.

Conclusions

In sum, the present results demonstrate that baseline variation in N/NE is uniquely associated with 30-month changes in general distress (i.e., broadband internalizing symptoms) but not anxious arousal or high PA during the transition from late adolescence to early adulthood. E/PE and other Big Five traits were unrelated to change in our primary internalizing outcomes. The results of our exploratory analyses raise the

possibility that prospective effects of E/PE on general distress are more evident at the facet level and support the hypothesis that low levels of E/PE prospectively predict increases in social-anxiety symptoms. Collectively, these observations highlight the centrality of N/NE to the longitudinal development of core components of internalizing psychopathology in emerging adulthood, provide new clues about the specific pathways linking dispositional risk to internalizing symptoms, set the stage for more precise etiologic and prognostic models of personality-psychopathology relations, and showcase the enhanced precision afforded by adopting hierarchical-dimensional models.

Transparency

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The author(s) declared that there were no conflicts of interest with respect to the authorship or the publication of this article.

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Open Practices

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Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/21677026231205270

Notes

1. Earlier formulations of the tripartite model suggested that measures of low PA (e.g., diminished motivation, interest, and enjoyment of rewards; often termed "anhedonia") distinguish pathological depression from anxiety (Clark & Watson, 1991). Although continuing to emphasize the importance of PA, researchers of more recent work have indicated that high PA (e.g., happy, excited, and enthusiastic; sometimes collectively termed "well-being") demonstrates superior discriminant validity relative to measures of low PA (Watson et al., 2008, 2012).
2. High PA is an interstitial dimension in the HiTOP framework, a key component of both the Internalizing and Detachment domains (Kotov et al., 2017).
3. For Cohen's *d* and LCS-derived change estimates for the other eight internalizing dimensions captured by the IDAS scale, see Tables S1 and S2 in the Supplemental Material. With the exception of Social Anxiety, the mean $|d|$ value was 0.06, consistent with the effect sizes for Dysphoria, Well-Being, and Panic. The effect for Social Anxiety was −0.36, more than 3 times as large as the next strongest effect. The LCS factor's variance estimate was statistically significant ($p < .001$) for all eight dimensions, indicating meaningful individual differences in the sign and degree of symptom change.
4. To examine potential gender differences in longitudinal symptom change, we created a multiple-group version of the unconditional LCS models. As shown in Table S3 in the Supplemental Material, neither the intercept nor the variance of the LCS factors varied significantly across gender, with one exception. Change in Dysphoria differed across genders. Men's Dysphoria decreased by approximately .10 *SD* from baseline to

follow-up, whereas women's Dysphoria increased by approximately .25 *SD*. For the corresponding parameter estimates for conditional LCS models separately for each gender, see Table S4 in the Supplemental Material. Results indicated that prospective associations between baseline differences in personality and symptom change showed negligible gender differences.

References

Achenbach, T. M. (1966). The classification of children's psychiatric symptoms: A factor-analytic study. *Psychological Monographs: General and Applied*, *80*(7), 1–37. https://doi.org/10.1037/h0093906

Achenbach, T. M. (2020). Bottom-up and top-down paradigms for psychopathology: A half-century odyssey. *Annual Review of Clinical Psychology*, *16*, 1–24. https://doi.org/10.1146/annurev-clinpsy-071119-115831

Allison, P. D. (2003). Missing data techniques for structural equation modeling. *Journal of Abnormal Psychology*, *112*(4), 545–557. https://doi.org/10.1037/0021-843X.112.4.545

Alloy, L. B., & Abramson, L. Y. (1999). The Temple-Wisconsin Cognitive Vulnerability to Depression Project: Conceptual background, design, and methods. *Journal of Cognitive Psychotherapy*, *13*(3), 227–262.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.).

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469–480. https://doi.org/10.1037/0003-066X.55.5.469

Barlow, D. H., Farchione, T. J., Bullis, J. R., Gallagher, M. W., Murray-Latin, H., Sauer-Zavala, S., Bentley, K. H., Thompson-Hollands, J., Conklin, L. R., Boswell, J. F., Ametaj, A., Carl, J. R., Boettcher, H. T., & Cassiello-Robbins, C. (2017). The unified protocol for transdiagnostic treatment of emotional disorders compared with diagnosis-specific protocols for anxiety disorders: A randomized clinical trial. *JAMA Psychiatry*, *74*(9), 875–884.

Barlow, D. H., Sauer-Zavala, S., Carl, J. R., Bullis, J. R., & Ellard, K. K. (2014). The nature, diagnosis, and treatment of neuroticism: Back to the future. *Clinical Psychological Science*, *2*(3), 344–365.

Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annual Review of Psychology*, *56*, 453–484.

Chmielewski, M., & Watson, D. (2009). What is being assessed and why it matters: The impact of transient error on trait research. *Journal of Personality and Social Psychology*, *97*(1), 186.

Clark, L. A. (2005). Temperament as a unifying basis for personality and psychopathology. *Journal of Abnormal Psychology*, *114*(4), 505–521. https://doi.org/10.1037/0021-843X.114.4.505

Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, *100*, 316–336. https://doi.org/10.1037//0021-843x.100.3.316

Conway, C. C., Forbes, M. K., Forbush, K. T., Fried, E. I., Hallquist, M. N., Kotov, R., Mullins-Sweatt, S. N., Shackman, A. J., Skodol, A. E., South, S. C., Sunderland, M., Waszczuk, M. A., Zald, D. H., Afzali, M. H., Bornovalova, M. A., Carragher, N., Docherty, A. R., Jonas, K. G., Krueger, R. F., . . . Eaton, N. R. (2019). A hierarchical taxonomy of psychopathology can transform mental health research. *Perspectives on Psychological Science*, *14*(3), 419–436.

Conway, C. C., Zinbarg, R. E., Mineka, S., & Craske, M. G. (2017). Core dimensions of anxiety and depression change independently during adolescence. *Journal of Abnormal Psychology*, *126*(2), 160–172. https://doi.org/10.1037/abn0000222

Copeland, W. E., Angold, A., Shanahan, L., & Costello, E. J. (2014). Longitudinal patterns of anxiety from childhood to adulthood: The Great Smoky Mountains Study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *53*(1), 21–33.

Costello, E. J., Copeland, W., & Angold, A. (2011). Trends in psychopathology across the adolescent years: What changes when children become adolescents, and when adolescents become adults? *Journal of Child Psychology and Psychiatry*, *52*(10), 1015–1025.

Craske, M. G., Stein, M. B., Eley, T. C., Milad, M. R., Holmes, A., Rapee, R. M., & Wittchen, H. U. (2017). Anxiety disorders. *Nature Reviews Disease Primers*, *3*, 17024. https://doi.org/10.1038/nrdp.2017.24

Cuijpers, P., Stringaris, A., & Wolpert, M. (2020). Treatment outcomes for depression: Challenges and opportunities. *The Lancet Psychiatry*, *7*(11), 925–927. https://doi.org/10.1016/S2215-0366(20)30036-5

Dalgleish, T., Black, M., Johnston, D., & Bevan, A. (2020). Transdiagnostic approaches to mental health problems: Current status and future directions. *Journal of Consulting and Clinical Psychology*, *88*(3), 179–195.

Dieleman, J. L., Cao, J., Chapin, A., Chen, C., Li, Z., Liu, A., Horst, C., Kaldjian, A., Matyasz, T., Scott, K. W., Bui, A. L., Campbell, M., Duber, H. C., Dunn, A. C., Flaxman, A. D., Fitzmaurice, C., Naghavi, M., Sadat, N., Shieh, P., . . . Murray, C. J. (2020). US health care spending by payer and health condition, 1996-2016. *Journal of the American Medical Association*, *323*(9), 863–884.

Fanous, A., Gardner, C. O., Prescott, C. A., Cancro, R., & Kendler, K. S. (2002). Neuroticism, major depression and gender: A population-based twin study. *Psychological Medicine*, *32*(4), 719–728. https://doi.org/10.1017/s003329170200541x

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175–191.

First, M. B., Williams, J. B., Karg, R. S., & Spitzer, R. L. (2015). *Structured clinical interview for DSM-5—Research version (SCID-5 for DSM-5, research version; SCID-5-RV)*. American Psychiatric Association.

Forbes, M. K. (2023). Implications of the symptom-level overlap among DSM diagnoses for dimensions of

psychopathology. *Journal of Emotion and Psychopathology*, *1*(1), 104–112. https://doi.org/10.55913/joep.v1i1.6

Forbes, M. K., Sunderland, M., Rapee, R. M., Batterham, P. J., Calear, A. L., Carragher, N., Ruggero, C., Zimmerman, M., Baillie, A. J., Lynch, S. J., Mewton, L., Slade, T., & Krueger, R. F. (2021). A detailed hierarchical model of psychopathology: From individual symptoms up to the general factor of psychopathology. *Clinical Psychological Science*, *9*(2), 139–168.

Fried, E. I., & Nesse, R. M. (2015). Depression is not a consistent syndrome: An investigation of unique symptom patterns in the STAR*D study. *Journal of Affective Disorders*, *172*, 96–102. https://doi.org/10.1016/j.jad.2014.10.010

GBD 2019 Diseases and Injuries Collaborators. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, *396*(10258), 1204–1222. https://doi.org/10.1016/S0140-6736(20)30925-9

Gell, M., Eickhoff, S. B., Omidvarnia, A., Küppers, V., Patil, K. R., Satterthwaite, T. D., Müller, V. I., & Langner, R. (2023). *The burden of reliability: How measurement noise limits brain-behaviour predictions*. *bioRxiv*. https://doi.org/10.1101/2023.02.09.527898

Goldstein, B. L., Mackin, D. M., Miao, J., Perlman, G., Watson, D., Ormel, J., Klein, D. N., & Kotov, R. (2022). Is personality stable and symptoms fleeting? A longitudinal comparison in adolescence. *Journal of Research in Personality*, *97*, 104190.

Goldstein, B. L., Perlman, G., Eaton, N. R., Kotov, R., & Klein, D. N. (2020). Testing explanatory models of the interplay between depression, neuroticism, and stressful life events: A dynamic trait-stress generation approach. *Psychological Medicine*, *50*(16), 2780–2789. https://doi.org/10.1017/S0033291719002927

Gruber, J., Hinshaw, S. P., Clark, L. A., Rottenberg, J., & Prinstein, M. J. (2023). Young adult mental health beyond the COVID-19 era: Can enlightened policy promote long-term change? *Policy Insights from the Behavioral and Brain Sciences*, *10*, 75–82. https://doi.org/10.1177/23727322221150199

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. https://doi.org/10.1017/S003329172000183X

Hauner, K. K., Zinbarg, R. E., & Revelle, W. (2014). A latent variable model approach to estimating systematic bias in the oversampling method. *Behavior Research Methods*, *46*(3), 786–797. https://doi.org/10.3758/s13428-013-0402-6

Hayden, E. P., & Klein, D. N. (2001). Outcome of dysthymic disorder at 5-year follow-up: The effect of familial psychopathology, early adversity, personality, comorbidity, and chronic stress. *American Journal of Psychiatry*, *158*(11), 1864–1870. https://doi.org/10.1176/appi.ajp.158.11.1864

Hur, J., DeYoung, K. A., Islam, S., Anderson, A. S., Barstead, M. G., & Shackman, A. J. (2020). Social context and the real-world consequences of social anxiety. *Psychological Medicine*, *50*(12), 1989–2000. https://doi.org/10.1017/S0033291719002022

Hur, J., Stockbridge, M. D., Fox, A. S., & Shackman, A. J. (2019). Dispositional negativity, cognition, and anxiety disorders: An integrative translational neuroscience framework. *Progress in Brain Research*, *247*, 375–436.

Jeronimus, B. F., Kotov, R., Riese, H., & Ormel, J. (2016). Neuroticism's prospective association with mental disorders halves after adjustment for baseline symptoms and psychiatric history, but the adjusted association hardly decays with time: A meta-analysis on 59 longitudinal/prospective studies with 443 313 participants. *Psychological Medicine*, *46*(14), 2883–2906. https://doi.org/10.1017/S0033291716001653

Kashdan, T. B. (2007). Social anxiety spectrum and diminished positive experiences: Theoretical synthesis and meta-analysis. *Clinical Psychology Review*, *27*, 348–365.

Kendler, K. S., Neale, M. C., Kessler, R. C., Heath, A. C., & Eaves, L. J. (1993). A longitudinal twin study of personality and major depression in women. *Archives of General Psychiatry*, *50*(11), 853–862. https://doi.org/10.1001/archpsyc.1993.01820230023002

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*(6), 593–602. https://doi.org/10.1001/archpsyc.62.6.593

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. U. (2012). Twelve month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research*, *21*(3), 169–184. https://doi.org/10.1002/mpr.1359

Khazanov, G. K., & Ruscio, A. M. (2016). Is low positive emotionality a specific risk factor for depression? A meta-analysis of longitudinal studies. *Psychological Bulletin*, *142*(9), 99–105. https://doi.org/10.1037/bul0000059

Khoo, S., Stanton, K., Clark, L. A., & Watson, D. (2020). Facet-level personality relations of the symptom dimensions of the tripartite model. *Journal of Psychopathology and Behavioral Assessment*, *42*, 160–177.

Kievit, R. A., Brandmaier, A. M., Ziegler, G., van Harmelen, A. L., de Mooij, S. M., Moutoussis, M., Goodyer, I. M., Bullmore, E., Jones, P. B., & Fonagy, P., NSPN Consortium, Lindenberger, U., & Dolan, R. J. (2018). Developmental cognitive neuroscience using latent change score models: A tutorial and applications. *Developmental Cognitive Neuroscience*, *33*, 99–117. https://doi.org/10.1016/j.dcn.2017.11.007

Klein, D. N., Kotov, R., & Bufferd, S. J. (2011). Personality and depression: Explanatory models and review of the evidence. *Annual Review of Clinical Psychology*, *7*, 269–295. https://doi.org/10.1146/annurev-clinpsy-032210-104540

Klopack, E. T., & Wickrama, K. (2020). Modeling latent change score analysis and extensions in Mplus: A practical guide for researchers. *Structural Equation Modeling: A Multidisciplinary Journal*, *27*(1), 97–110.

Kotov, R., Cicero, D. C., Conway, C. C., DeYoung, C. G., Dombrovski, A., Eaton, N. R., First, M. B., Forbes, M. K., Hyman, S. E., Jonas, K. G., Krueger, R. F., Latzman,

R. D., Li, J. J., Nelson, B. D., Regier, D. A., Rodriguez-Seijas, C., Ruggero, C. J., Simms, L. J., Skodol, A. E., . . . Wright, A. (2022). The Hierarchical Taxonomy of Psychopathology (HiTOP) in psychiatric practice and research. *Psychological Medicine*, *52*(9), 1666–1678. https://doi.org/10.1017/S0033291722001301

Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking "big" personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin*, *136*(5), 768–821. https://doi.org/10.1037/a0020327

Kotov, R., Krueger, R. F., Watson, D., Achenbach, T. M., Althoff, R. R., Bagby, R. M., Brown, T. A., Carpenter, W. T., Caspi, A., Clark, L. A., Eaton, N. R., Forbes, M. K., Forbush, K. T., Goldberg, D., Hasin, D., Hyman, S. E., Ivanova, M. Y., Lynam, D. R., Markon, K., . . . Zimmerman, M. (2017). The Hierarchical Taxonomy of Psychopathology (HiTOP): A dimensional alternative to traditional nosologies. *Journal of Abnormal Psychology*, *126*(4), 454–477. https://doi.org/10.1037/abn0000258

Kotov, R., Krueger, R. F., Watson, D., Cicero, D. C., Conway, C. C., DeYoung, C. G., Eaton, N. R., Forbes, M. K., Hallquist, M. N., Latzman, R. D., Mullins-Sweatt, S. N., Ruggero, C. J., Simms, L. J., Waldman, I. D., Waszczuk, M. A., & Wright, A. (2021). The hierarchical taxonomy of psychopathology (HiTOP): A quantitative nosology based on consensus of evidence. *Annual Review of Clinical Psychology*, *17*, 83–108. https://doi.org/10.1146/annurev-clinpsy-081219-093304

McArdle, J. J. (2001). A latent difference score approach to longitudinal dynamic structural analyses. In R. Cudeck, S. du Toit, & D. Sörbom (Eds.), *Structural equation modeling: Present and future* (pp. 342–380). Scientific Software International.

McArdle, J. J., & Nesselroade, J. R. (1994). Using multivariate data to structure developmental change. In S. H. Cohen & H. W. Reese (Eds.), *Life span developmental psychology: Methodological contributions* (pp. 223–267). Erlbaum.

Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology*, *49*(1), 377–412. https://doi.org/10.1146/annurev.psych.49.1.377

Mõttus, R., Wood, D., Condon, D. M., Back, M. D., Baumert, A., Costantini, G., Epskamp, S., Greiff, S., Johnson, W., Lukaszewski, A., Murray, A., Revelle, W., Wright, A. G. C., Yarkoni, T., Ziegler, M., & Zimmermann, J. (2020). Descriptive, predictive and explanatory personality research: Different goals, different approaches, but a shared need to move beyond the Big Few traits. *European Journal of Personality*, *34*, 1175–1201.

Naragon-Gainey, K., McMahon, T. P., & Park, J. (2018). The contributions of affective traits and emotion regulation to internalizing disorders: Current state of the literature and measurement challenges. *American Psychologist*, *73*, 1175–1186.

National Academies of Sciences, Engineering, and Medicine. (2021). *Mental health, substance use, and wellbeing in higher education: Supporting the whole student*. The National Academies Press.

Nelson, G. H., O'Hara, M. W., & Watson, D. (2018). National norms for the expanded version of the Inventory of Depression and Anxiety Symptoms (IDAS-II). *Journal of Clinical Psychology*, *74*(6), 953–968. https://doi.org/10.1002/jclp.22560

Newton-Howes, G., Horwood, J., & Mulder, R. (2015). Personality characteristics in childhood and outcomes in adulthood: Findings from a 30 year longitudinal study. *The Australian and New Zealand Journal of Psychiatry*, *49*(4), 377–386. https://doi.org/10.1177/0004867415569796

Nikolaidis, A., Chen, A. A., He, X., Shinohara, R. T., Vogelstein, J., Milham, M., & Shou, H. (2022). *Suboptimal phenotypic reliability impedes reproducible human neuroscience*. bioRxiv. https://doi.org/10.1101/2022.07.22.501193

Olbert, C. M., Gala, G. J., & Tupler, L. A. (2014). Quantifying heterogeneity attributable to polythetic diagnostic criteria: Theoretical framework and empirical application. *Journal of Abnormal Psychology*, *123*, 452–462. https://doi.org/10.1037/a0036068

Olfson, M., Blanco, C., Wall, M. M., Liu, S. M., & Grant, B. F. (2019). Treatment of common mental disorders in the United States: Results from the national epidemiologic survey on alcohol and related conditions-III. *The Journal of Clinical Psychiatry*, *80*(3), Article 21534. https://doi.org/10.4088/JCP.18m12532

Ormel, J., Jeronimus, B. F., Kotov, R., Riese, H., Bos, E. H., Hankin, B., Rosmalen, J., & Oldehinkel, A. J. (2013). Neuroticism and common mental disorders: Meaning and utility of a complex relationship. *Clinical Psychology Review*, *33*(5), 686–697. https://doi.org/10.1016/j.cpr.2013.04.003

R Core Team. (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.R-project.org

Rohde, P., Lewinsohn, P. M., Klein, D. N., Seeley, J. R., & Gau, J. M. (2013). Key characteristics of major depressive disorder occurring in childhood, adolescence, emerging adulthood, and adulthood. *Clinical Psychological Science*, *1*(1), 41–53. https://doi.org/10.1177/2167702612457599

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36.

Sauer-Zavala, S. E., & Barlow, D. H. (2021). *Neuroticism. A new framework for emotional disorders and their treatment*. The Guilford Press.

Schönbrodt, F. D., & Perugini, M. (2013). At what sample size do correlations stabilize? *Journal of Research in Personality*, *47*(5), 609–612. https://doi.org/10.1016/j.jrp.2013.05.009

Shackman, A. J., Tromp, D. P. M., Stockbridge, M. D., Kaplan, C. M., Tillman, R. M., & Fox, A. S. (2016). Dispositional negativity: An integrative psychological and neurobiological perspective. *Psychological Bulletin*, *142*(12), 1275–1314. https://doi.org/10.1037/bul0000073

Shackman, A. J., Weinstein, J. S., Hudja, S. N., Bloomer, C. D., Barstead, M. G., Fox, A. S., & Lemay, E. P. (2018). Dispositional negativity in the wild: Social environment governs momentary emotional experience. *Emotion*, *18*(5), 707–724. https://doi.org/10.1037/emo0000339

Singewald, N., Sartori, S. B., Reif, A., & Holmes, A. (2023). Alleviating anxiety and taming trauma: Novel pharmacotherapeutics for anxiety disorders and posttraumatic stress disorder. *Neuropharmacology*, *226*, Article 109418. https://doi.org/10.1016/j.neuropharm.2023.109418

Soto, C. J., & John, O. P. (2017). The next Big Five Inventory (BFI-2): Developing and assessing a hierarchical model with 15 Facets to enhance bandwidth, fidelity, and predictive power. *Journal of Personality and Social Psychology*, *113*(1), 117–143. https://doi.org/10.1037/pspp0000096

Spinhoven, P., Elzinga, B. M., Hovens, J. G. F. M., Roelofs, K., Van Oppen, P., Zitman, F. G., & Penninx, B. W. J. H. (2011). Positive and negative life events and personality traits in predicting course of depression and anxiety. *Acta Psychiatrica Scandinavica*, *124*(6), 462–473. https://doi.org/10.1111/j.1600-0447.2011.01753.x

Stasik-O'Brien, S. M., Brock, R. L., Chmielewski, M., Naragon-Gainey, K., Koffel, E., McDade-Montez, E., O'Hara, M. W., & Watson, D. (2019). Clinical utility of the inventory of depression and anxiety symptoms (IDAS). *Assessment*, *26*(5), 944–960. https://doi.org/10.1177/1073191118790036

Stieger, M., Flückiger, C., Rüegger, D., Kowatsch, T., Roberts, B. W., & Allemand, M. (2021). Changing personality traits with the help of a digital personality change intervention. *Proceedings of the National Academy of Sciences, USA*, *118*, Article e2017548118. https://doi.org/10.1073/pnas.2017548118

Tiego, J., Martin, E., DeYoung, C. G., Hagan, K., Cooper, S. E., Pasion, R., Satchell, L., Shackman, A. J., Bellgrove, M. A., & Fornito, A., & The HiTOP Neurobiological Foundations Work Group. (2023). Precision behavioral phenotyping as a strategy for uncovering the biological correlates of psychopathology. *Nature Mental Health*, *1*, 304–315. https://doi.org/10.1038/s44220-023-00057-5

Waszczuk, M. A., Kotov, R., Ruggero, C., Gamez, W., & Watson, D. (2017). Hierarchical structure of emotional disorders: From individual symptoms to the spectrum. *Journal of Abnormal Psychology*, *126*(5), 613–634. https://doi.org/10.1037/abn0000264

Watson, D., Forbes, M. K., Levin-Aspenson, H. F., Ruggero, C. J., Kotelnikova, Y., Khoo, S., Bagby, R. M., Sunderland, M., Patalay, P., & Kotov, R. (2022). The development of preliminary HiTOP internalizing spectrum scales. *Assessment*, *29*(1), 17–33.

Watson, D., Levin-Aspenson, H. F., Waszczuk, M. A., Conway, C. C., Dalgleish, T., Dretsch, M. N., Eaton, N. R., Forbes, M. K., Forbush, K. T., Hobbs, K. A., Michelini, G., Nelson, B. D., Sellbom, M., Slade, T., South, S. C., Sunderland, M., Waldman, I., Witthöft, M., Wright, A., . . . HiTOP Utility Workgroup. (2022). Validity and utility of Hierarchical Taxonomy of Psychopathology (HiTOP): III. Emotional dysfunction superspectrum. *World Psychiatry*, *21*(1), 26–54. https://doi.org/10.1002/wps.20943

Watson, D., Nus, E., & Wu, K. D. (2019). Development and validation of the faceted inventory of the five-factor model (FI-FFM). *Assessment*, *26*, 17–44.

Watson, D., O'Hara, M. W., Chmielewski, M., McDade-Montez, E. A., Koffel, E., Naragon, K., & Stuart, S. (2008). Further validation of the IDAS: Evidence of convergent, discriminant, criterion, and incremental validity. *Psychological Assessment*, *20*(3), 248–259. https://doi.org/10.1037/a0012570

Watson, D., O'Hara, M. W., Naragon-Gainey, K., Koffel, E., Chmielewski, M., Kotov, R., Stasik, S. M., & Ruggero, C. J. (2012). Development and validation of new anxiety and bipolar symptom scales for an expanded version of the IDAS (the IDAS-II). *Assessment*, *19*(4), 399–420. https://doi.org/10.1177/1073191112449857

Watson, D., O'Hara, M. W., Simms, L. J., Kotov, R., Chmielewski, M., McDade-Montez, E. A., Gamez, W., & Stuart, S. (2007). Development and validation of the Inventory of Depression and Anxiety Symptoms (IDAS). *Psychological Assessment*, *19*(3), 253–268. https://doi.org/10.1037/1040-3590.19.3.253

Watson, D., Stanton, K., Khoo, S., Ellickson-Larew, S., & Stasik-O'Brien, S. M. (2019). Extraversion and psychopathology: A multilevel hierarchical review. *Journal of Research in Personality*, *81*, 1–10.

Wilson, S., DiRago, A. C., & Iacono, W. G. (2014). Prospective inter-relationships between late adolescent personality and major depressive disorder in early adulthood. *Psychological Medicine*, *44*(3), 567–577. https://doi.org/10.1017/S0033291713001104

Young, K. S., Bookheimer, S. Y., Nusslock, R., Zinbarg, R. E., Damme, K. S. F., Chat, I. K. Y., Kelley, N. J., Vinograd, M., Perez, M., Chen, K., Cohen, A. E., & Craske, M. G. (2021). Dysregulation of threat neurocircuitry during fear extinction: The role of anhedonia. *Neuropsychopharmacology*, *46*(9), 1650–1657.

Zinbarg, R. E., Mineka, S., Craske, M. G., Griffith, J. W., Sutton, J., Rose, R. D., Nazarian, M., Mor, N., & Waters, A. M. (2010). The Northwestern-UCLA youth emotion project: Associations of cognitive vulnerabilities, neuroticism and gender with past diagnoses of emotional disorders in adolescents. *Behaviour Research and Therapy*, *48*(5), 347–358.

Supplementary Results

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Supplementary Table S1. ***Descriptive statistics and standardized mean changes for all internalizing symptom dimensions.***

Dimension	Assessment	Mean	SD	SE	Standardized mean change from baseline to follow-up (Cohen's *d*)
Dysphoria	Baseline	2.03	0.68	0.04	0.08
	Follow-Up	2.08	0.77	0.05	
Well-being	Baseline	3.06	0.43	0.03	-0.03
	Follow-Up	3.05	0.46	0.03	
Panic	Baseline	1.30	0.40	0.03	-0.03
	Follow-Up	1.29	0.43	0.03	
Lassitude	Baseline	2.27	0.67	0.04	0.12
	Follow-Up	2.34	0.76	0.05	
Insomnia	Baseline	1.78	0.56	0.04	0.04
	Follow-Up	1.81	0.68	0.04	
Suicidality	Baseline	1.14	0.32	0.02	0.06
	Follow-Up	1.16	0.35	0.02	
Appetite Loss	Baseline	1.71	0.83	0.05	-0.07
	Follow-Up	1.65	0.82	0.05	
Appetite Gain	Baseline	2.01	0.77	0.05	-0.06
	Follow-Up	1.97	0.85	0.06	
Ill-temper	Baseline	1.46	0.45	0.03	0.05
	Follow-Up	1.49	0.56	0.04	
Social Anxiety	Baseline	1.86	0.69	0.05	-0.36
	Follow-Up	1.66	0.58	0.04	
Traumatic Intrusions	Baseline	1.47	0.56	0.04	0.05
	Follow-Up	1.50	0.65	0.04	

Note. Baseline N = 234. Follow-up N = 230.

Supplementary Table S2. ***Parameter estimates from univariate unconditional LCS models of internalizing symptoms.***

Parameter	Lassitude	Insomnia	Suicidality
Covariance of LCS factor with baseline symptoms	-0.12 (0.03)***	-0.123 (0.029)***	-0.044 (0.013)***
Correlation of LCS factor with baseline symptoms	-0.29***	-0.35***	-0.42***
LCS factor intercept	0.070 (0.039)	-0.389 (0.061)	-0.019 (0.021)
Standardized LCS factor intercept	0.12	-0.05	-0.06
Baseline symptom mean	2.268 (0.044)***	1.783 (0.037)***	1.142 (0.021)***
LCS factor variance	0.359 (0.038)***	0.389 (0.061)***	0.106 (0.022)***
Baseline symptom variance	0.451 (0.054)***	0.316 (0.047)***	0.100 (0.028)***

Parameter	Appetite Loss	Appetite Gain	Ill-temper
Covariance of LCS factor with baseline symptoms	-0.35 (0.06)***	-0.246 (0.046)***	-0.080 (0.024)***
Correlation of LCS factor with baseline symptoms	-0.51***	-0.41***	-0.35***
LCS factor intercept	-0.050 (0.055)	-0.046 (0.052)	0.029 (0.034)
Standardized LCS factor intercept	-0.06	-0.06	0.06
Baseline symptom mean	1.708 (0.054)***	2.014 (0.050)***	1.463 (0.029)***
LCS factor variance	0.699 (0.093)***	0.619 (0.067)***	0.264 (0.037)***
Baseline symptom variance	0.688 (0.095)***	0.588 (0.061)***	0.203 (0.026)***

Parameter	Social Anxiety	Traumatic Intrusions
Covariance of LCS factor with baseline symptoms	-0.226 (0.037)***	-0.132 (0.029)***
Correlation of LCS factor with baseline symptoms	-0.59***	-0.39***
LCS factor intercept	-0.199 (0.037)	-0.027 (0.040)
Standardized LCS factor intercept	-0.36	0.04
Baseline symptom mean	1.859 (0.045)***	1.473 (0.037)***
LCS factor variance	0.308 (0.046)***	0.366 (0.066)***
Baseline symptom variance	0.474 (0.053)***	0.314 (0.054)***

Note. Standard errors appear in parentheses. *** $p < 0$ .001. All parameter estimates are unstandardized except for the standardized LCS factor intercept and the correlation of the LCS factor with baseline symptoms.

Table S3. ***Gender differences in change-factor mean and variance estimates in unconditional LCS models of internalizing symptom change***

Parameter	IDAS Scale	Estimate		Likelihood Ratio Test	
		Men	Women	$\chi^2(1)$	p
Change Factor Mean	Dysphoria	-0.093	0.254	7.11	< 0.01
	Well-being	-0.075	0.028	0.61	0.43
	Panic	-0.137	0.059	2.67	0.10
Change Factor Variance	Dysphoria	0.382	0.397	0.02	0.89
	Well-being	0.174	0.140	0.99	0.32
	Panic	0.102	0.144	0.80	0.37

Note. We report standardized estimates for the LCS factor means across genders and unstandardized estimates for the LCS factor variance parameter estimates. IDAS = Inventory of Depression and Anxiety Symptoms; df = degrees of freedom.

Table S4. ***Gender differences in personality domains' prospective associations with internalizing symptoms***

IDAS Scale	Personality Domain	Standardized Estimate		Likelihood Ratio Test	
		Men	Women	$\chi^2(1)$	p
Dysphoria	Neuroticism	0.249	0.169	0.09	0.77
	Extraversion	0.092	-0.055	1.06	0.30
	Agreeableness	-0.078	-0.097	0.34	0.85
	Conscientiousness	-0.094	-0.157	0.15	0.69
	Openness to Experience	-0.020	0.017	0.11	0.74
Well-being	Neuroticism	-0.036	0.156	1.44	0.23
	Extraversion	-0.084	0.111	1.64	0.20
	Agreeableness	0.058	0.059	0.00	0.99
	Conscientiousness	0.125	-0.063	2.05	0.15
	Openness to Experience	0.049	0.182	0.89	0.34
Panic	Neuroticism	0.039	-0.001	0.05	0.82
	Extraversion	0.046	-0.027	0.39	0.53
	Agreeableness	0.014	-0.137	2.35	0.12
	Conscientiousness	-0.130	-0.100	0.01	0.93
	Openness to Experience	0.010	0.115	1.17	0.28

Note. Parameter estimates represent standardized multiple regression coefficients, adjusted for effects of the other 4 personality domains, in multiple-group models that allowed this coefficient to vary freely across gender. The likelihood ratio test compares the fit of this "unconstrained" model to the fit of a constrained model that forced regression coefficients for a particular personality domain to equality across gender. IDAS = Inventory of Depression and Anxiety Symptoms; df = degrees of freedom.

Table S5.1: ***Regressions of LCS Model Variables on Baseline N/NE Facets***

	Baseline Symptoms				*Symptom LCS Factor*			
	b	*SE*	*p*	*β*	*b*	*SE*	*p*	*β*
Dysphoria								
Depression	**0.097**	**0.012**	**< 0.001**	**0.551**	0.029	0.017	0.090	0.175
Anxiety	**0.024**	**0.010**	**0.017**	**0.131**	-0.003	0.015	0.841	-0.018
Emotional Volatility	**0.029**	**0.010**	**0.004**	**0.167**	**0.029**	**0.014**	**0.042**	**0.178**
Well-being								
Depression	**-0.074**	**0.008**	**< 0.001**	**-0.657**	-0.019	0.010	0.055	-0.180
Anxiety	0.005	0.010	0.653	0.040	0.008	0.008	0.290	0.080
Emotional Volatility	0.006	0.009	0.497	0.055	0.012	0.008	0.162	0.115
Panic								
Depression	**0.034**	**0.009**	**< 0.001**	**0.322**	0.014	0.009	0.092	0.158
Anxiety	0.009	0.007	0.179	0.084	-0.011	0.008	0.172	-0.113
Emotional Volatility	0.012	0.008	0.122	0.113	0.005	0.007	0.473	0.057
Lassitude								
Depression	**0.056**	**0.014**	**< 0.001**	**0.319**	**0.036**	**0.015**	**0.015**	**0.231**
Anxiety	0.021	0.013	0.109	0.115	-0.012	0.015	0.420	-0.074
Emotional Volatility	0.023	0.014	0.100	0.133	0.017	0.014	0.216	0.110
Insomnia								
Depression	**0.034**	**0.013**	**0.010**	**0.235**	0.021	0.012	0.082	0.128
Anxiety	0.013	0.011	0.248	0.088	0.009	0.013	0.492	0.053
Emotional Volatility	**0.032**	**0.012**	**0.007**	**0.217**	-0.009	0.013	0.457	-0.058
Suicidality								
Depression	**0.039**	**0.007**	**< 0.001**	**0.470**	**0.035**	**0.011**	**0.002**	**0.408**
Anxiety	**-0.012**	**0.006**	**0.040**	**-0.146**	**-0.022**	**0.009**	**0.014**	**-0.250**
Emotional Volatility	**0.013**	**0.006**	**0.031**	**0.153**	0.005	0.007	0.493	0.061
Appetite Loss								
Depression	**0.061**	**0.019**	**0.002**	**0.282**	**0.055**	**0.021**	**0.009**	**0.251**
Anxiety	-0.007	0.017	0.675	-0.031	**-0.063**	**0.021**	**0.002**	**-0.283**
Emotional Volatility	**0.045**	**0.018**	**0.012**	**0.208**	0.026	0.018	0.153	0.120
Appetite Gain								
Depression	0.017	0.021	0.406	0.086	0.000	0.015	0.990	0.001
Anxiety	-0.017	0.019	0.366	-0.084	-0.019	0.018	0.295	-0.088
Emotional Volatility	**0.053**	**0.019**	**0.007**	**0.266**	**0.064**	**0.017**	**< 0.001**	**0.315**

Ill-temper								
Depression	**0.024**	**0.010**	**0.013**	**0.203**	0.004	0.012	0.736	0.031
Anxiety	0.002	0.008	0.794	0.017	0.001	0.012	0.932	0.008
Emotional Volatility	**0.047**	**0.009**	**< 0.001**	**0.405**	**0.027**	**0.012**	**0.029**	**0.202**
Social Anxiety								
Depression	**0.112**	**0.012**	**< 0.001**	**0.630**	0.013	0.014	0.332	0.092
Anxiety	**0.035**	**0.013**	**0.008**	**0.191**	0.014	0.011	0.177	0.097
Emotional Volatility	**-0.027**	**0.012**	**0.027**	**-0.150**	0.000	0.010	0.982	0.002
Traumatic Intrusions								
Depression	**0.045**	**0.013**	**< 0.001**	**0.310**	0.012	0.013	0.355	0.079
Anxiety	0.009	0.010	0.404	0.057	-0.019	0.012	0.123	-0.115
Emotional Volatility	0.019	0.011	0.085	0.133	**0.032**	**0.013**	**0.013**	**0.204**

Note. Bolded parameter estimates are statistically significant ($p < 0.05$).

Table S5.2: ***Regressions of LCS Model Variables on Baseline E/PE Facets***

	Baseline Symptoms				*Symptom LCS Factor*			
	b	*SE*	*p*	*β*	*B*	*SE*	*p*	*β*
Dysphoria								
Sociability	0.014	0.013	0.275	0.087	**0.033**	**0.015**	**0.026**	**0.210**
Assertiveness	**-0.037**	**0.013**	**0.004**	**-0.192**	-0.015	0.017	0.395	-0.080
Energy Level	**-0.094**	**0.017**	**< 0.001**	**-0.441**	**-0.047**	**0.019**	**0.013**	**-0.234**
Well-being								
Sociability	-0.003	0.008	0.766	-0.024	-0.010	0.008	0.224	-0.102
Assertiveness	0.015	0.009	0.079	0.122	0.002	0.010	0.828	0.020
Energy Level	**0.073**	**0.009**	**< 0.001**	**0.536**	**0.022**	**0.010**	**0.028**	**0.174**
Panic								
Sociability	-0.001	0.009	0.937	-0.007	0.012	0.008	0.151	0.135
Assertiveness	-0.009	0.009	0.279	-0.080	-0.008	0.011	0.464	-0.079
Energy Level	**-0.037**	**0.010**	**< 0.001**	**-0.297**	-0.012	0.008	0.133	-0.109
Lassitude								
Sociability	0.020	0.014	0.164	0.121	0.022	0.013	0.085	0.153
Assertiveness	**-0.032**	**0.016**	**0.040**	**-0.166**	-0.011	0.014	0.459	-0.061
Energy Level	**-0.071**	**0.017**	**< 0.001**	**-0.336**	**-0.035**	**0.016**	**0.030**	**-0.186**
Insomnia								
Sociability	0.011	0.012	0.375	0.079	0.022	0.015	0.128	0.146
Assertiveness	-0.003	0.013	0.826	-0.018	-0.020	0.017	0.250	-0.109
Energy Level	**-0.053**	**0.014**	**< 0.001**	**-0.301**	**-0.028**	**0.014**	**0.049**	**-0.142**
Suicidality								
Sociability	0.000	0.006	0.980	0.002	-0.000	0.006	0.994	-0.001
Assertiveness	-0.006	0.006	0.358	-0.063	-0.008	0.006	0.183	-0.086
Energy Level	**-0.031**	**0.007**	**< 0.001**	**-0.312**	-0.016	0.011	0.149	-0.156
Appetite Loss								
Sociability	-0.000	0.016	0.976	-0.002	0.018	0.017	0.284	0.089
Assertiveness	-0.023	0.019	0.230	-0.096	-0.010	0.018	0.560	-0.042
Energy Level	**-0.072**	**0.021**	**< 0.001**	**-0.275**	**-0.056**	**0.022**	**0.013**	**-0.211**
Appetite Gain								
Sociability	**0.043**	**0.018**	**0.016**	**0.226**	**0.045**	**0.017**	**0.009**	**0.233**
Assertiveness	-0.031	0.018	0.083	-.0140	-0.013	0.017	0.449	-0.057
Energy Level	-0.028	0.020	0.158	-0.115	-0.030	0.017	0.085	-0.120

Ill-temper								
Sociability	0.002	0.008	0.779	0.022	0.016	0.012	0.166	0.130
Assertiveness	0.012	0.010	0.238	0.092	-0.013	0.012	0.279	-0.089
Energy Level	**-0.046**	**0.011**	**< 0.001**	**-0.322**	-0.017	0.014	0.237	-0.103
Social Anxiety								
Sociability	-0.025	0.013	0.055	-0.149	0.005	0.011	0.676	0.034
Assertiveness	**-0.060**	**0.015**	**< 0.001**	**-0.302**	-0.019	0.014	0.171	-0.120
Energy Level	**-0.051**	**0.015**	**0.001**	**-0.233**	-0.018	0.012	0.138	-0.102
Traumatic Intrusions								
Sociability	0.001	0.011	0.900	0.010	0.044	0.014	0.002	0.296
Assertiveness	-0.015	0.013	0.256	-0.094	0.030	0.016	0.063	-0.174
Energy Level	**-0.031**	**0.015**	**0.046**	**-0.174**	**-0.041**	**0.015**	**0.005**	**-0.215**

Note. Bolded parameter estimates are statistically significant ($p < 0.05$).

Table S5.3: ***Regressions of LCS Model Variables on Baseline Agreeableness Facets***

	Baseline Symptoms				*Symptom LCS Factor*			
	b	*SE*	*p*	*β*	*b*	*SE*	*p*	*β*
Dysphoria								
Compassion	0.026	0.019	0.184	0.099	-0.013	0.020	0.496	-0.054
Respectfulness	-0.027	0.022	0.227	-0.105	-0.032	0.018	0.085	-0.131
Trust	**-0.086**	**0.016**	**< 0.001**	**-0.414**	0.001	0.016	0.946	0.006
Well-being								
Compassion	0.003	0.014	0.833	0.017	0.000	0.011	0.976	0.002
Respectfulness	0.006	0.012	0.647	0.035	0.017	0.011	0.135	0.110
Trust	**0.050**	**0.011**	**< 0.001**	**0.379**	-0.003	0.010	0.791	-0.022
Panic								
Compassion	-0.005	0.011	0.635	-0.035	-0.001	0.009	0.877	-0.010
Respectfulness	-0.007	0.014	0.640	-0.044	-0.006	0.009	0.520	-0.043
Trust	**-0.028**	**0.011**	**0.014**	**-0.223**	-0.005	0.006	0.476	-0.042
Lassitude								
Compassion	0.004	0.021	0.848	0.016	0.013	0.021	0.531	0.056
Respectfulness	-0.040	0.023	0.076	-0.158	-0.024	0.019	0.201	-0.106
Trust	**-0.050**	**0.018**	**0.005**	**-0.243**	-0.017	0.017	0.302	-0.094
Insomnia								
Compassion	0.005	0.016	0.755	0.023	0.007	0.018	0.677	0.031
Respectfulness	-0.028	0.019	0.145	-0.133	-0.025	0.018	0.175	-0.104
Trust	**-0.040**	**0.014**	**0.004**	**-0.231**	0.004	0.015	0.806	0.019
Suicidality								
Compassion	-0.007	0.010	0.443	-0.061	-0.021	0.011	0.069	-0.166
Respectfulness	0.004	0.010	0.727	0.030	-0.013	0.007	0.076	-0.102
Trust	**-0.026**	**0.010**	**0.008**	**-0.263**	0.001	0.008	0.844	0.015
Appetite Loss								
Compassion	-0.010	0.024	0.669	-0.032	-0.009	0.027	0.734	-0.028
Respectfulness	-0.002	0.030	0.944	-0.007	-0.027	0.023	0.239	-0.085
Trust	**-0.047**	**0.021**	**0.024**	**-0.185**	-0.022	0.017	0.191	-0.084
Appetite Gain								
Compassion	0.006	0.024	0.820	0.019	0.026	0.023	0.262	0.085
Respectfulness	**-0.090**	**0.023**	**< 0.001**	**-0.307**	-0.030	0.026	0.245	-0.100
Trust	0.005	0.021	0.822	0.020	-0.004	0.021	0.837	-0.017

Ill-temper								
Compassion	-0.003	0.014	0.814	-0.019	-0.019	0.013	.0155	-0.093
Respectfulness	**-0.045**	**0.014**	**0.001**	**-0.264**	-0.004	0.015	0.803	-0.020
Trust	**-0.034**	**0.011**	**0.001**	**-0.246**	-0.002	0.012	0.860	-0.013
Social Anxiety								
Compassion	0.009	0.021	0.676	0.033	0.003	0.013	0.796	0.016
Respectfulness	-0.013	0.023	0.557	-0.051	-0.001	0.015	0.921	-0.007
Trust	**-0.071**	**0.016**	**< 0.001**	**-0.336**	-0.013	0.011	0.260	-0.075
Traumatic Intrusions								
Compassion	0.028	0.016	0.076	0.131	-0.017	0.015	0.258	-0.073
Respectfulness	-0.013	0.019	0.511	-0.059	-0.005	0.016	0.730	-0.024
Trust	**-0.047**	**0.016**	**0.004**	**-0.270**	-0.008	0.013	0.532	-0.043

Note. Bolded parameter estimates are statistically significant ($p < 0.05$).

Table S5.4: ***Regressions of LCS Model Variables on Baseline Conscientiousness Facets***

	Baseline Symptoms				*Symptom LCS Factor*			
	b	*SE*	*p*	*β*	*b*	*SE*	*p*	*β*
Dysphoria								
Organization	**0.036**	**0.013**	**.008**	**.195**	-0.016	0.013	.218	-.091
Productiveness	**-0.086**	**0.016**	**< .001**	**-.418**	-0.006	0.019	.741	-.032
Responsibility	**-0.057**	**0.019**	**.003**	**-.244**	-0.013	0.018	.449	-.061
Well-being								
Organization	-0.014	0.008	.086	-.121	-0.012	0.008	.123	-.112
Productiveness	**0.060**	**0.011**	**< .001**	**.456**	0.013	0.010	.206	.105
Responsibility	0.012	0.011	.286	.082	0.009	0.011	.397	.068
Panic								
Organization	0.011	0.010	.271	.100	-0.014	0.007	.051	-.141
Productiveness	**-0.035**	**0.012**	**.004**	**-.288**	0.003	0.012	.775	.031
Responsibility	-0.019	0.012	.110	-.139	-0.006	0.009	.490	-.052
Lassitude								
Organization	0.006	0.013	.628	.035	-0.013	0.012	.284	-.080
Productiveness	**-0.076**	**0.015**	**< .001**	**-.370**	-0.005	0.017	.756	-.030
Responsibility	**-0.049**	**0.019**	**.008**	**-.213**	0.011	0.017	.531	.052
Insomnia								
Organization	0.002	0.013	.128	.011	-0.014	0.012	.248	-.081
Productiveness	**-0.033**	**0.015**	**.031**	**-.191**	-0.011	0.015	.461	-.060
Responsibility	-0.030	0.018	.109	-.153	0.009	0.016	.581	.041
Suicidality								
Organization	0.011	0.007	.097	.129	0.001	0.007	.907	.010
Productiveness	**-0.020**	**0.009**	**.029**	**-.202**	0.003	0.009	.728	.030
Responsibility	**-0.019**	**0.008**	**.020**	**-.170**	**-0.028**	**0.010**	**.006**	**-.250**
Appetite Loss								
Organization	-0.008	0.018	.653	-.037	-0.008	0.016	.629	-.034
Productiveness	-0.019	0.021	.385	-.073	0.012	0.019	.519	.047
Responsibility	**-0.056**	**0.028**	**.047**	**-.196**	**-0.050**	**0.020**	**.014**	**-.175**
Appetite Gain								
Organization	**0.036**	**0.017**	**.035**	**.172**	-0.012	0.016	.469	-.054
Productiveness	**-0.050**	**0.020**	**.012**	**-.213**	-0.007	0.020	.729	-.029
Responsibility	**-0.062**	**0.023**	**.006**	**-.235**	-0.001	0.021	.966	-.003

Ill-temper								
Organization	0.002	0.010	.835	.016	-0.012	0.013	.353	-.088
Productiveness	-0.012	0.011	.288	-.084	-0.003	0.016	.875	-.016
Responsibility	**-0.030**	**0.014**	**.030**	**-.190**	-0.022	0.016	.163	-.124
Social Anxiety								
Organization	**0.034**	**0.014**	**.012**	**.180**	-0.015	0.009	.111	-.096
Productiveness	**-0.060**	**0.017**	**< .001**	**-.287**	-0.007	0.011	.524	-.041
Responsibility	**-0.066**	**0.019**	**.001**	**-.276**	0.009	0.014	.554	.045
Traumatic Intrusions								
Organization	0.006	0.014	.661	.041	-0.011	0.015	.436	-.064
Productiveness	-0.020	0.015	.202	-.115	-0.007	0.018	.707	-.037
Responsibility	-0.029	0.017	.086	-.151	-0.021	0.016	.200	-.099

Note. Bolded parameter estimates are statistically significant ($p < 0.05$).

Table S5.5: ***Regressions of LCS Model Variables on Baseline Open-Mindedness Facets***

	Baseline Symptoms				*Symptom LCS Factor*			
	b	*SE*	*p*	*β*	*b*	*SE*	*p*	*β*
Dysphoria								
Intellectual Curiosity	0.008	0.026	.747	.029	-0.014	0.021	.517	-.050
Aesthetic Sensitivity	**0.055**	**0.013**	**< .001**	**.297**	0.001	0.012	.913	.008
Creative Imagination	**-0.056**	**0.019**	**.003**	**-.242**	0.003	0.017	.838	.016
Well-being								
Intellectual Curiosity	0.015	0.015	.292	.083	-0.011	0.013	.375	-.067
Aesthetic Sensitivity	**-0.019**	**0.009**	**.047**	**-.159**	0.009	0.007	.206	.087
Creative Imagination	**0.043**	**0.012**	**< .001**	**.294**	0.018	0.011	.110	.132
Panic								
Intellectual Curiosity	-0.019	0.017	.252	-.112	-0.002	0.010	.869	-.011
Aesthetic Sensitivity	**0.019**	**0.009**	**.037**	**.173**	0.005	0.006	.469	.047
Creative Imagination	-0.011	0.011	.337	-.079	0.004	0.010	.699	.031
Lassitude								
Intellectual Curiosity	0.017	0.023	.469	.058	0.021	0.019	.276	.081
Aesthetic Sensitivity	**0.041**	**0.013**	**.002**	**.221**	0.006	0.011	.595	.037
Creative Imagination	**-0.040**	**0.017**	**.020**	**-.173**	-0.004	0.016	.824	-.018
Insomnia								
Intellectual Curiosity	-0.028	0.019	.142	-.117	0.022	0.019	.242	.081
Aesthetic Sensitivity	**0.038**	**0.011**	**< .001**	**.247**	-0.013	0.012	.254	-.077
Creative Imagination	-0.009	0.014	.500	-.047	-0.003	0.017	.861	-.015
Suicidality								
Intellectual Curiosity	-0.004	0.012	.730	-.030	0.010	0.010	.306	.072
Aesthetic Sensitivity	**0.015**	**0.007**	**.032**	**.179**	-0.003	0.007	.687	-.030
Creative Imagination	-0.014	0.008	.100	-.129	-0.005	0.008	.480	-.048
Appetite Loss								
Intellectual Curiosity	-0.002	0.029	.956	-.004	0.014	0.025	.588	.038
Aesthetic Sensitivity	**0.037**	**0.016**	**.021**	**.161**	-0.014	0.016	.405	-.060
Creative Imagination	-0.031	0.023	.173	-.109	-0.011	0.020	.575	-.039
Appetite Gain								
Intellectual Curiosity	-0.028	0.024	.242	-.085	0.013	0.026	.634	.037
Aesthetic Sensitivity	**0.053**	**0.014**	**< .001**	**.253**	0.015	0.015	.309	.071
Creative Imagination	-0.014	0.020	.484	-.054	-0.009	0.022	.668	-.035

Ill-temper								
Intellectual Curiosity	0.001	0.015	.930	.007	-0.000	0.016	.984	-.001
Aesthetic Sensitivity	**0.019**	**0.009**	**.029**	**.152**	0.010	0.011	.371	.071
Creative Imagination	0.000	0.012	.967	.003	-0.004	0.016	.791	-.024
Social Anxiety								
Intellectual Curiosity	0.007	0.025	.770	.024	-0.013	0.013	.305	-.054
Aesthetic Sensitivity	**0.039**	**0.013**	**.003**	**.206**	**0.021**	**0.009**	**.023**	**.139**
Creative Imagination	**-0.061**	**0.019**	**.001**	**-.260**	-0.008	0.013	.528	-.045
Traumatic Intrusions								
Intellectual Curiosity	-0.004	0.021	.834	-.018	0.009	0.016	.571	.035
Aesthetic Sensitivity	0.020	0.011	.054	.133	0.015	0.011	.178	.092
Creative Imagination	0.005	0.014	.700	.027	-0.009	0.015	.547	-.045

Note. Bolded parameter estimates are statistically significant ($p < 0.05$).

Supplementary Table S6. ***Regressions of LCS model variables on baseline personality domains.***

	Baseline Symptoms				*LCS Factor*			
	b	*SE*	*p*	*β*	*b*	*SE*	*p*	*β*
Lassitude								
Neuroticism	**0.021**	**0.004**	**< .001**	**.316**	**0.012**	**0.005**	**.023**	**.199**
Extraversion	-0.005	0.005	.245	-.070	0.001	0.004	.849	.012
Conscientiousness	**-0.026**	**0.005**	**< .001**	**-.311**	-0.002	0.006	.749	-.026
Agreeableness	-0.010	0.006	.093	-.105	-0.007	0.006	.298	-.080
Open-mindedness	**0.011**	**0.005**	**.024**	**.123**	0.008	0.005	.145	.095
Insomnia								
Neuroticism	**0.023**	**0.004**	**< .001**	**.407**	0.005	0.005	.281	.085
Extraversion	0.002	0.004	.514	.040	-0.001	0.005	.783	-.019
Conscientiousness	**-0.008**	**0.004**	**.031**	**-.122**	-0.005	0.006	.424	-.062
Agreeableness	-0.008	0.005	.131	-.101	0.000	0.006	.934	.005
Open-mindedness	0.006	0.005	.240	.075	-0.001	0.005	.917	-.006
Suicidality								
Neuroticism	**0.010**	**0.002**	**< .001**	**.313**	0.000	0.003	.992	.001
Extraversion	**-0.005**	**0.002**	**.013**	**-.135**	**-0.005**	**0.002**	**.034**	**-.144**
Conscientiousness	-0.002	0.002	.432	-.041	-0.004	0.002	.113	-.098
Agreeableness	-0.004	0.003	.205	-.083	-0.008	0.004	.056	-.173
Open-mindedness	0.002	0.003	.464	.047	0.003	0.003	.322	.057
Appetite Loss								
Neuroticism	**0.025**	**0.005**	**< .001**	**.303**	-0.005	0.007	.515	-.055
Extraversion	**-0.013**	**0.006**	**.025**	**-.145**	-0.007	0.006	.218	-.075
Conscientiousness	-0.012	0.006	.073	-.114	-0.009	0.007	.177	-.088
Agreeableness	-0.000	0.008	.957	-.004	-0.017	0.009	.052	-.149
Open-mindedness	0.007	0.007	.315	.061	-0.000	0.007	.985	-.001

	Baseline Symptoms	*Symptom Change Score Factor*

	b	*SE*	*p*	*β*	*b*	*SE*	*p*	*β*
Appetite Gain								
Neuroticism	**0.012**	**0.005**	**.023**	**.165**	**0.022**	**0.005**	**< .001**	**.287**
Extraversion	0.011	0.006	.057	.130	**0.017**	**0.006**	**.003**	**.188**
Conscientiousness	**-0.016**	**0.006**	**.009**	**-.171**	-0.005	0.007	.480	-.051
Agreeableness	**-0.016**	**0.008**	**.046**	**-.146**	0.006	0.007	.372	.055
Open-mindedness	0.011	0.007	.090	.105	0.001	0.006	.855	.010
Ill-temper								
Neuroticism	**0.020**	**0.003**	**< .001**	**.457**	0.008	0.005	.065	.168
Extraversion	0.004	0.003	.122	.088	0.003	0.004	.335	.059
Conscientiousness	0.000	0.003	.959	.003	**-0.010**	**0.004**	**.023**	**-.153**
Agreeableness	**-0.019**	**0.004**	**< .001**	**-.298**	-0.004	0.005	.369	-.061
Open-mindedness	**0.009**	**0.003**	**.004**	**.152**	0.004	0.004	.336	.060
Social Anxiety								
Neuroticism	**0.027**	**0.004**	**< .001**	**.396**	0.007	0.003	.059	.120
Extraversion	**-0.029**	**0.004**	**< .001**	**-.374**	**-0.008**	**0.004**	**.020**	**-.134**
Conscientiousness	-0.007	0.004	.081	-.088	-0.004	0.004	.390	-.053
Agreeableness	-0.002	0.005	.642	-.024	-0.001	0.004	.822	-.012
Open-mindedness	0.003	0.005	.465	.036	0.004	0.004	.283	.056
Traumatic Intrusions								
Neuroticism	**0.023**	**0.004**	**< .001**	**.413**	0.004	0.005	.392	.072
Extraversion	-0.002	0.004	.576	-.038	0.001	0.004	.745	.019
Conscientiousness	-0.003	0.004	.443	-.043	-0.010	0.006	.070	-.135
Agreeableness	0.001	0.005	.885	.008	-0.007	0.006	.244	-.080
Open-mindedness	0.008	0.005	.078	.109	0.008	0.004	.083	.092

Note. Bold parameter estimates are statistically significant ($p < 0.05$).