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Personality in a Hierarchical and Dimensional Model of Youth Psychopathology

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## Abstract

The predominant, categorical system used to classify and diagnose psychiatric disorders suffers from several critical scientific limitations, including extensive comorbidity, unreliability, and disorder heterogeneity. As such, clinical psychological scientists are increasingly moving away from this traditional, categorical system, and toward empirically-based, dimensional, and transdiagnostic alternatives such as the Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al., 2017). The HiTOP model is based on quantitative studies of disorder co-occurrence or comorbidity; but as a dimensional model, normative personality also serves as a “fundamental base” for the HiTOP structure (Widiger et al., 2019). However, the HiTOP model has been primarily built on adult samples, and the degree to which it may generalize to developing populations is still being understood. In the present dissertation, I use personality as a framework for understanding the psychological content of a hierarchical, dimensional model of psychopathology as it applies to youth. Study 1 takes a multi-stage construct validation approach to understanding relational aggression, a developmentally relevant psychopathology component with proposed connections to both normative and pathological personality. Study 2 examines the structure of seven common psychiatric disorders and their associations with facet-level personality traits. Study 3 then evaluates the longitudinal relationships between these lower-order personality traits and psychopathology spectra across the transition to adolescence. Collectively, these studies suggest that the structural and external validity of psychopathology dimensions have subtle differences across age groups. In addition, these studies support the conceptualization of psychiatric illness and normative personality as either being part of a shared continuum or, at minimum, sharing common causal antecedents.

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## Chapter 1: General Introduction

Classification systems are the bedrock of research, assessment, and ultimately, treatment of psychopathology. The past decade of research in psychopathology has seen a tremendous shift from traditional, categorical taxonomies of mental illness such as the Diagnostic and Statistical Manual of Mental Disorder (DSM; American Psychiatric Association, 2013) to an empirically-based, dimensional framework. The Hierarchical Taxonomy of Psychopathology (HiTOP, Kotov et al., 2017) is one key product of this quantitative classification movement. HiTOP is a new system for organizing research and assessment of psychopathology that conceptualizes psychiatric illness at multiple levels of bandwidth from broad dimensions of dysfunction (e.g., the general factor of psychopathology) down to highly specific symptoms. Using a data-driven approach to modeling comorbidity, or co-occurrence of psychological problems, HiTOP may offer substantial improvements over categorical diagnostic systems in terms of both reliability and validity. Despite its potential, however, this quantitative nosology is a work in progress. To date, evidence for the validity of HiTOP constructs comes primarily from cross-sectional factor analytic studies of adult psychopathology; however, construct validation is a multistage process that incorporates evidence across a variety of specific measures and data sources. In this dissertation, I use personality development as a framework (1) to evaluate the validity of a dimensional, hierarchical model of psychopathology in youth, and (2) to bridge existing, dimensional models of youth psychopathology with the current, (primarily) adult HiTOP model.

### **Development and Validation of An Alternative Psychiatric Taxonomy**

The DSM and other categorical classification systems such as the International Classification of Diseases (ICD-11; World Health Organization, 2019) have substantially advanced the standardization of psychopathology assessment and treatment (Kendell &

Jablensky, 2003), but they suffer from multiple serious limitations. First, traditional psychiatric taxonomies assume that psychiatric disorders are separable from normative functioning; however, nearly all forms of psychopathology evidence some degree of continuity with normative individual differences (e.g., Haslam et al., 2012). Second, the DSM and ICD assume that mental disorders are discrete or separable from one another; however, comorbidity between disorders is extremely high. Approximately 50% of individuals who qualify for one diagnosis qualify for a second, and 50% of those who qualify for a second qualify for a third, and so on (Newman et al., 1998). Third, categorical diagnoses consistently fail to demonstrate recommended levels of reliability in psychological research, while dimensions perform much better (e.g., Markon et al., 2011). Quantitative classification systems such as HiTOP instead seek to overcome these limitations by accounting for a full range of severity within each of their dimensions and by capturing comorbidity through their hierarchical structure. At the bottom of this hierarchy are the most specific, or unidimensional *symptoms* (e.g., “excessive handwashing”), which are then clustered into increasingly more multidimensional, or broad *components, syndromes, subfactors, spectra, and superfactors* (see [Figure 1.1](#) for HiTOP structure and sample dimensions). Each level of analysis in HiTOP may have unique utility in assessing pathology, targeting treatments, and understanding the mechanisms underlying psychopathology, though not all levels have received the same degree of validation.

Construct validity is the primary task of psychometric research, but it is often neglected and misunderstood (Clark & Watson, 2019). The term “construct validity” refers to the extent to which theory and evidence support how scientists (or clinicians, psychometrists, etc.) interpret the scores on a test—not the validity of a test itself (American Educational Research Association, 2014). Construct validation is, therefore, an iterative and ongoing process of theory development

and empirical testing that can never be “achieved” per se, as evidence is continually being accumulated and theory is continually being updated (Grahek et al., 2021; Tackett et al., 2016). Construct validation involves a variety of steps, and among them are construct operationalization, testing the psychometric properties of measures designed to capture the target construct (e.g., factor structure, reliability), and assessing relationships between the target construct and theoretically relevant external variables and outcomes otherwise known as a nomological network (e.g., convergent and discriminant validity, criterion validity; Cronbach & Meehl, 1955). Not only does the construct validation process require researchers to establish concurrent associations between the target construct and external criteria, but it also requires examining the extent to which the target construct predicts (or is predicted by) external constructs over time (i.e., predictive validity). By necessity, this process also entails testing the generalizability of a construct and its nomological network across a variety of populations to determine its boundary conditions. Construct validation of many HiTOP dimensions is currently in early stages, and existing studies within this framework have focused nearly exclusively on testing 1) the psychometric properties (namely, reliability and structural validity) of broad *spectra* and *superfactors*, and 2) convergent and discriminant validity of *spectra* and *superfactors* with respect to other individual difference constructs among adults.

### **Personality in HiTOP**

Personality forms an integral thread in the nomological network of nearly any clinical construct, and the extensive overlap between “normative” traits and symptoms is explicitly incorporated into HiTOP. Five Factor Model (FFM; Widiger, 2014) traits—including neuroticism, extraversion, conscientiousness, agreeableness, and openness to experience—are strongly associated with psychopathology both within and across time. High neuroticism is

characteristic of nearly all forms of psychopathology (Brandes et al., 2019; Zinbarg et al., 2016), low agreeableness and conscientiousness are associated with externalizing problems (Krueger et al., 2002), low extraversion is associated with internalizing and thought disorders (Kotov et al., 2010; Naragon-Gainey et al., 2009), and high openness to experience may be associated with thought disorders (Chmielewski et al., 2014). This high degree of overlap is also evident in core HiTOP constructs. HiTOP *spectra* include five primary dimensions that roughly correspond to the FFM of normative personality. These *spectra* capture both common psychiatric disorder and personality pathology; they include internalizing (high neuroticism), detachment (low extraversion), disinhibited externalizing (low conscientiousness), antagonistic externalizing (low agreeableness), and thought disorder (high openness; Kotov et al., 2017). As HiTOP is a dimensional framework, the existence of a connection between normative functioning and dysfunction is foundational. However, there remain several open questions about the nature of the personality—psychopathology relationship in HiTOP.

First, the extent to which symptom dimensions converge with narrower trait constructs remains unclear. Like psychopathology, personality is a hierarchical construct that can be conceptualized at a variety of levels of specificity other than the FFM, including those of higher-order traits, facets, and specific “nuance traits” (e.g., Brandes & Tackett, 2019; Digman, 1997; John & Srivastava, 1999; McCrae, 2015; Möttus et al., 2019). FFM traits are highly multidimensional, and despite the FFM’s popularity, emerging evidence suggests that more specific, lower-order traits may offer several advantages in understanding why personality is connected to psychopathology (e.g., Walton et al., 2018). First, facet-level traits do not have simple structure—that is, even when measures are designed to increase the loadings of facets onto a single FFM domain each, most facets contain variance that overlaps with more than one

trait domain (Schwaba et al., 2020). Indeed, these interstitial facets (e.g., impulsivity) may represent blends of trait domains that have incremental utility for predicting certain clinical outcomes (e.g., suicidality; Whiteside et al., 2005). Second, differences in the extent to which lower-order traits are related to an outcome may be obscured by examining only higher-order trait domains. For example, while depression is negatively correlated with domain-level extraversion in adults, only positive emotionality and sociability facets are strongly negatively correlated with depression, while assertiveness and sensation seeking facets are uncorrelated with symptoms (Watson et al., 2015; Watson, Ellickson-Larew, et al., 2019). To understand psychopathology structural models across multiple levels of construct specificity, it is therefore appropriate to incorporate personality measurement across multiple levels of construct specificity.

Second, there is a clear need to evaluate *why* normative personality traits and psychopathology overlap. The primary hypothesis advanced by HiTOP's Normal Personality Workgroup is that symptom dimensions range from relatively normative to maladaptive individual differences; that is, they exist on a single continuum (Widiger et al., 2019). However, this "spectrum" model is not the only possible causal model that may explain the personality—psychopathology relationship. Among multiple other explanations, traits may serve as vulnerability factors for the later development of symptoms (the "vulnerability model"), symptoms may alter personality (the "scar model"), or symptoms and traits may share common causes (the "common cause model"; Tackett, 2006). Teasing apart these models requires further longitudinal study, as the Normal Personality workgroup's position has not been comprehensively evaluated alongside alternatives. These longitudinal studies would ideally

capture critical developmental periods, and by extension, developmentally-appropriate dimensions of psychopathology.

### **Developmental Extension of HiTOP**

The HiTOP structure has not yet been extended to youth populations, despite that dimensional structural models of child psychopathology have a rich history. The earliest psychopathology structural studies were factor analyses of children’s psychiatric symptoms (Achenbach, 1966), and the internalizing-externalizing structure revealed in these studies remains popular in modern child psychopathology research. This evidence base has certainly informed the basic HiTOP structure, but only to a limited degree. Adult studies make up the majority of studies included in theoretical and empirical reviews establishing the preliminary HiTOP structure (Kotov et al., 2017, 2018, 2021; Ringwald et al., 2021), and no alternative structure for developing populations currently exists. And while the structural and convergent validity of many HiTOP dimensions may be robust across adult samples, their generalizability to child and adolescent samples cannot be simply assumed.

Existing evidence suggests some divergence in psychopathology structure between youth and adult samples. First, the relationships between HiTOP dimensions may differ substantially. For example, a separable somatoform *spectrum* has been preliminarily included in HiTOP; however, somatic complaints and internalizing problems are more strongly correlated—and therefore less separable—in children relative to adults (Achenbach & Rescorla, 2001). Second, some symptoms may be indicative of wholly different pathology in populations at different developmental stages. For example, “fantasy proneness” is currently included as a symptom of the thought disorder spectrum. However, childhood psychotic symptoms such as these are nonspecific precursors to a variety of disorders in adulthood (Fisher et al., 2013); thus,

problematic engagement with fantasy and daydreaming more likely indicates attention problems in children (Achenbach & Rescorla, 2001). Third, children's normative personality traits take on a slightly different hierarchical structure than do adults'. While some traits are more separable in children (e.g., activity and other facets of extraversion; De Pauw & Mervielde, 2010; Soto & Tackett, 2015), others are less so (e.g., neuroticism and agreeableness; Tackett et al., 2012). Insofar as personality structure forms a "foundational base" of the HiTOP model (Widiger et al., 2019), these studies suggest that structural models of psychopathology may need refining for developmental populations. Further, normative personality may be a useful lens through which to understand what is being captured by dimensional, transdiagnostic factors of psychopathology and how comparable those constructs are between youth and adult populations.

### **The Present Investigation**

The overall goal of this dissertation is to understand the construct validity of a transdiagnostic, hierarchical model of youth psychopathology vis-à-vis its connections with normative personality traits. While HiTOP and similar dimensionally-based, data-driven psychiatric models appear robust across adult samples, there is a clear need to expand them to developmental populations and to bridge them with existing structural studies of youth psychopathology. This dissertation contributes to that evidence base by 1) evaluating the structural and external validity of youth psychopathology with regard to its connections to normative personality, and 2) interrogating the boundaries and overlap between normative personality and symptom dimensions. Starting from the lowest bandwidth elements of HiTOP, Study 1 will use a multi-stage construct validity approach to examine one key candidate for a developmentally-relevant, lower-order psychopathology *component*, relational aggression. Moving up the HiTOP hierarchy, Study 2 will investigate the extent to which domain- and facet-

level personality traits characterize *syndromes* and their higher-order symptom dimensions. Study 3 will then evaluate several explanatory models of the personality-psychopathology relationship through a longitudinal study of facet-level traits and the internalizing *spectrum* and externalizing *superspectrum*. These studies will be conducted using data from six samples; these samples are partially overlapping between studies of this dissertation.

### **General Participants and Procedures**

Data from six archival samples are included in the present dissertation. As some samples are included in multiple studies, for conciseness, I briefly describe them here and subsequently refer to them as Samples 1-6. Participant recruitment source, compensation, and survey modality differed by study (see [Table 1.1](#) for details), but all were community samples of families of children aged 5-18 years. Exclusion criteria for all samples were neurodevelopmental or psychotic disorders or intellectual disability in the child, and additional online data quality-control exclusions were applied to (online) Sample 5 (e.g., failed attention check items, insufficient time spent on each page). Inclusion criteria were fluency in English (all samples) and Spanish (Sample 2 only). Where individuals participated in two of the selected archival studies, they were excluded from analysis in the second study. Where multiple siblings participated in the same study, siblings with either less complete data or who participated later were excluded from data analysis. All studies received approval from the appropriate Institutional Review Board or Research Ethics Board (details in Table 1). Parent participants provided consent, and child participants provided verbal assent.

Statistical analyses were conducted using a combination of base R, “psych”, “lavaan”, and “semTools” packages in R (Jorgensen et al., 2021; R Core Team, 2021; Revelle, 2021; Rosseel, 2012). Figures were created using the “ggplot2” and “MetBrewer” packages (Mills,

2022; Wickham, 2016). All structural equation models in the following studies were evaluated on the basis of multiple global fit criteria, including Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). I used the general guidelines laid out by Brown & Cudeck (1992), with CFI and TLI  $\geq .95$ , RMSEA  $\leq .05$ , and SRMR  $\leq .06$  indicating good fit. CFI and TLI values between .90 and .95 and RMSEA values between .10 and .05 indicate adequate fit. All structural models used maximum likelihood estimation with Huber-White ‘robust’ standard errors, as psychopathology data were expectedly skewed. Full information maximum likelihood estimation was used to handle missing data.

All measurement invariance analyses in each study were conducted using a free baseline strategy across four levels (Stark et al., 2006). I tested the relative fit of models in which the following were constrained to equality across groups (Studies 1 and 2) or time points (Study 3): 1) the number of factors, indicating configural invariance; 2) the loadings of indicators, indicating metric or weak invariance; 3) the intercepts of indicators, indicating scalar or strong invariance; and 4) the indicator residuals, indicating strict invariance. I used the guidelines laid out by Chen (2007), with  $\Delta\text{RMSEA} > .015$ ,  $\Delta\text{CFI} > .01$ ,  $\Delta\text{TLI} > .01$  indicating a significant decrement in fit. I also incorporated evidence from chi-square difference tests, though it was expected that the majority of these tests would be significant at  $\alpha < .05$  given the sample sizes examined in each study.

## Chapter 2: Using a Multistage Construct Validity Approach to Examine Relational Aggression as a Psychopathology Component

Relational aggression is one candidate psychopathology *component* with salient connections to personality and clear developmental relevance. In contrast to physical aggression, which is both overt and observable (Casper & Card, 2017), relational aggression relies on the use of interpersonal skills, status, and relationships to cause harm (Archer & Coyne, 2005; Crick & Grotpeter, 1995; Voulgaridou & Kokkinos, 2015). Although historically conceptualized as a more “female” form of aggression (e.g., Crick & Grotpeter, 1995), boys and girls engage in relational aggression at similar rates (e.g., Card et al., 2008; Voulgaridou & Kokkinos, 2015). Much has been learned about relational aggression in terms of the nature of the behaviors and their correlates and consequences (e.g., Archer & Coyne, 2005; Coyne & Ostrov, 2018; Tackett, Daoud, et al., 2013; Tackett, Herzhoff, et al., 2014; Tackett, Kushner, et al., 2014; Voulgaridou & Kokkinos, 2015). However, relational aggression remains substantially understudied relative to other forms of disruptive behavioral problems in youth, and its placement within the broader HiTOP model has not been systematically evaluated. The focus of the current study is to comprehensively evaluate the relational aggression construct via independent validation of one of the most widely used relational aggression measures, the Children’s Social Behavior Scale (CSBS; Crick & Grotpeter, 1995). In my analysis of relational aggression’s nomological network, I focus primarily on those constructs that can best speak to relational aggression’s placement within HiTOP. These include dimensions of psychopathology, normative personality traits, and personality pathology.

### **The Nature of the Relational Aggression Construct**

Relational aggression is a common and, to a degree, even normative behavior, particularly in middle childhood and early adolescence when social skills become increasingly sophisticated and social status is highly salient (Fite & Pederson, 2018; Tackett, Herzhoff, et al., 2014). It includes many specific behaviors such as malicious gossip, intentionally ignoring another, and excluding others from party invitations or other social groupings (e.g., social clustering in the lunchroom; Archer & Coyne, 2005). Many researchers also maintain that relational aggression is, by nature, covert (e.g. Underwood et al., 2018). Like other forms of aggression, relationally aggressive acts involve an aggressor, a victim, and an intent to harm. Relational aggression can also reach extreme (i.e., pathological or clinical) levels and can result in significant impairment for both relationally aggressive children and their victims. Thus, although it does not have a separable diagnostic category in the DSM, it has been argued that relational aggression and disinhibitory child psychopathology have more in common than not (Reardon et al., 2017, 2018, 2020; Tackett et al., 2009; Tackett, Daoud, et al., 2013; Tackett, Kushner, et al., 2014b). Relational aggression has been preliminarily listed as a component of both disinhibited and antagonistic externalizing spectra within HiTOP, under antisocial behavior (DeYoung et al., 2020; Kotov et al., 2017). However, construct validation work is needed to confirm this placement. Although relational aggression occurs across the lifespan (Archer & Coyne, 2005), I focus here on its manifestations in childhood and adolescence, when it is the most common (and potentially the most damaging; Fite & Pederson, 2018; Tackett, Herzhoff, et al., 2014).

When considering the overall health and functioning of the aggressor, children who perpetrate increased relational aggression show increased risk for both internalizing (e.g., anxiety, depression) and externalizing (e.g., oppositionality, rule breaking) forms of

psychopathology (Archer & Coyne, 2005; Card et al., 2008; Tackett & Ostrov, 2010). Within the domain of externalizing psychopathology, relational aggression shows levels of comorbidity comparable to that of externalizing disorders themselves, which again supports the inclusion of relational aggression on a spectrum with other forms of child psychopathology (Tackett, 2010; Tackett, Daoud, et al., 2013). Relational aggression perpetrators show a variety of other forms of maladjustment as well, including impaired social functioning and an increased likelihood of being a victim of aggression themselves (Archer & Coyne, 2005; Crick, 1996; Crick & Grotpeter, 1995; Leadbeater & Sturges, 2018; Leff et al., 2010). Of course, it is not just the aggressors who suffer deleterious consequences from these behaviors. Much empirical work has supported the severe and far-reaching consequences for relational aggression victims, who often report increased rates of internalizing and externalizing psychopathology and increased social isolation and maladjustment (Ostrov, 2010; Prinstein et al., 2001). Thus, the impairment stemming from these behaviors is wide-ranging and highly consequential.

One approach to better understanding the psychological nature of relationally aggressive behaviors is by examining associations with personality traits. Personality associations with psychopathology may provide a richer understanding of the psychological components of various disorders and syndromes than examination of symptoms alone (e.g., Tackett, Kushner, et al., 2014). Like other child externalizing problems, relational aggression is typically associated with high neuroticism and low agreeableness and conscientiousness (Tackett, Daoud, et al., 2013; Voulgaridou & Kokkinos, 2015). Curiously, relational aggression initially appeared to be less related to personality traits than were other forms of externalizing pathology (Tackett, Daoud, et al., 2013), however, personality traits most strongly associated with relational aggression are found in personality pathology domains (Crick et al., 2005; Ostrov & Houston,

2008; Reardon et al., 2018, 2020; Tackett, Herzhoff, et al., 2014; Tackett, Kushner, et al., 2014b; Underwood et al., 2011). In line with its placement as a component of antisocial behavior in HiTOP, relational aggression is associated with antagonism and interpersonal manipulation; however, other evidence suggests that youth relational aggression is most related to borderline and narcissistic personality pathology (Reardon et al., 2017, 2020). Thus, it remains unclear where relational aggression should be placed within a developmentally-informed HiTOP model; this issue may be resolved through further delineation of relational aggression's nomological network.

### **Investigating the Construct Validity of Relational Aggression**

Given the socially undesirable and often covert nature of relational aggression, researchers have been very cautious about its measurement (e.g., Archer & Coyne, 2005; Tackett & Ostrov, 2010; Underwood et al., 2018). Some studies have used creative approaches to observational measurement or behavior provoked in laboratory manipulations, although such work is very resource-intensive (e.g., Ostrov et al., 2004). As self- and informant-reports are often the most flexible, efficient, and reliable methods for assessing behavior (Dang et al., 2020), measurement of relational aggression has relied heavily on questionnaire report (as with most similar psychological constructs). Despite this, there remain concerns that parents and teachers may often miss these covert behaviors or that youth self-reports may suffer from acquiescence and other age-specific response biases (e.g., Underwood et al., 2018). Perhaps the most widely used questionnaire is the CSBS developed by Crick and Grotpeter (1995). Given the relative novelty of this construct and the small number of research labs actively investigating it, perhaps it is no surprise that a “gold standard” measure does not currently exist. For over a decade, the Personality Across Development Lab has used the same version of the parent- and youth-report

CSBS across multiple samples. This offers me an important opportunity to test some of the concerns about questionnaire measures of relational aggression, and to undertake a deep-dive validation effort of relational aggression as assessed via this foundational, yet previously underexamined measure.

In the present study, I examine the following aspects of construct validity of the CSBS Relational Aggression (RAgg) subscale in a demographically diverse pooled sample of children:

- 1) Reliability, including internal consistency, test-retest, and interrater;
- 2) Structural validity, including unidimensionality assessed within a factor analytic framework; Item Response Theory (IRT) analysis of item difficulty (or location), discrimination, and information; and measurement invariance of the CSBS across sex, race/ethnicity, age, and time;
- 3) External validity, including convergent/discriminant validity with other measures assessing relational aggression, broad personality traits, psychopathology dimensions, and other forms of aggression; and criterion and predictive validity with measures of social problems, social competencies, peer relationship quality, friendship quality, satisfaction with life, subjective well-being, non-independent life stressors, and callous-unemotional traits.

Tables of expected correlation magnitudes are included in the preregistration (<https://osf.io/fmzy4>). However, this project was primarily descriptive, and thus, I did not advance specific hypotheses about many of the planned psychometric analyses.

## **Methods**

### **Participants & Procedures**

Data for this study was pooled from Samples 1-6. After data exclusions (see General Participants and Procedures), this pooled sample included 3,019 parent informants and 1,059 youth across 3,102 families ( $M_{\text{age}} = 11.42$  years,  $SD_{\text{age}} = 3.35$  years, 50.4% female). All hypotheses and analytic plans were preregistered prior to data cleaning (<https://osf.io/fmzy4>).

## Measures

The primary measure examined in the present study was the 5-item Relational Aggression (RAgg) subscale of the CSBS, which is a 13-item questionnaire completed by parents and youth. Items are rated on a 5-point scale ranging from 1 (*never true*) to 5 (*almost always true*). Sixteen other measures were included in the construct validation process; for conciseness, these are listed in [Table 2.1](#). These measures belonged to broad domains of aggression, psychopathology, personality and temperament, interpersonal functioning, and other outcomes (including non-independent life stressors and subjective well-being). Further detail on measure scoring and analytic plans are included in the preregistration.

## Data Analytic Plan

### *Reliability*

Reliability was assessed via internal consistency, test-retest, and interrater indices. Internal consistency of the CSBS RAgg scale was tested via coefficient alpha (Cronbach, 1951), the average inter-item correlation (AIC; Cortina, 1993), and the distribution of split-half reliabilities (Revelle & Condon, 2019). Test-retest reliability was tested via Pearson correlations between adjacent longitudinal timepoints (e.g., T1 and T2; approximately 1-2 years apart), and between more distal timepoints (e.g., T1 and T4). I also evaluated the continuous effect of time between collection waves (measured in days) on the test-retest reliability of CSBS RAgg via

ordinary least squares (OLS) regression. Interrater reliability was indexed by Pearson correlations between parent and youth CSBS RAgg scores.

### ***Structural Validity***

Structural validity was examined via unidimensionality in a factor analytic framework, Item Response Theory (IRT) analysis, and measurement invariance. I evaluated the unidimensionality of CSBS RAgg using a one-factor confirmatory factor analytic (CFA) model. I also examined IRT parameters derived from factor analysis (Kamata & Bauer, 2008) to estimate CSBS RAgg item discrimination (alpha), difficulty (beta; also known as location or extremity), and information. These values correspond to a two-parameter Graded Response Model (Samejima, 1970), as the CSBS is polytomous. I tested measurement invariance in the same individuals across time (i.e., temporal invariance) as well as between groups (i.e., invariance across gender, race/ethnicity, and age group; Meredith, 1993).

### ***External Validity***

Convergent, discriminant, and criterion validity were tested via Pearson correlations between unit-weighted CSBS RAgg and theoretically specified external measures. These measures are listed in Table 2, and predictions are listed in the preregistration for this project. Predictive validity was tested in a series of OLS regressions, with T2 external variables (callous unemotional traits, life stressors, social problems, and social competencies) predicted by T1 RAgg and the respective T1 external variable to control for cross-sectional overlap between RAgg and the external variable.

## **Results**

### **Deviations from the Preregistration**

Following data cleaning, the sample size of youth with more than one time point of CSBS data were more limited than I had planned ( $n = 63$ ); therefore, I chose not to report test-retest or predictive validity analyses for youth-report as the likelihood of obtaining spurious results was judged to be high. To adhere to the preregistration, these planned analyses are included on the OSF page (<https://osf.io/gpjr9/>), although I urge caution in interpreting these results due to the limited sample size. Second, although I preregistered analyses that would test the overlap between youth-reported CSBS RAgg and SRQ RAgg, this was not possible as youth-reports of these two measures were not collected at the same time point in any study, and I believe that testing between-timepoint relationships between these measures would have limited utility. Third, criterion and predictive results included tests of parent-reported Satisfaction with Life and ICU traits, though these analyses were not preregistered. Fourth, given the variable sample sizes available for external validity analyses including some that were smaller than advisable for structural equation modeling, I report observed (rather than latent) correlations and regressions.

## **Reliability**

### ***Internal Consistency***

Cronbach's alpha for parent-report CSBS RAgg was .87, while youth-report was .72. The AIC was for parent-report was .58, while youth-report was .34. The distribution of split-half reliabilities for parent- and youth-report can be found in [Figure 2.1](#). Together, internal consistency for parent-report was judged to be good by multiple metrics, while youth-report was adequate.

### ***Test-Retest Reliability***

In the pooled longitudinal sample, the Pearson correlation between CSBS RAgg scores across time was  $r(426) = .47$  for parent-report (follow up time  $M = 1.83$ ,  $SD = 0.88$  years; range:

0.40 to 4.44 years). As predicted, for the sample of only short-term (i.e., 1-2 year) follow ups, the correlation between CSBS RAgg scores across time for parent-report ( $r(221) = .55$ ) was somewhat stronger relative to that of longer follow ups (i.e., 2+ years).

Time between assessments (in days) did not significantly moderate the association between CSBS RAgg scores over time for parent-report ( $\beta[\text{time} \times \text{T1 RAgg}] = -.12, p = .445$ ), however. Further, the association between CSBS RAgg scores between T1 and T2 for parent-report was not attenuated by controlling for time between follow ups and the interaction between time and T1 RAgg scores ( $\beta[\text{T1 RAgg}] = .54, p < .001$ ). Together, these results indicated that parent-reported test-retest reliability is moderate or adequate for the CSBS RAgg subscale.

### ***Interrater Reliability***

The Pearson correlation between parent- and youth-reported CSBS RAgg was  $r(621) = .37$ . In accordance with my preregistered hypotheses, these results indicated that interrater reliability between parents and youth for CSBS RAgg was moderate.

### **Structural or Internal Validity**

#### ***Test Structure***

The fit of the one-factor model of parent-report CSBS RAgg ( $N = 3,019$ ) fit adequately to very well by all metrics (CFI = .99, TLI = .98, RMSEA = .07, RMSEA 90% CI [.06, .09], SRMR = .02). Item loadings ranged from .63 to .86 (see Supplemental Figure 1 at <https://osf.io/krvh5/>), well exceeding my preregistered threshold of .30. The fit of the one-factor model of youth-report CSBS RAgg ( $N = 1,059$ ) was excellent by all metrics (CFI = 1.0, TLI = .99, RMSEA = .03, RMSEA 90% CI [.00, .05], SRMR = .02). Item loadings ranged from .49 to .74, exceeding my preregistered threshold.

#### ***Item Response Theory Analyses***

IRT analyses indicated that all items had relatively similar degrees of discrimination for both parent-report (range [1.01, 2.25]) and youth-report (range [0.71, 1.58]). Item information curves for parent-report CSBS RAgg items can be found in [Figure 2.2](#). Item information curves were largely the same for youth-report, and these can be found in Supplemental Figure 2 at <https://osf.io/krvh5/>. Overall, analyses indicated that across both informants, most items captured a high degree of information at the high ends of the latent construct ( $\Theta$  [1, 3]), with few items capturing information at the low ends ( $\Theta$  [-3, -1]). In particular, item 7 (“*When angry at another kid, tries to get other children to stop hanging around with or stop liking the kid*”) had a more extreme location (and captured more information at the highest ends of the construct) for both parent- and youth-report. However, perhaps contrary to expectations, youth-report did not provide more information at lower levels of the trait spectrum than parent-report according to IRT analyses.

### ***Measurement Invariance***

The retained measurement invariance models and relative fit statistics for these models can be found in [Table 2.2](#). Parent-report CSBS RAgg met criteria for strict invariance across genders by all preregistered metrics. Youth-report only met criteria for configural invariance across genders (loading model  $\Delta CFI = .014$ ,  $\Delta TLI = .019$ ,  $\Delta RMSEA = .019$ ), though when tested for partial invariance, the model in which I constrained all items but item 9 (“*Threaten to stop being another kid’s friend in order to hurt the kid or to get what I want from the kid*”) met criteria for metric invariance. Both parent- and youth-report CSBS RAgg met criteria for strong invariance across racial/ethnic groups. For youth-report, only CFI increased significantly from the metric to the strong model.

Parent-report CSBS RAgg met criteria for strict invariance across age groups by RMSEA and TLI, though CFI increased significantly from the strong to the strict model. Additionally, CFI and TLI increased significantly from the metric to the strong model, though parent-report RAgg met criteria for at least metric invariance by all fit indices. Youth-report CSBS RAgg met criteria for metric invariance across age groups, though RMSEA increased significantly from the configural to the weak model. Parent-report CSBS RAgg met all criteria for strict invariance within the same individuals across time.

## **External Validity**

### ***Convergent and Discriminant Validity***

**Parent-Report.** All convergent and discriminant validity relationships can be found in Figures [2.3](#) and [2.4](#). All convergent validity analyses were conducted within informant. Unless otherwise noted, the direction of all associations was consistent with predictions, though there were some small differences in magnitude. A full comparison between predicted and observed magnitudes of external validity associations can be found on the OSF page for this project. I used the following benchmarks for interpreting effect sizes (Funder & Ozer, 2019):  $.10 < r < .20$  = “weak,”  $.20 < r < .30$  = “moderate,”  $.30 < r < .40$  = “strong,” and  $r \geq .40$  = “very strong.”

Parent-report CSBS RAgg was very strongly positively related to Social Relations Questionnaire (SRQ) RAgg, Forms and Functions of Aggression (FFA) RAgg, and CSBS Physical Aggression, and strongly positively related to FFA Overt Aggression. Parent-report CSBS RAgg was moderately negatively related to CSBS Prosocial Behavior. Parent-report CSBS RAgg was very strongly positively related to (Pediatric Symptom Checklist) PSC Externalizing Problems, PSC Internalizing Problems, and Dimensional Personality Symptom Item Pool (DIPSI) Disagreeableness. Parent-report CSBS RAgg was strongly positively related

to Child Behavior Checklist (CBCL) Externalizing and moderately positively related to Internalizing Problems.

Personality convergent-discriminant associations for parent-report CSBS RAgg differed somewhat by the instrument administered. Parent-report CSBS RAgg was very strongly positively related to Inventory of Children's Individual Differences (ICID) Neuroticism and only moderately positively related to BFI Neuroticism. Parent-report CSBS RAgg was very strongly negatively related to ICID Agreeableness and moderately negatively related to Big Five Inventory (BFI) Agreeableness. Parent-report CSBS RAgg was weakly negatively related to both ICID and BFI Conscientiousness. Judging by the confidence intervals, these results did not significantly differ by BFI version administered. Among temperament instruments, convergent-discriminant associations also differed by measure. Consistent with personality results, parent-report CSBS RAgg was strongly positively associated with Temperament in Middle Childhood Questionnaire (TMCQ) Negative Affectivity and very strongly positively associated with Early Adolescent Temperament Questionnaire (EATQ) Negative Affectivity. Parent-report CSBS RAgg was weakly negatively related to TMCQ Effortful Control and moderately negatively related to EATQ Effortful Control.

**Youth-Report.** Convergent-discriminant analyses for youth-report CSBS RAgg largely replicated those of parent-report, and as with parent-report, were conducted within-informant. Youth-report CSBS RAgg was very strongly positively related to CSBS Physical Aggression and moderately negatively related to CSBS Prosocial Behavior. Youth-report CSBS RAgg was very strongly positively related to Youth Self-Report (YSR) Externalizing Problems and DIPSI Disagreeableness, and moderately positively related to YSR Internalizing Problems.

Trait analyses indicated that youth-reported CSBS RAgg was moderately positively related to both ICID and BFI Neuroticism. These results differed significantly between BFI versions administered, however, with BFI-1 Neuroticism showing a larger positive relationship with CSBS RAgg ( $r(684) = .30$ , 95% CI [.23, .37]) than BFI-2 Neuroticism ( $r(255) = .17$ , 95% CI [.05, .29]). Youth-report CSBS was very strongly negatively related to ICID Agreeableness and strongly negatively related to BFI Agreeableness. Youth-report CSBS RAgg was moderately negatively related to ICID Conscientiousness and weakly negatively related to BFI Conscientiousness. Agreeableness and Conscientiousness results did not differ by BFI version judging by the confidence intervals. Temperament measures also showed a somewhat similar pattern with youth-report CSBS RAgg being very strongly positively related to EATQ Negative Affectivity and very strongly negatively related to EATQ Effortful Control.

### ***Criterion Validity***

All within-informant criterion validity results can be found in [Figure 2.5](#). Point estimates and confidence intervals for cross-informant criterion validity results can be found in Supplemental Table 1 at <https://osf.io/krvh5/>. Parent-report criterion analyses were largely consistent with my hypotheses, with select exceptions. Parent-report CSBS RAgg was moderately positively related to parent-report Social Problems (from the CBCL) and weakly positively related to youth-report Social Problems (from the YSR). Parent-reported CSBS RAgg was not related to either parent- or youth-reported CBCL/YSR Social Competencies, however. Parent-report CSBS RAgg was moderately positively related to parent-reported callous-unemotional (ICU) traits, but not related to youth-report ICU traits. Parent-report CSBS RAgg was strongly negatively related to parent-report “Good” Friends (higher RAgg was related to fewer good friends), and strongly positively related to parent-report “Bad” Friends (higher RAgg

was related to more bad friends). Parent-reported CSBS RAgg was not related to youth-reports of Good or Bad Friends or Friendship Quality (FQQ Total Score), however. Parent-report CSBS RAgg was moderately positively associated with parent-report Life Events Questionnaire (LEQ) Non-Independent Non Family Life Events during the past year period, while it was weakly positively associated with parent-report LEQ Non-Independent Non Family Life Events during the whole life period. There were insufficient participants with both parent-reported CSBS and youth-reported LEQ to test cross-informant validity ( $n = 84$ ). Finally, parent-report CSBS RAgg was not related to parent-report Satisfaction with Life.

Youth-report CSBS RAgg criterion analyses were mostly consistent with my hypotheses and with parent-report criterion analyses. Youth-report CSBS RAgg was moderately positively related to youth-report Social Problems (YSR) and weakly positively related to parent-report Social Problems (CBCL). Youth-report CSBS RAgg was not related to either youth- or parent-reported CBCL/YSR Social Competencies. Youth-report CSBS RAgg was moderately positively related to both parent- and youth-report ICU traits. Youth-report CSBS RAgg was weakly positively associated with youth-report LEQ Non-Independent Non Family Events for the past year and whole life periods, but it was weakly positively related to parent-reported Events during the past year period. Finally, youth-report CSBS RAgg was moderately negatively related to Satisfaction with Life as measured by youth-report, but the sample size was insufficient to test youth CSBS RAgg's association with parent-reported Satisfaction with Life ( $n = 73$ ).

### ***Predictive Validity***

As shown in [Table 2.3](#), the predictive model in which T2 CBCL Social Problems was regressed on T1 CSBS RAgg and T1 CBCL Social Problems indicated that T1 CSBS RAgg was not an incremental predictor ( $\beta_{\text{RAgg}} = -.03, p = .582$ ) of T2 Social Problems. The same was found

for the predictive model for CBCL Social Competencies; CSBS RAgg ( $\beta_{\text{RAgg}} = .04, p = .448$ ) was not an incremental predictor of T2 competencies. The predictive model for ICU Total traits indicated that T1 CSBS RAgg ( $\beta_{\text{RAgg}} = .14, p = .042$ ) incrementally predicted T2 ICU Traits, however, given the relatively small sample size available for this analysis and relatively greater imprecision in this estimate, this finding requires replication. Finally, the predictive model for LEQ Non-Independent Non Family Life Events also showed that CSBS RAgg ( $\beta_{\text{RAgg}} = .18, p = .002$ ) was a significant incremental predictor of youth-influenced life stressors.

### **Discussion**

The present study interrogated the construct of relational aggression – as measured with the Children’s Social Behavior Scale – using a comprehensive multi-stage construct validation approach. Results indicated that the CSBS is a reliable, structurally valid, and informative measure, assessing a relational aggression construct that is supported by a theoretically coherent nomological net incorporating personality traits, other forms of psychopathology, and social developmental outcomes. These results demonstrated that both parent- and youth-report versions of this questionnaire may be used to validly measure relational aggression across a variety of demographic subgroups, and that relational aggression as measured by the CSBS offers independent predictive validity for some life outcomes. With respect to relational aggression’s placement in the HiTOP model, these analyses suggest that rather than being a component of antisocial behavior in youth, relational aggression’s nomological network is more overlapping with that of borderline and narcissistic personality pathology.

### **Reliability**

The reliability of CSBS RAgg was measured in three ways in the present study, and all three indices provided robust evidence for consistency across items, time, and informants. First,

to examine internal consistency, Cronbach's alpha for parent-report was well above the threshold typically deemed acceptable for basic research (e.g., Nunnally, 1978) and split-half reliabilities clustered in the good to adequate range. Although the youth-report form fell just below that threshold, it is still in the range of adequate internal consistency. However, Cronbach's alpha and split half reliability do not speak to the homogeneity or specificity of a scale, which are more appropriately addressed by the AIC (Clark & Watson, 2019). The youth-report AIC falls in the recommended range in general ([.15, .50]) and within a specific range that might be recommended for intermediate to narrow breadth constructs such as relational aggression (e.g., [.30, .50]; Clark & Watson, 2019). Notably, the parent-report AIC falls even above this range. The high AIC of CSBS RAgg also supports the hypothesis that relational aggression is a fairly narrow-bandwidth construct covering a specific set of behaviors rather than broad, general tendencies like personality traits. Second, test-retest reliability, or stability, was in the adequate or moderate range for parent-reports. This indicated that CSBS RAgg scores were consistent across time during middle childhood and adolescence by parent-report, and this consistency did not decrease substantially as the length of time between assessments increased up to approximately 4 years. Consistent with relational aggression's position within the individual difference space, parent-report relational aggression demonstrated a similar degree of stability to psychopathology (e.g., 1-year  $r$  [.50, .70]; Prinzie et al., 2014), and somewhat lower stability than personality facets in this age range (e.g., 1-year  $r$  [.60, .80]; Brandes et al., 2021). Finally, interrater reliability was moderate for CSBS RAgg, supporting two primary interpretations: first, that informants agree on the presence or absence of these behaviors, and second, that relational aggression is visible, even to parents. While the interrater reliability of relational aggression measures has been significantly understudied in the past, my results address one significant

concern about parent informants. Prior researchers and theorists have advocated that “the covert nature of relational aggression may make it especially difficult for parents to recognize...” (Underwood et al., 2018, p. 65). While the results of my IRT analyses indicate that indeed, parents do endorse more severe forms of the behavior when they endorse it at all, the same is true of youth, and the interrater reliability of this scale suggests that parents’ reports largely agree with their children’s. In summary, relational aggression is judged to be quite reliable across all indices examined. However, given the relatively lower reliability of youth-report relational aggression, using multi-informant assessments is advisable where possible.

### **Structural Validity**

The structural validity of CSBS RAgg was also assessed in three ways in the present study, and these tests each provided convergent evidence for a robust unitary factor. First, a one-factor confirmatory model fit well across parent and youth data, with item loadings in both models far exceeding my predicted threshold of .30, indicating a strong relationship between all five items and the latent relational aggression factor. Second, IRT analyses indicated that CSBS items have similar levels of discrimination across parent and youth reports, and that the items are most informative at the high end of the construct as measured by the CSBS RAgg scale. Third, measurement invariance was robust across gender, racial/ethnic identification, and age group. Parent-report data evidenced strong to strict invariance across most demographic variables, indicating that not only is the CSBS RAgg scale measuring the same factor across groups, but that means, variances, covariances, and sometimes, item-specific residuals can be compared. Youth-report data evidenced weaker invariance across gender and age in comparison to parent-report. This indicates that the same latent factor is being assessed and that variances and covariances can be compared across males and females and across different age groups.

However, items function somewhat differently across groups. This is in line with prior work suggesting that the manifestations of relational aggression may differ between boys and girls, and that they may change over the course of development (Crick et al., 1999; Murray-Close & Ostrov, 2009). Combined with the IRT and the test structure results, measurement invariance analyses suggest the CSBS RAgg scale has remarkably good structural validity across a variety of demographic groups.

### **External Validity**

The external validity of CSBS RAgg was investigated through both parent- and youth-reports of additional variables capturing individual differences, psychopathology, and social development. In these analyses, my expectations that CSBS RAgg would be moderately to strongly associated with externalizing psychopathology and antagonistic forms of personality pathology were largely supported. However, I also found that CSBS RAgg was moderately to strongly associated with internalizing psychopathology (parent  $r$  [.25, .54], youth  $r = .29$ ), which was a more robust relationship than I hypothesized. Among individual differences, relational aggression was positively related to trait negative affectivity/neuroticism to a moderate to strong degree ( $r$  [.28, .49]) aside from parent-report BFI Neuroticism ( $r = .21$ ); negatively related to agreeableness to a moderate to strong degree ( $r$  [-.55, -.27]); and negatively related to conscientiousness and effortful control ranging from a weak to strong degree ( $r$  [-.44, -.15]).

The present study may be further interpreted in the context of prior research suggesting that relational aggression is a salient developmental precursor to narcissistic and borderline personality disorders (NPD and BPD; e.g., Crick et al., 2005; Reardon et al., 2017, 2020). Disinhibited and antagonistic (i.e., ‘Cluster B’) personality disorders are most often associated with externalizing features as well as (low) conscientiousness and agreeableness (e.g., Widiger et

al., 2016); however, my results indicate that relational aggression, like NPD and BPD and *unlike* antisocial personality disorder, may also have internalizing or neurotic features. Associations between trait negative affect and BPD are relatively undisputed in the literature (e.g., Samuel et al., 2013), while connections between NPD and neuroticism are more variable. Narcissism is a multifaceted construct with two primary subdimensions: grandiosity and vulnerability (e.g., Edershile et al., 2019). While grandiosity is largely separate from neuroticism, vulnerability is highly overlapping with neuroticism (Miller et al., 2018). If relational aggression is to be understood as a developmental precursor to NPD and BPD given the broader literature on this topic, the present study points to a need for future research to examine how subdimensions of narcissistic personality pathology (e.g., grandiosity vs. vulnerability) may be differentially associated with relational aggression. Future research on this topic may help bridge disparate domains of research on relational aggression and personality pathology.

### **Limitations**

Despite its strengths, the present study also has several limitations. First, the present study was limited to a single, focal questionnaire measure, the Children's Social Behavior Scale (Crick & Grotpeter, 1995). Some researchers have expressed concerns about measuring relational aggression via questionnaire (Underwood et al., 2018), given that relational aggression is not a socially desirable behavior. While the present study tested the convergence between the CSBS RAgg scale and an interview-based measure of relational aggression, the ongoing construct validation of relational aggression would benefit from the incorporation of alternative measures of relational aggression (e.g., observer ratings, behavioral task performance). Second, the present study pooled data across six samples that each completed a different set of my external validity measures. As such, I had to harmonize measures across several different forms

in some cases, and some measures had relatively large amounts of missing data. However, I determined that these costs were outweighed by the benefits of data pooling using archival samples—namely, my ability to maximize the overall sample size and the breadth of external validity measures included. Future studies replicating the present results, particularly for my measures with large amounts of missingness, are needed.

## **Conclusion**

All HiTOP dimensions require continued construct validation, but in particular, there is a great deal to be discovered about which *components* should be included at lower-order levels of the psychopathology hierarchy. Study 1 of this dissertation furthers the developmental extension of one specific portion of the HiTOP model by comprehensively mapping one symptom cluster within individual difference space. This study showed that relational aggression is a relatively narrow, internally consistent, and observable set of symptoms that fit within a broader nomological net that includes internalizing and externalizing psychopathology, antagonistic personality pathology, and other forms of interpersonal dysfunction. Much further work is needed to comprehensively map how other developmentally-relevant, narrowband psychopathology components map onto the existing HiTOP model. Study 2 will then travel up the HiTOP hierarchy to map specific *syndromes*, *subfactors*, and *spectra* within domain- and facet-level trait space.

### Chapter 3: Youth Personality Facets and Psychopathology: An Investigation of Specific Disorders and Higher-Order Dimensions

HiTOP is a taxonomy of dimensional psychopathology that captures a continuum between normative and impaired functioning; as such, normative personality has clear relevance for understanding the meaning of HiTOP constructs. A special issue of the *Journal of Research in Personality* even featured five reviews contextualizing the FFM within HiTOP (Brandes & Tackett, 2019; Krueger et al., 2020; Lynam & Miller, 2019; Mullins-Sweatt et al., 2019; Watson, Stanton, et al., 2019; Widiger & Crego, 2019). However, the FFM is just one level of a broader trait hierarchy, and it may not even be the best one for understanding dimensions of psychopathology. Recent research in adult samples has indicated that not all facets within each FFM domain are connected to psychopathology, and further, that facets may have unique utility for differentiating specific *syndromes* within broader transdiagnostic *spectra* (e.g., Naragon-Gainey & Simms, 2017; Walton et al., 2018; Watson et al., 2015). Additionally, it remains unknown how facet-level traits may map onto higher- and lower-order factors of psychopathology in youth samples, as children's personality structure differs somewhat from adults'. In the present study, I aim to examine the extent to which facets uniquely characterize 1) specific psychiatric disorders (*syndromes*) relative to 2) higher-order psychopathology dimensions (*subfactors* and *spectra*) in a large, combined sample of youth.

While the FFM is arguably the most common dimensional model of personality, as discussed in Chapter 1, there are many other ways of carving up personality variance. Like FFM domains, narrower facet and nuance traits are reliable over time, have their own developmental trajectories, and reflect unique genetic and environmental influences (e.g., Brandes et al., 2021; Jang et al., 1998; Möttus et al., 2017, 2019). Thus, whether researchers and clinicians choose to

assess personality in terms of broad traits, facets, or specific items becomes less a question of which level of granularity is most valid, and more a question of which level is likely to be most useful for a given purpose (see Möttus et al., 2020). Indeed, recent research indicates that facet-level traits better predict important outcomes outside of psychopathology, including political attitudes, cardiovascular disease, or identity development, in comparison to FFM domains (Stewart et al., 2022). In a clinical context, unique personality content underlying facets such as fearfulness and hostility (which aggregate into domain-level neuroticism) may capture distinct behavioral, affective, and cognitive processes endemic to specific disorders. Lower-order traits may therefore improve the precision with which we can predict who may develop which forms of psychopathology and explain why personality and psychopathology are so robustly related (Clark et al., 1994; Paunonen & Ashton, 2001).

A number of studies in adults have demonstrated that some facets (e.g., positive emotionality) incrementally predict psychopathology over FFM traits; these results hold for both specific disorders (e.g., depression, substance use) and broad psychopathology dimensions (e.g., internalizing). However, these kinds of studies are relatively limited in number and in coverage of common psychopathology outcomes in youth samples. Only three prior studies have examined comprehensive connections between facet-level traits and youth internalizing psychopathology (Brandes et al., 2019; Herzhoff & Tackett, 2012; Prinzie et al., 2014), and eight studies have examined associations between facets and any form of youth externalizing psychopathology (Becht et al., 2016; Brandes et al., 2019; De Clercq & De Fruyt, 2003; Furr et al., 2007; Herzhoff et al., 2013; Herzhoff & Tackett, 2012; Klimstra et al., 2014; Tackett, Kushner, et al., 2014a). The current study builds on this previous work by establishing more

comprehensive facet-level trait profiles across multiple specific disorders and higher-order psychopathology spectra.

## **Youth Psychopathology and Personality Facets**

### ***Specific Psychiatric Disorders***

**Anxiety.** A limited number of existing studies have indicated that childhood anxiety disorders are specifically associated with high facet-level fearfulness (N; Brandes et al., 2019), low optimism and sociability (E), and low compliance and high egocentrism (A; Prinzie et al., 2014). No prior studies have examined how childhood anxiety overlaps with facets of conscientiousness (C) or openness to experience (O), but research in adults suggests that anxiety disorders are particularly associated with low industriousness facets (C) and unrelated to any facets of openness (e.g., Bienvenu et al., 2004; Khoo et al., 2020; Walton et al., 2018).

**Depression.** Two prior studies have suggested that youth depression is characterized by high neuroticism across all facets including fearfulness, insecurity, and irritability (Brandes et al., 2019), low extraversion across all facets including optimism, sociability, positive emotions, and (to a lesser extent) activity level, and low agreeableness across all facets including low compliance and altruism and high egocentrism (Prinzie et al., 2014). As with anxiety, however, no published studies have reported the associations between youth depression and conscientiousness or openness facets. Adult research, however, indicates that depression is characterized by decreases across all conscientiousness facets and has no clear connection to any facets of openness (e.g., Khoo et al., 2020; Naragon-Gainey & Simms, 2017; Naragon-Gainey & Watson, 2014a; Walton et al., 2018).

**Disruptive Behavior.** A small number of studies have shown that adolescent conduct disorder and antisocial personality disorder (a closely related adult diagnosis) are characterized

by low warmth and positive emotions (E), high excitement seeking (E), and low agreeableness and conscientiousness across all facets (De Clercq & De Fruyt, 2003; Furr et al., 2007). Facet profiles for neuroticism differ between studies, however. Furr and colleagues (2007) found that conduct disorder was characterized by increased neuroticism across all facets except for self-consciousness, while De Clercq and DeFruyt (2003) found that adolescent antisocial personality disorder symptoms were exclusively associated with anger and impulsivity facets (N). Notably, the latter finding mirrors the neuroticism facet profile found in meta analyses of adult antisocial behavior (Decuyper et al., 2009; Jones et al., 2011; Ruiz et al., 2008; Vize et al., 2018).

No prior studies have examined relationships between oppositional defiant disorder (ODD) and personality facets in children. Studies using domain-level trait measures indicate that ODD is characterized by high neuroticism, low conscientiousness, and low agreeableness youth (e.g., Herzhoff & Tackett, 2016; Watts et al., 2019; Zastrow et al., 2018). Some of these studies find that ODD is also associated with low extraversion (e.g., Herzhoff & Tackett, 2016; Watts et al., 2019), but others find no relationship (e.g., Zastrow et al., 2018).

**Attention Problems.** Two prior studies using data from the present study have suggested that attention deficit hyperactivity disorder (ADHD) is characterized by high fearfulness and anger/irritability (N; Brandes et al., 2019), low positive emotionality (E), low conscientiousness and agreeableness across all facets, and low intellect (O; Herzhoff et al., 2013). We are not aware of cross-sectional studies examining facet-level trait profiles of child ADHD in any other datasets, however.

The clinical utility of facet-level trait profiles of child psychopathology has been limited by two factors: most prior studies have not used comprehensive trait measures, and there is extensive comorbidity between ostensibly distinct diagnoses. Indeed, many specific symptom

clusters are associated with similar sets of facet-level traits. For example, rule breaking and aggression are two subfactors of externalizing psychopathology, and they both have a trait profile of high irritability/anger (N), and low conscientiousness and agreeableness across all facets. This might indicate that these traits underlie a broader, transdiagnostic vulnerability to externalizing problems; however, this hypothesis has not been directly tested. Further research measuring both individual disorders and the higher-order transdiagnostic dimensions to which they belong is needed. Here, we review the select few studies that have done so using facet-level trait measures.

### ***Higher-Order Domains of Youth Psychopathology***

**Internalizing.** The internalizing spectrum reflects the covariation among anxiety, depressive, and related disorders (Achenbach, 1966; Achenbach & Rescorla, 2001) and is robustly positively associated with domain-level neuroticism in children; however, associations with other trait domains are mixed (e.g., Brandes et al., 2019; De Pauw et al., 2009; Levin-Aspenson et al., 2019; Watts et al., 2019). Only one prior study (Herzhoff & Tackett, 2012) examined the associations between broadband internalizing problems and any personality facets in children, finding no associations between the internalizing spectrum and facets of openness to experience. Research in adults, however, has found that broadband internalizing problems are characterized by high neuroticism across all facets, low extraversion facets across all facets except for excitement seeking, low industry-related facets of conscientiousness, and possibly low altruism facets of agreeableness (Uliaszek & Zinbarg, 2016).

**Externalizing.** The externalizing spectrum reflects the covariation among rule breaking and aggression symptoms (Achenbach, 1966; Achenbach & Rescorla, 2001), and in the HiTOP model, attentional difficulties as well (Kotov et al., 2017). Among FFM traits, the externalizing

dimension is reliably associated with high neuroticism, low conscientiousness, and low agreeableness in children (De Pauw et al., 2009; Krueger & Tackett, 2003; Levin-Aspenson et al., 2019; Tackett, Kushner, et al., 2013; Watts et al., 2019). Just two prior studies examined associations between a broad externalizing spectrum and any facet-level personality traits, finding that externalizing psychopathology was specifically positively associated with anger/irritability (N; Brandes et al., 2019) and negatively associated with intellect (O; Herzhoff & Tackett, 2012). Despite the dearth of developmental research on the higher-order externalizing spectrum and agreeableness and conscientiousness facets, one adult study found that the higher-order externalizing spectrum is consistently negatively correlated with all conscientiousness and agreeableness facets (Uliaszek & Zinbarg, 2016).

In summary, facet-level traits may be informative about both what distinguishes internalizing from externalizing psychopathology *and* what distinguishes one disorder from another within each spectrum. However, prior studies have not been positioned to test this hypothesis for three primary reasons. First, no prior research has compared facet-level trait profiles for both *spectra* and specific *syndromes*. As such, it is not yet clear whether some trait facets are characteristic of a spectrum itself vs. which traits are syndrome-specific. Second, studies typically only examined facets and a single disorder (e.g., ADHD; Herzhoff et al., 2013) or facets within a single domain and multiple disorders (e.g., neuroticism; Brandes et al., 2019). As such, direct comparison of how facet profiles may differentiate specific disorders from one another (i.e., with the same dataset) has not been done, and the facet profiles for some disorders are incomplete (e.g., conscientiousness facets and anxiety/depression). Finally, only two of these studies (Brandes et al., 2019; Tackett, Kushner, et al., 2014a) have examined how psychopathology may be connected to the unique (i.e., residual) content within each personality

facet to quantify the added explanatory value of particular facets over and above their respective domains. Therefore, we aimed to gain a comprehensive portrait of how child personality facets map onto both higher- and lower-order dimensions of child psychiatric disorder to address these knowledge gaps.

### **The Present Study**

In the current study, I examine relationships between facet-level personality traits and 1) seven common DSM-IV childhood disorders and 2) two to three empirically derived, higher-order psychopathology factors in a pooled, racially, ethnically, and socioeconomically diverse sample of preadolescent children from North America. I examined facet-level trait relationships with both specific *syndromes* and broad dimensions of psychopathology to determine whether facet-level trait profiles may differentiate particular disorders (e.g., if low positive emotionality is unique to Major Depressive Disorder) or whether they are nonspecific markers of higher-order psychopathology spectra (e.g., if low positive emotionality is common to all internalizing problems). I first used CFA to model higher-order dimensions of psychopathology based on the Achenbach and HiTOP models, including two- (internalizing-externalizing) and three-factor (fear-distress-externalizing) models (Achenbach, 1966; Kotov et al., 2017). I then estimated all correlations between facets and psychopathology dimensions including specific *syndromes* and higher-order factors. Next, I compared the magnitude of each facet-psychopathology correlation to that of other facets within the same domain (e.g., compared the positive emotionality—internalizing correlation to sociability—internalizing). Finally, I regressed each psychopathology outcome on all facets within each personality domain to estimate specific, or semi-partial relationships between facets and outcomes. This allowed me to examine the amount of variance

in psychopathology that was predicted by the unique variance in each facet (i.e., the residual variance that is removed when using FFM factors).

## Methods

### Participants and Procedures

Data for this study was pooled from two studies, Samples 1-2. The present study only utilized one measurement occasion per family: intake from both samples where available, and additional families who were added to Sample 1 at the second follow up to counteract attrition. The pooled sample included 783 primary caregivers of 8 to 14 year-old children ( $M_{age} = 10.78$ ,  $SD_{age} = 1.32$ ; 51.3% female). Hypotheses and analytic plans for this project were not preregistered.

### Measures

#### *Computerized Diagnostic Interview Schedule for Children (C-DISC; Shaffer et al., 2000)*

The C-DISC is a structured interview-based measure of psychopathology intended to capture DSM-IV mental disorders. Parent reporters responded to queries recorded on a 3-point scale (*No*, *Sometimes/Somewhat*, and *Yes*). For a dimensional measure of each *syndrome*, I summed items into seven criteria counts: Separation Anxiety Disorder (SAD), Generalized Anxiety Disorder (GAD), Social Phobia (SoPh), Major Depressive Disorder (MDD), Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and Attention Deficit Hyperactivity Disorder (ADHD, combined). The C-DISC was administered to both Sample 1 and Sample 2, but GAD was not administered to Sample 1, and SAD was not administered to Sample 1, wave 3. The C-DISC was administered by research assistants who received a semester-long training in clinical interviewing prior to data collection.

***Inventory of Children's Individual Differences (ICID; Deal et al., 2007; Halverson et al., 2003)***

The ICID (Halverson et al., 2003) is a lexically-derived child personality measure capturing five higher-order personality factors roughly analogous to the adult FFM and fifteen lower-order facets. The ICID is rated on a scale of 1 (*much less than the average child*) to 7 (*much more than the average child*). Lower-order facets in the ICID (numbered with respect to their domain) include: Fearful/Insecure (N1), Shyness (N2), Negative Affect (N3); Positive Emotions (E1), Sociability (E2), Considerate (E3), and Activity Level (E4); Organized (C1), Achievement Oriented (C2), and Distractible (reversed; C3); Antagonism (A1) and Strong-Willed (A2); and Intellect (O1) and Openness (O2). A Compliant facet was included by Deal et al. (2007), with cross-loadings on Conscientiousness and Agreeableness. It is presented as A3 for convenience, as one of our prior studies found that its developmental trajectory tracked Agreeableness more closely than Conscientiousness (Brandes et al., 2021). The original form of the ICID includes 144 items, and the subsequent short form (ICID-S; Deal et al., 2007) includes 50 fully overlapping items. Participants in Sample 1 completed the long form of the ICID, while those in Sample 2 completed the short form. Measures were harmonized by scoring only items from the ICID-S in both samples.

To determine the appropriateness of collapsing data across the two samples, I conducted measurement invariance tests on psychopathology measurement models and mean difference tests (independent samples *t*-tests) of demographic characteristics and personality (see code and output at <https://osf.io/ndqzv/> for details). These tests revealed that psychopathology models met criteria for weak invariance across the samples. Further, participants in Sample 1 were significantly older ( $M_{\text{age}} = 11.54$  years,  $SD = 1.22$ ) than in Sample 2 ( $M_{\text{age}} = 9.81$  years,  $SD =$

0.66 years), as expected given the additional recruitment at T3 of that study. There were also significant mean differences in two specific disorders (SoPh and ADHD) and three facets (Negative Affect [N3], Antagonism [A1], and Strong Willed [A2]). Finally, there were gender differences in multiple psychopathology and personality variables (see Brandes et al., 2021; Herzhoff, 2018). Therefore, age, gender, and sample were included as covariates in all OLS regression models, and indicators in all latent variable models were residualized for age and gender (sample was included as an observed covariate).

### **Data Analytic Plan**

As I was interested in testing the associations between personality facets and 1) higher-order psychopathology dimensions and 2) specific disorders, I first estimated a series of latent psychopathology measurement models using CFA, with residualized disorder criteria counts as observed variables. Using the resulting measurement models, I then examined correlations and unique (i.e., semi-partial) relationships between each facet and psychopathology variable. For higher-order psychopathology dimensions, this was done in a set of partially latent structural regression models (see [Figure 3.1](#)); for specific disorders, this was done in a series of OLS regression models. In these regression models, each psychopathology variable (e.g., Internalizing, SAD) was regressed on all facets within each domain. This resulted in 5 partially latent structural regression models (as multiple psychopathology dimensions could be examined simultaneously) and 35 OLS regression models (7 disorders x 5 trait domains). For both structural and OLS regressions, I used a Holm correction (Holm, 1979) for multiple comparisons within each psychopathology dimension or disorder (Lakens, 2016).

In the partially latent models, I first estimated Pearson correlations between all psychopathology factors and personality facets, including sample as an observed covariate.

Second, I examined semi-partial relationships between latent psychopathology dimensions and all facets within each personality domain, controlling for sample. The first and second sets of models were identical—only the estimands differed: correlations between psychopathology factors ( $y$ s) and personality facets ( $x$ s) in the first set of tests ( $r_{xy} = \frac{Cov_{xy}}{\sigma_x \sigma_y}$ ), and regressions ( $b_{y.x} = \frac{Cov_{xy}}{\sigma_x}$ ) in the second.

In the OLS regressions, I applied the same two stages of testing to (observed) specific disorders. I estimated partial correlations between all specific disorders and each personality facet, controlling for age, gender, and sample. Second, I estimated semi-partial relationships between disorder criteria counts and all facets within each personality domain, controlling for age, gender, and sample.

## Results

### Confirmatory Factor Analysis

See [Table 3.1](#) for measurement model fit statistics, factor reliabilities, and standardized parameter estimates, and see <https://osf.io/ndqzv/> for full model results and unstandardized parameter estimates. I tested two *a priori* specified psychopathology measurement models, including a two-factor internalizing-externalizing model and a three-factor anxiety-distress-externalizing model. In the two-factor model, I allocated CDISC SAD, SoPh, MDD, and GAD to the Internalizing factor, while CDISC ODD, CD, and ADHD were allocated to the Externalizing factor. This test indicated that the fit of the two-factor model was good to adequate and all standardized loadings exceeded .40. Factor reliabilities were deemed adequate.

In the three-factor model, I allocated CDISC SAD and SoPh to the Fear factor, GAD and MDD to the Distress factor, and as in the previous model, ODD, CD, and ADHD were allocated

to the Externalizing factor. Results indicated that the fit of this model was good by all metrics.

All factor loadings exceeded .40. Factor reliabilities for the three factors were adequate.

### **Latent Psychopathology Factors**

See [Table 3.2](#) and [Table 3.3](#) for all structural regression model fit statistics, correlations, regression parameter estimates, and confidence intervals. Model fit was determined to be good to adequate for all fit statistics and all models, with the exception of TLI for Openness facet models (two-factor TLI = .88, three-factor TLI = .89). Facet correlations were determined to be significantly different from one another (i.e., from other facets within the same domain) if the point estimate of one correlation was not contained in the 95% confidence interval of the other.

### ***Age- and Gender-Adjusted Correlations***

Using two-factor model dimensions, Internalizing showed heterogeneous facet associations within Neuroticism and Extraversion domains. Internalizing had the strongest positive correlation with Fear (N1;  $r = .51$ , 95% CI [.41, .61]) within Neuroticism and the strongest negative correlations with Sociability (E2;  $r = -.30$ , 95% CI [-.42, -.17]) and Activity Level (E4;  $r = -.25$ , 95% CI [-.37, -.15]) within Extraversion. Externalizing showed differentiable facet associations within Neuroticism, Extraversion, and Openness to Experience domains. Externalizing had the strongest positive correlation with Negative Affect (N3;  $r = .62$ , 95% CI [.54, .69]) within Neuroticism, the strongest negative correlations with Positive Emotions (E1;  $r = -.34$ , 95% CI [-.44, -.23]) and Considerate (E3;  $r = -.33$ , 95% CI [-.43, -.23]) within Extraversion, and the strongest negative correlation with Intellect (O1;  $r = -.27$ , 95% CI [-.39, -.14]) within Openness to Experience.

Among three-factor model dimensions, Anxiety showed differentiable facet correlations within Neuroticism and Extraversion domains. Anxiety was most strongly positively associated with Fear (N1;  $r = .52$ , 95% CI [.42, .62]) within Neuroticism, most strongly negatively associated with Sociability (E2;  $r = -.23$ , 95% CI [-.37, -.08]) and Activity Level (E4;  $r = -.21$ , 95% CI [-.33, -.09]) within Extraversion. Distress had heterogeneous facet associations within the Extraversion domain alone. Distress was more strongly negatively associated with Positive Emotions (E1;  $r = -.20$ , 95% CI [-.35, -.06]), Sociability (E2;  $r = -.31$ , 95% CI [-.46, -.17]), and Activity Level (E4;  $r = -.25$ , 95% CI [-.36, -.15]) relative to Considerate (E3;  $r = -.08$ , 95% CI [-.20, .05]) within the Extraversion domain. The specification of the Externalizing factor in the three-factor model, and therefore its associations with personality facets, was unchanged from the two-factor model.

### ***Structural Regressions***

Among two-factor model dimensions, Internalizing was only uniquely predicted by Fear (N1;  $\beta = .39$ , 95% CI [.25, .54]). Externalizing was significantly associated with Negative Affect (N3;  $\beta = .62$ , 95% CI [.54, .70]), and with low Organized (C1;  $\beta = -.27$ , 95% CI [-.37, -.18]) and high Distractibility (C3;  $\beta = .38$ , 95% CI [.29, .47]). Externalizing was independently predicted by all Agreeableness facets, including Antagonism (A1;  $\beta = .23$ , 95% CI [.07, .39]), Strong Willed (A2;  $\beta = .31$ , 95% CI [.21, .41]), and Compliant (A3;  $\beta = -.34$ , 95% CI [-.47, -.22]); and both Openness to Experience facets, including low Intellect (O1;  $\beta = -.45$ , 95% CI [-.61, -.28]) and high Openness (O2;  $\beta = .30$ , 95% CI [.17, .43]).

Within three-factor model dimensions, Anxiety was significantly and independently predicted by Fear (N;  $\beta = .45$ , 95% CI [.30, .61]) and Intellect (O1;  $\beta = -.26$ , 95% CI [-.43, -

.09]). Distress was not uniquely predicted by any specific facets after correction for multiple comparisons.

## **Specific Disorders**

### *Age- and Gender-Adjusted Correlations*

See [Figures 3.2](#) and [3.3](#) for a depiction of correlations and 95% confidence intervals for selected disorders, including SAD, SoPh, ODD, and ADHD (and see supplemental materials at <https://osf.io/ndqzv/> for full correlation matrices).

For SAD, the only personality domain that showed differentiable facet associations was Neuroticism, with Fear (N1;  $r = .31$ , 95% CI [.22, .39]) having the strongest positive correlation. SoPh showed heterogeneous facet associations within Neuroticism and Extraversion domains. SoPh had the strongest positive correlations with Fear (N1;  $r = .25$ , 95% CI [.19, .32]) and Shyness (N2;  $r = .24$ , 95% CI [.17, .30]) within Neuroticism, and the strongest negative correlations with Sociability (E2;  $r = -.16$ , 95% CI [-.23, -.09]) and Activity Level (E4;  $r = -.13$ , 95% CI [-.20, -.06]) within Extraversion. GAD showed no facet-specific patterns of association. MDD showed differentiable facet associations within Extraversion. MDD was more strongly negatively correlated with Sociability (E2;  $r = -.17$ , 95% CI [-.24, -.10]) and Activity Level (E4;  $r = -.14$ , 95% CI [-.21, -.07]) than Considerate (E3;  $r = -.06$ , 95% CI [-.13, .01]) within Extraversion.

ODD showed heterogeneous facet associations within Neuroticism, Extraversion, Conscientiousness, and Agreeableness domains. ODD had the strongest positive correlation with Negative Affect (N3;  $r = .47$ , 95% CI [.41, .52]) within Neuroticism, the strongest negative correlations with Positive Emotions (E1;  $r = -.28$ , 95% CI [-.34, -.21]) and Considerate (E3;  $r = -.24$ , 95% CI [-.31, -.17]) within Extraversion, the strongest negative correlations with Organized

(C1;  $r = -.23$ , 95% CI  $[-.29, -.16]$ ) and Achievement Oriented (C2;  $r = -.23$ , 95% CI  $[-.30, -.16]$ ) within Conscientiousness, and the strongest correlations with Antagonism (A1;  $r = .44$ , 95% CI  $[.38, .50]$ ) and Strong-Willed (A2;  $r = .41$ , 95% CI  $[.35, .47]$ ) within Agreeableness. CD showed differentiable relationships with facets within Neuroticism, Extraversion, Agreeableness, and Openness. CD had the strongest positive correlation with Negative Affect (N3;  $r = .24$ , 95% CI  $[.17, .31]$ ) within Neuroticism, the strongest negative correlations with Positive Emotions (E1;  $r = -.12$ , 95% CI  $[-.19, -.05]$ ) and Considerate (E3;  $r = -.14$ , 95% CI  $[-.21, -.07]$ ) within Extraversion, and the strongest correlation with Antagonism (A1;  $r = .31$ , 95% CI  $[.24, .37]$ ) within Agreeableness. CD also had the strongest negative association with Intellect (O1;  $r = -.13$ , 95% CI  $[-.20, -.06]$ ) within Openness to Experience. ADHD showed differentiable facet associations within all five personality domains. ADHD had the strongest positive correlations with Negative Affect (N3;  $r = .30$ , 95% CI  $[.23, .37]$ ) within Neuroticism. Within Extraversion, ADHD had the strongest negative correlations with Positive Emotions (E1;  $r = -.10$ , 95% CI  $[-.17, -.03]$ ) and Considerate (E3;  $r = -.17$ , 95% CI  $[-.24, -.09]$ ), but interestingly, ADHD also had a very small *positive* correlation with Activity Level (E4;  $r = .08$ , 95% CI  $[.01, .15]$ ) within Extraversion. ADHD also had the strongest correlations with Organized (C1;  $r = -.48$ , 95% CI  $[-.53, -.42]$ ) and Distractibility (C3;  $r = .52$ , 95% CI  $[.47, .57]$ ) within Conscientiousness, the strongest negative correlation with Compliant (A3;  $r = -.45$ , 95% CI  $[-.50, -.39]$ ) within Agreeableness, and a more strongly negative association with Intellect (O1;  $r = -.22$ , 95% CI  $[-.29, -.16]$ ) within Openness to Experience.

### ***Ordinary Least Squares Regressions***

See [Figure 3.4](#) and [3.5](#) for a representation of OLS regression parameter estimates and 95% confidence intervals for selected disorders, including SAD, SoPh, ODD, and ADHD (and see <https://osf.io/hvabg/> for full model output).

SAD was only significantly and specifically associated with Fear (N1;  $\beta = .30$ , 95% CI [.21, .40]) within the Neuroticism domain, and not with any facets of other personality domains. SoPh was significantly and uniquely predicted by both Fear (N1;  $\beta = .16$ , 95% CI [.08, .24]) and Shyness (N2;  $\beta = .12$ , 95% CI [.04, .21]) within the Neuroticism domain and by Sociability (E2;  $\beta = -.15$ , 95% CI [-.25, -.06]) alone within the Extraversion domain. Within Openness to Experience, SoPh was uniquely predicted by Intellect (O1;  $\beta = -.15$ , 95% CI [-.24, -.07]).

GAD was not uniquely predicted by any facets in any personality domain. MDD was significantly predicted by Negative Affect (N3;  $\beta = .12$ , 95% CI [.06, .19]) within Neuroticism, but no other specific facets survived correction for multiple comparisons.

ODD was independently predicted by Negative Affect (N3;  $\beta = .47$ , 95% CI [.40, .54]) within the Neuroticism domain, and by Positive Emotions (E1;  $\beta = -.25$ , 95% CI [-.36, -.15]) within the Extraversion domain. ODD was also uniquely associated with Organized (C1;  $\beta = -.13$ , 95% CI [-.23, -.04]) and Achievement Oriented (C2;  $\beta = -.14$ , 95% CI [-.24, -.05]) facets of Conscientiousness and with all facets of Agreeableness, including Antagonism (A1;  $\beta = .23$ , 95% CI [.14, .32]), Strong-Willed (A2;  $\beta = .20$ , 95% CI [.12, .28]), and Compliant (A3;  $\beta = -.12$ , 95% CI [-.20, -.05]). CD was significantly and independently associated with Negative Affect (N3;  $\beta = .22$ , 95% CI [.15, .30]) within the Neuroticism domain, Antagonism (A1;  $\beta = .24$ , 95% CI [.15, .34]) within Agreeableness, and Intellect (O1;  $\beta = -.17$ , 95% CI [-.25, -.08]) within Openness to Experience. ADHD was uniquely predicted by increased Fear (N1;  $\beta = .13$ , 95% CI [.05, .21]) and Negative Affect (N3;  $\beta = .25$ , 95% CI [.18, .32]) within the Neuroticism domain. Within

Extraversion, ADHD was negatively related to Considerate (E3;  $\beta = -.22$ , 95% CI [-.32, -.12]), and within Conscientiousness, with Organized (C1;  $\beta = -.24$ , 95% CI [-.32, -.17]) and Distractibility (C3;  $\beta = .33$ , 95% CI [.26, .40]). ADHD was independently associated with Strong Willed (A2;  $\beta = .21$ , 95% CI [.13, .29]) and Compliant (A3;  $\beta = -.37$ , 95% CI [-.44, -.30]) within the Agreeableness domain. Interestingly, ADHD was also uniquely *negatively* associated with Intellect (O1;  $\beta = -.36$ , 95% CI [-.44, -.28]) and *positively* associated with Openness (O2;  $\beta = .24$ , 95% CI [.16, .32]) with Openness to Experience.

### Discussion

The present study developed comprehensive facet-level trait profiles for seven common *syndromes* and the higher order psychopathology factors onto which they map in a moderately large combined sample of youth. This study indicated that personality facets had complex associations with common forms of psychopathology in children. Often, this complexity was not apparent upon examining FFM trait profiles alone. As predicted, our results indicated that many FFM traits were connected to psychopathology via only one or two facets within that trait domain. Despite that facets within each personality domain have a great deal of conceptual and empirical overlap with one another, unique variance in some facets incrementally predicted clinical outcomes in children. Further, facet profiles differed between specific disorders within the same higher-order spectrum, suggesting that youth personality facets may be useful in understanding the constructs underlying specific *syndromes* within the same broader *spectrum*.

### Facets and Broad Psychopathology Spectra

In addition to these novel results, we replicated prior work (e.g., Watts et al., 2019) finding that child psychopathology could be modeled either in a two- (Internalizing-Externalizing) or three-factor (Anxiety-Distress-Externalizing) higher-order structure. Upon

examining domain- and facet-level associations with two- and three-factor model dimensions, however, we found that anxiety and distress subfactors were largely overlapping and did not have discriminant associations with personality variables (Cronbach & Meehl, 1955). Anxiety and Distress factors were strongly correlated ( $r = .70$ , 95% CI [.51, .89]), whereas Internalizing and Externalizing factors were less so ( $r = .41$ , 95% CI [.25, .56]). With limited exceptions, Anxiety and Distress factors were also associated with domain- and facet-level traits to similar extents, whereas Internalizing and Externalizing factors showed substantially different domain- and facet-level trait profiles. On the one hand, these results are consistent with the conceptualization of psychopathology as a hierarchical construct, as both two- and three-factor models adequately capture the structure of criterion-level psychopathology data. On the other hand, these results directly parallel prior research in adults showing that domain- and facet-level trait profiles for anxiety and distress *subfactors* differ little; that is, they lack discriminant validity with respect to personality features (e.g., Kotov et al., 2010; Walton et al., 2018). This suggests that there is a need for future research to further investigate how and in what contexts it may be useful to distinguish between fear and distress *subfactors*, and when it may be sufficient to collapse them into a broader internalizing *spectrum*. Likewise, we observed that distinctions between trait profiles were more pronounced at the level of specific (e.g., social anxiety, separation anxiety) *syndromes* among children.

### **Facets and Disorders**

In the present study, I observed that facets within the domains of neuroticism, extraversion, and openness had relatively specific associations with psychopathology, and thus were better characterized at the facet level. Meanwhile, facets of conscientiousness and agreeableness had relatively homogenous associations with psychopathology, and thus

connections between these traits and psychiatric illness may be sufficiently understood at the broad, domain level.

### ***Neuroticism, Extraversion, and Openness***

Consistent with prior research, our findings indicated that neuroticism was positively associated with all psychiatric syndromes and higher-order psychopathology factors, and therefore was a relatively “noninformative” marker of psychopathology at the domain level (Ormel et al., 2004). However, the same was not true of neuroticism’s facets. The connection between neuroticism and SAD was primarily explained by high Fear (N1), while that between neuroticism and SoPh was explained by both high Fear (N1) and Shyness (N2). The associations between neuroticism and GAD and MDD were attributable to uniform elevations in all neuroticism facets; this finding aligns with prior research showing that depression is highly comorbid with both anxiety and externalizing disorders (e.g., Lahey et al., 2012; Tackett, Lahey, et al., 2013; Zinbarg et al., 2016), and is characterized by diffuse, undifferentiated elevations in trait-level negative emotionality (Brandes et al., 2019). Interestingly, while the associations between neuroticism and two externalizing syndromes, ODD and CD, were attributable to elevated Negative Affect (N3), ADHD was uniquely associated with both Fear (N1) and Negative Affect (N3). These results add to prior evidence showing that people with antagonistic externalizing problems (such as antisocial behavior) show relatively specific elevations in anger and irritability, while those with disinhibited externalizing problems such as ADHD are often both irritable and anxious (e.g., Herzhoff et al., 2013; Jones et al., 2011; Ruiz et al., 2008; Stanton & Watson, 2016; Vize et al., 2018).

For the first time, our results demonstrate that extraversion has a highly specific set of facet-level trait associations with psychopathology in children, and that these patterns only

partially mirror findings in adults (e.g., Watson et al., 2015). Among internalizing disorders, domain-level extraversion was negatively associated with SoPh and MDD and unrelated to SAD and GAD. The connection between extraversion and SoPh was primarily attributable to low Sociability (E2) and Activity Level (E4), while the relationship with MDD was explained by low Positive Emotions (E1), Sociability (E2), and Activity Level (E4). These findings extend some prior work showing that low sociability is a hallmark of social anxiety and depression (Naragon-Gainey et al., 2009; Naragon-Gainey & Watson, 2014a). Our results are also consistent with findings that individuals who are interpersonally warm and enthusiastic tend to be at decreased risk for depression (Watson, Ellickson-Larew, et al., 2019; Watson et al., 2015). However, we did not find evidence that Positive Emotions (E1) *uniquely* predicted internalizing disorders above and beyond other facets in the same domain, as prior adult research has (e.g., Watson et al., 2015). The present results are a necessary developmental extension in this area. Notably, the average age of our sample falls somewhat below the typical onset for depression (around age 13; Merikangas et al., 2010), and it may be the case that earlier-onset depression may have a unique affective trait profile relative to later- or adult-onset depression. Another possible explanation for these findings is that social withdrawal and low activity are more visible aspects of depression relative to anhedonia, and parents are more likely to notice overt, behavioral symptoms (such as activity level) relative to internal ones (such as positive emotions; Herjanic & Reich, 1982).

Within externalizing disorders, domain-level extraversion was negatively associated with ODD and CD, but unrelated to ADHD. In contrast to the internalizing disorders, however, the connection between extraversion and ODD and CD was primarily explained by low Positive Emotions (E1) and Considerate (E3), and the null relationship with ADHD was attributable to a suppression effect. While ADHD had small negative correlations with Positive Emotions (E1)

and Considerate (E3), it had a very small ( $r = .08$ ) but significant *positive* correlation with Activity Level (E4). Agentic facets of extraversion (e.g., dominance, sensation-seeking) are sometimes positively correlated with externalizing problems in adults (Walton et al., 2018; Watson et al., 2015; Watson, Stanton, et al., 2019), but we found no robust positive associations between extraversion and psychopathology in the present study. Rather than indicating true developmental differences in risk for externalizing problems, this discrepancy may be due to measurement differences. Agentic traits (e.g., dominance, sensation seeking) tend not to be core features of child extraversion, possibly due to reliance on parent reports of child personality and children's place in the family social context (see Tackett et al., 2021). While mature social roles might allow for more adaptive displays of dominance, much of the willfulness that parents observe at home may be interpreted as disagreeableness (see De Pauw et al., 2009; De Pauw & Mervielde, 2010). Indeed, on examining facets with dominance-related personality content in our study (e.g., Strong Willed, including items such as "My child... wants his/her own way"), we find the same elevated risk of externalizing disorders shown in adult research.

Though only two facets of openness to experience are included in the ICID-S, we found evidence of striking facet specificity within this domain. At the domain level, Openness to Experience was negatively correlated with SoPh, CD, and ADHD. While this relationship was attributable to both low Intellect (O1) and facet-level Openness (O2; i.e., imagination) for SoPh, only Intellect (O1) explained this relationship for CD and ADHD. Interestingly, facet-level Openness (O2) also had a *positive* unique relationship with ADHD after controlling for Intellect (O1); this suggests that, in comparison to children with similar levels of intellectual abilities, children with ADHD are actually *more* imaginative and curious than those without. This effect adds to the literature on ADHD and creativity, as some studies suggest that children with

ADHD—particularly those that are intellectually gifted—are more adept at divergent thinking than neurotypical children (e.g., White & Shah, 2006). However, given the heterogeneity of effects in this area (Paek et al., 2016) replication of this finding is needed.

### *Conscientiousness and Agreeableness*

In contrast to neuroticism, extraversion, and openness to experience, conscientiousness and agreeableness associations with psychopathology appeared to be well characterized at the domain level (i.e., had less facet specificity). Among internalizing disorders, both correlation and regression estimates were primarily small to null and showed no consistent facet-level divergence. These results largely differ from those in adults (Bienvenu et al., 2004; Kaplan et al., 2015; Naragon-Gainey & Simms, 2017), which find that depression and some anxiety disorders are particularly well-characterized by low self-efficacy facets (e.g., distractibility, diligence). This may reflect developmental differences in community support—even when they have emotional difficulties, children’s ability to pursue goals and complete developmentally appropriate tasks is facilitated by parents. Many adults, however, lack such external support. Similarly, agreeableness facets showed no reliable relationships with most internalizing disorders except MDD, which was weakly negatively correlated with all facets. This finding is consistent with the conceptualization of depression as involving both emotional and interpersonal difficulties, a recognition that goes back to Burton’s melancholia (Burton, 1857). Thus, conscientiousness and agreeableness’ connection to internalizing disorders appears to be relatively well captured at the FFM domain level.

Facets within conscientiousness and agreeableness domains likewise showed little specificity in their relationships with externalizing disorders, though some facets incrementally predicted select disorders over and above others in the same domain. All conscientiousness and

agreeableness facets were negatively correlated with both higher- and lower-order externalizing problems, as in prior research (e.g., Ruiz et al., 2008). However, all conscientiousness facets were much more strongly related to ADHD ( $r$ 's  $[-.51, -.41]$ ) relative to ODD ( $r$ 's  $[-.23, -.14]$ ) or CD ( $r$ 's  $[-.09, -.11]$ ). The three externalizing disorders were also independently predicted by unique sets of facets within agreeableness: CD by Antagonism, ADHD by Strong-Willed and Compliant, and ODD by all three facets. These unique trait constellations within conscientiousness and agreeableness domains are consistent with a proposed distinction between disinhibited (e.g., ADHD, substance use) and antagonistic (e.g., antisocial behavior, conduct disorder) externalizing psychopathology, as represented in HiTOP *spectra* (Kotov et al., 2017). This suggests that the trait bases of disinhibited vs. antagonistic externalizing disorders show both overlap at the domain level and important unique contributions from specific facets within conscientiousness and agreeableness.

## Conclusion

Because symptoms in a dimensional model of psychopathology vary in severity ranging from normative functioning to severely impairing, there is a need to understand how symptoms throughout levels of the HiTOP hierarchy are connected to normative personality. In Study 2 of this dissertation, I established comprehensive facet-level profiles of seven common *syndromes*, two *subfactors*, the internalizing *spectrum*, and the externalizing *superspectrum*. While these facet-level trait profiles can advance our understanding of why some FFM traits are related to psychopathology, they cannot directly speak to how these relationships arise. Study 3 will now use longitudinal methods to examine several explanatory models of the personality-psychopathology connection.

## Chapter 4: Evaluating Developmental Models of Facet-Level Personality and Psychopathology from Middle Childhood to Adolescence

Prior research and the studies this dissertation make clear that HiTOP constructs are heavily intertwined with normative personality traits; however, determining the genesis of these connections is an ongoing effort. The past decade has seen advances in the use of longitudinal and causally informative designs to understand why personality traits are associated with psychopathology; these studies have highlighted several primary theoretical models of the personality-psychopathology relationship. The most popular of these include 1) the *vulnerability or predisposition model*, which stipulates that personality traits serve as independent risk factors for the development of future pathology, 2) the *scar or complication model*, which holds that psychopathology can lead to lasting changes in personality traits, 3) the *pathoplasty or exacerbation model*, in which personality influences the manifestation or course of psychopathology, 4) the *stagnation model*, which states that the experience of psychopathology alters the course of personality development such that symptoms disrupt normative maturation processes, and 5) the *continuity model*, which stipulates that personality and psychopathology lie on the same underlying continuum (Durbin & Hicks, 2014; Tackett, 2006). Limited research (e.g., De Bolle et al., 2012) has tested these models across more than one trait domain or disorder, nor have many studies directly compared the strength of evidence for different models in a single sample. As such, the present study aims to test multiple explanatory models of personality-psychopathology associations, focusing on lower-order personality facets and the internalizing *spectrum* and externalizing psychopathology *superspectrum* across the middle childhood to early adolescent developmental transition.

Each of the aforementioned theories has received some degree of support for at least some personality or temperament traits. These studies suggest that multiple developmental mechanisms give rise to phenotypic correlations between personality traits and psychopathology, rather than just one process accounting for all personality-psychopathology relationships across all developmental periods. In the following section, I review only longitudinal and behavior genetic studies with developmental (i.e.,  $\leq 18$  years) samples so as to cover the most relevant background for the present study. Several prior works have reviewed the adult literature more extensively (e.g., De Bolle et al., 2012; Kotov et al., 2010; Tackett, 2006; Widiger et al., 2019).

### **Existing Evidence for Multiple Mechanistic Models**

The vulnerability model is arguably the most researched explanatory model of the personality-psychopathology relationship. The vulnerability model posits that traits, at least in part, exert an independent causal influence on psychopathology. As such, this model is typically tested in prospective designs, ideally (though not often) in designs that can control for common causes or continuity effects (e.g., behavior genetic studies). A vulnerability effect is apparent when, controlling for baseline symptoms via design or statistical control, earlier personality level (e.g., extraversion score at age 9) predicts later psychopathology level (e.g., depression score at age 13). For internalizing psychopathology (e.g., anxiety, depression, somatic disorders), high neuroticism has been implicated as a primary vulnerability factor across a variety of ages (Forbes et al., 2017; Gilbert et al., 2019; Goldstein et al., 2018; Laceulle et al., 2014; Wichstrøm et al., 2018; Zinbarg et al., 2016), with few exceptions for select disorders and facets of neuroticism (e.g., fear/inhibition facets do not predict future depression in preschoolers; Bufferd et al., 2014; Gilbert et al., 2019). Low extraversion (Forbes et al., 2017; Goldstein et al., 2018) and low conscientiousness (Gilbert et al., 2019; Goldstein et al., 2018; Laceulle et al., 2014) have also

been identified as risk factors for internalizing problems (c.f., Bufferd et al., 2014). For externalizing psychopathology (e.g., substance use, CD), high neuroticism (e.g., Gilbert et al., 2019; Wichstrøm et al., 2018; Zinbarg et al., 2016) and low conscientiousness/effortful control (Forbes et al., 2017; Wichstrøm et al., 2018) have been identified as primary vulnerability factors, with the exception of one study finding no effect for ADHD (Martel et al., 2014). High extraversion has been associated with greater risk of developing externalizing problems in youth (Forbes et al., 2017; Wichstrøm et al., 2018), though not in all studies (e.g., Gilbert et al., 2019; Laceulle et al., 2014).

The scar model has received relatively little empirical attention, and it is often collapsed (or conflated) with the stagnation model. The scar model postulates that, in the reverse of the vulnerability model, earlier psychopathology exerts a causal and enduring influence on future personality trait levels. The stagnation model, on the other hand, proposes that the experience of psychopathology derails normative trait development (i.e., maturation; Roberts et al., 2006). Both models are tested in longitudinal designs, with a scarring effect evident if earlier psychopathology level (e.g., depression at age 9) predicts future personality level (e.g., extraversion at age 13). A stagnation effect would be evident if earlier psychopathology level predicts future personality trajectory (e.g., extraversion change from age 9 to 13). Because only one study that I am aware of (Ormel et al., 2020) tested a stagnation model by name, here, I primarily review studies that nominally tested a scar model, noting that most studies were not truly positioned to statistically distinguish between scarring and stagnation. Internalizing psychopathology shows evidence of scarring for neuroticism, whereby symptoms have predicted higher subsequent neuroticism (De Bolle et al., 2012; Ormel et al., 2020). Internalizing has also predicted higher subsequent conscientiousness and lower subsequent openness in one study (De

Bolle et al., 2012), though this was not found in another study of effortful control, the temperament analogue to conscientiousness (Ormel et al., 2020). Externalizing psychopathology has shown relatively consistent scarring effects on conscientiousness and agreeableness, whereby earlier symptoms have predicted lower subsequent levels of these two traits (Atherton et al., 2019; De Bolle et al., 2012; Hengartner, 2018; Ormel et al., 2020; Wichstrøm et al., 2018). Externalizing psychopathology predicted higher subsequent neuroticism in one study (Shiner et al., 2002) but not others (Hengartner, 2018; Wichstrøm et al., 2018) and higher extraversion in two studies (De Bolle et al., 2012; Wichstrøm et al., 2018), but not in another (Hengartner, 2018).

The pathoplasty model has received moderate direct attention in the empirical literature, and evidence to date is more mixed than for other models. The pathoplasty model proposes that traits influence the course, prognosis, or presentation of psychopathology over time; however, most existing studies have examined illness course. The pathoplasty model can be tested in longitudinal designs, such that a pathoplasty effect is evident when trait levels at younger ages predict psychopathology trajectory (e.g., depression change from age 9 to 13) over time. Neuroticism and extraversion have shown pathoplastic effects in adult studies, with high neuroticism and low extraversion predicting internalizing symptom maintenance (e.g., Naragon-Gainey et al., 2013; Naragon-Gainey & Watson, 2014), but these effects have not been found consistently in youth samples (De Bolle et al., 2012; Gilbert et al., 2019). One study found that only decreased sociability—and not other extraversion facets—was consistently predictive of less favorable internalizing trajectories (Prinz et al., 2014). For externalizing, low extraversion has predicted exacerbation of externalizing psychopathology (De Bolle et al., 2012) in one study, but not in others (Gilbert et al., 2019; Hengartner, 2018; Wichstrøm et al., 2018). Likewise, low

conscientiousness and agreeableness have predicted symptom exacerbation for externalizing problems in some (De Bolle et al., 2012; Hengartner, 2018) but not all (Gilbert et al., 2019; Wichstrøm et al., 2018) studies. Similarly to internalizing, however, one study found that only select facets of extraversion (low optimism, high energy) and agreeableness (low compliance) consistently predicted worsening of externalizing symptoms (Becht et al., 2016).

Finally, the continuity and spectrum models are a set of related, but separable explanations for the relationship between personality and psychiatric disorders (Durbin & Hicks, 2014). The continuity model—the model tentatively advanced by HiTOP’s Normal Personality Workgroup—postulates that personality and psychopathology covary because they are conceptually indistinguishable (Widiger et al., 2019). That is, traits and symptoms are strongly correlated cross-sectionally and change together over time because they reflect the same latent psychological phenomena. The spectrum model has the additional requirement that psychopathology symptoms represent maladaptive extreme levels of normative traits. Both continuity and spectrum models require testing through longitudinal, preferably causally informative designs (e.g., Hettema et al., 2006; Tackett, Lahey, et al., 2013). The spectrum model additionally requires psychometric study of the relative severity of traits versus symptoms along shared continua (see Suzuki et al., 2015 for an example in the personality disorder domain).

Evidence for the continuity model is relatively robust, and the spectrum model has only rarely been tested directly (c.f., De Bolle et al., 2012). Among internalizing problems, increases in neuroticism are associated with concurrent increases in internalizing (De Bolle et al., 2012), decreases in neuroticism reliably follow from therapy targeting internalizing symptoms (Roberts et al., 2017), and neuroticism and internalizing share genetic (Schmitz et al., 1999) and

environmental influences (Mikolajewski et al., 2013). Likewise, the general factor of psychopathology (which is particularly associated with distress disorders such as depression) shares genetic influences with neuroticism (Tackett, Lahey, et al., 2013). Decreases in extraversion and decreases in agreeableness are also associated with concurrent increases in internalizing psychopathology (De Bolle et al., 2012). Among externalizing problems, increases in neuroticism and decreases in conscientiousness (or effortful control), agreeableness, extraversion, and openness are associated with concurrent increases in externalizing (e.g., Atherton et al., 2019, 2020; De Bolle et al., 2012; Hengartner, 2018; Martel et al., 2014). Likewise, decreases in neuroticism consistently result from interventions targeting substance use disorder (Roberts et al., 2017), and externalizing shares genetic and environmental influences with conscientiousness and agreeableness (Schmitz et al., 1999; Young et al., 2000).

While some progress has been made in identifying the directionality of trait—psychopathology relationships, there are several reasons that these domain-level studies may be limited. First, existing studies in this area have varied widely in the personality measures used, and thus, inevitably vary in the personality content assessed. While FFM traits are *nominally* similar across different personality inventories (e.g., BFI-2 vs. IPIP Extraversion) for adults (Goldberg et al., 2006; Soto & John, 2017) and children (Tackett, Kushner, et al., 2013), measures can differ substantially in the items and lower-order facets they include. For example, given two studies that examine extraversion as a vulnerability factor for depression, one study's inventory may weigh heavily on positive emotionality content, while the other may more strongly reflect assertiveness content. These differences in measurement may result in seemingly (but not necessarily truly) conflicting evidence for the same theoretical model. Second, FFM domains are highly multidimensional, and as demonstrated in Chapter 3, not all facets within

each domain are equally connected to psychopathology. These differences in magnitude could plausibly reflect differences in causal processes. For example, anxiety-related facets of neuroticism may be connected to anxiety symptoms because they lie on a shared spectrum; however, irritability-related facets of neuroticism may be connected to anxiety because anxious-avoidant behavior causes regular conflicts between a child and their family members. FFM domains are known to have complex causal antecedents and consequences (Möttus et al., 2020); thus, narrower traits may better serve the present explanatory research goals.

In order to understand the mechanisms by which traits are related to psychopathology, research using both longitudinal methods and alternate levels of the personality hierarchy is clearly needed. Four prior studies have combined longitudinal and facet-level approaches in youth samples (Becht et al., 2016; Goldstein et al., 2018; Prinzie et al., 2014; Zinbarg et al., 2016). This research has indicated that different facets within the same personality domain may conform to different mechanistic models (e.g., within extraversion, communal facets show a vulnerability effect for depression, while agentic facets do not; Goldstein et al., 2018). However, these prior studies have examined only one domain of psychopathology (e.g., internalizing; Goldstein et al., 2018) or personality (neuroticism; Zinbarg et al., 2016) at a time. Importantly, all prior youth studies have also only examined one mechanistic model at a time (e.g., pathoplasty; Prinzie et al., 2014) and have not simultaneously examined other models of the personality-psychopathology relationship. As such, it is difficult to evaluate the incremental evidence for each mechanistic model when alternative models are not controlled for; this gap in knowledge stimulated the present research.

### **The Present Study**

The present study examined five primary explanatory models of the psychopathology-personality relationship by leveraging lower-order personality facets in a longitudinal sample of youth assessed over the transition to adolescence (age 9-13 years). Parents ( $N = 442$ ) reported on their child's internalizing and externalizing psychopathology via the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) and FFM personality domains and facets via the ICID-S (Deal et al., 2007) at four annual measurement occasions. I aimed to test vulnerability, pathoplasty, scar, stagnation, and continuity/common cause models of the personality-psychopathology relationship using random-intercept cross-lagged panel models and latent growth curve modeling. It should be noted that because the present study did not use a causally informative design, it is not well-positioned to distinguish between a continuity model and a common cause model, or the hypothesis that personality and psychopathology are phenomenologically distinct but are affected by third variables (e.g., genetic pleiotropy). Spectrum analyses were beyond the present scope. Rather, I examined several observations that would be expected under a continuity *or* common cause model (e.g., correlated change). Additionally, I aimed to evaluate whether lower-order facets may offer unique information about the development of internalizing and externalizing psychopathology relative to personality domains. Incremental utility of facets (vs. higher-order domain) would be evident if different facets within the same higher-order domain (e.g., order vs. achievement within conscientiousness) demonstrated significantly different degrees of support within each theoretical model. Specific hypotheses varied by model and were registered on the OSF (<https://osf.io/aunfq>) prior to data analysis.

## Method

### Participants & Procedures

Data for this study were taken from Sample 1. This sample included 442 mothers of children from a four-wave longitudinal study of personality development during the transition from middle childhood to early adolescence. At intake, youth were approximately 10 years old ( $M = 9.97$ ,  $SD = 0.81$ ), and approximately one ( $M_{T1-T2} = 1.18$ ,  $SD_{T1-T2} = 0.27$ ;  $M_{T2-T3} = 0.94$ ,  $SD_{T2-T3} = 0.31$ ;  $M_{T3-T4} = 0.97$ ,  $SD_{T3-T4} = 0.24$ ) year elapsed between each wave. Participant retention varied across waves, ranging from 69.1% at the second wave, to 79.5% and 80% at the third and fourth waves, respectively.

## Measures

### *Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001)*

The CBCL is a 118-item parent-report, dimensionally-based psychopathology inventory that assesses two higher-order psychopathology dimensions including Internalizing and Externalizing Problems and nine lower-order subfactors (not scored separately here). Items are rated on a 3-point scale (from 0 *not true (as far as you know)* to 2 *very true or often true*) and summed into higher-order scales. Internal consistencies (coefficient alpha), annual stabilities (test-retest reliability), and three-year stabilities can be found at <https://osf.io/jvx8s/>.

### *Inventory of Children's Individual Differences – Short Form (ICID-S; Deal et al., 2007)*

See Study 2 Materials.

## Data Analytic Plan

All analyses were conducted in an accelerated longitudinal design to account for (expected) heterogeneity in age within each collection wave. Participants were grouped into five age bins between 9 (including individuals aged 9.99 and under) and 13 (including individuals aged 13.0 and up). Model sensitivity to influential cases was tested via generalized Cook's distance (Pek & MacCallum, 2011), and observations were excluded from each model if Cook's

distance  $> 1$  (see Cook & Weisberg, 1982) in 50% or more of the tested models. The focal analyses consisted of four stages, including measurement invariance analyses, random-intercept cross-lagged panel models (RI-CLPMs), univariate latent growth curve models, and growth factor score regressions.

All quantitative thresholds and nearly all analyses were registered prospectively (prior to data analysis). Analyses conducted prior to the preregistration were psychopathology measurement invariance analyses, univariate growth models, and growth factor score correlations for neuroticism facets. Gender was included as a preregistered covariate in all models but omitted from the text for space. All analysis scripts, output, and supplemental results can be found on the OSF page for this project (<https://osf.io/69nf8/>).

## Results

### Deviations from the Preregistration

Two deviations from the preregistration were undertaken. First, upon observing that within-person residual correlations in the RI-CLPM analyses (analysis stage 2) were relatively similar across time, I estimated a model that fixed these parameters to equality across time for the sake of parsimony. This did not change the interpretation of the results. Second, after estimating univariate growth models (analysis stage 3), I observed that the Externalizing intercept and slope factors were strongly negatively correlated, possibly reflecting regression to the mean. In the factor score correlation analyses (analysis stage 4), this also appeared to drive several counterintuitive pathoplasty effects for the facets that were most clearly connected to Externalizing problems—for example, the most Antagonistic (A1) children in the sample tended to *decrease* in Externalizing problems (see scatterplots at <https://osf.io/t8yzx/>). As a result, I

chose to conduct these analyses in a multiple regression framework to control for correlations between intercept and slope factors within the same domain (see below for more detail).

### **Measurement Invariance**

Measurement invariance is a prerequisite for interpreting any longitudinal analyses, and these analyses were conducted using the same strategy as Chapter 2 and 3 of this dissertation (Meredith, 1993). I used item parceling to create more reliable indicators for psychopathology models (Little et al., 2002), as the zero or near-zero variance of some CBCL items (e.g., “Uses drugs for nonmedical purposes” in younger age groups) resulted in estimation problems (e.g., non-positive definite matrices) in item-level models. To determine the robustness of the results to parcel composition (Sterba, 2011), I tested the configural model across 100 random item-to-parcel specifications.

The Internalizing factor met criteria for strong invariance across age groups by two criteria, and strict invariance by another two criteria (residual model  $\Delta\chi^2 = 57.29, p = .013$ ;  $\Delta\text{CFI} = .010$ ;  $\Delta\text{TLI} = -.002^1$ ;  $\Delta\text{RMSEA} = .001$ ). The Externalizing factor met criteria for strict invariance across age groups by all metrics (residual model  $\Delta\chi^2 = 55.58, p = .113$ ;  $\Delta\text{CFI} = .000$ ;  $\Delta\text{TLI} = -.010$ ;  $\Delta\text{RMSEA} = -.004$ ). Randomized parcel allocation indicated that both Internalizing and Externalizing models were robust to parcel allocation. Full measurement invariance results for personality facets are reported in Brandes and colleagues (2021) and invariance results for psychopathology dimensions are found at <https://osf.io/69nf8/>. Invariance results differed across metrics (e.g., chi-square vs. CFI) for nearly all facets. Across ages, three facets only met criteria for weak invariance, three for strong invariance, and nine for strict invariance.

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<sup>1</sup> Negative change statistics indicate an *improvement* in model fit with the more restricted model. This may occur when model fit changes are small and robust test statistics are used, as was the case for the present approach.

## Random-Intercept Cross-Lagged Panel Models

To examine the vulnerability and scar models as well as several necessary observations under a continuity/common cause model, I estimated random-intercept cross-lagged panel models. RI-CLPMs disaggregate within- and between-person effects in cross-lagged associations and account for the trait covariance structure of repeated measurements over time (rather than simple autoregressive effects; Hamaker et al., 2015). These models therefore yield less biased estimates of cross-lagged effects in comparison to traditional cross-lagged panel models where the constructs of interest show trait-like stability across all timepoints. A representation of these models can be found in [Figure 4.1](#) and code and output can be found on the OSF page for this project at <https://osf.io/69nf8/>. I interpreted cross-lagged effects of earlier age-specific personality residuals on later psychopathology residuals as consistent with a vulnerability model and cross-lagged effects of earlier age-specific psychopathology residuals on later personality residuals as consistent with a scar model. I interpreted between-person correlations (i.e., between random intercepts) and within-person correlations (i.e., between age-specific, person-specific residuals) as necessary but not sufficient evidence in favor of a continuity/common cause model.

I tested the relative fit of the following specifications for each psychopathology—personality RI-CLPM: 1) an “unconstrained” model in which all autoregressive, cross-lagged, and within-person residual effects were freely estimated, 2) a “partially constrained” model in which only within-person residual correlations were fixed to equality from age 10-13, and 3) a “fully constrained” model in which autoregressive and cross-lagged effects were fixed to equality from age 10-13. Differences in fit were evaluated using the same criteria as for measurement invariance analyses. Where there was a significant decrement in model fit, the less constrained model was retained.

Full model fit statistics for RI-CLPMs can be found on the OSF page for this project. Cross-lagged effects are summarized in [Figures 4.2](#) and [4.3](#), and between- and within-person continuity/common cause effects are reported in [Figure 4.4](#). Eight observations in internalizing cross-lagged models and eight observations in externalizing cross-lagged models (with only one overlapping individual) were identified as influential cases via generalized Cook's distance and the corresponding models were re-estimated with these individuals excluded (see index plots at <https://osf.io/sjdfz/>). Global fit statistics indicated that, with the exception of SRMR in a small number of models, all RI-CLPMs achieved good fit. Partially constrained models were retained for all Internalizing models except for Organized (C1). Fully constrained models were retained for all Externalizing models except for Strong Willed (A2). Thus, while autoregressive and cross-lagged effects differed by age for most internalizing models, this was not so for most externalizing models.

***Personality → Psychopathology Cross-Lagged Effects (Vulnerability Model)***

Parameter estimates for cross-lagged effects of personality on psychopathology are summarized in panel 1 of [Figures 4.2](#) and [4.3](#). Results demonstrated limited support for a vulnerability model during the early adolescent period. Among Internalizing models, only Distractible (C3) showed a significant vulnerability effect. Children who showed increased distractibility at earlier ages showed increased Internalizing at later ages ( $\beta$ s: .40 to .22,  $ps$ : .002 to .033), however this effect was not significant from ages 9 to 10 ( $\beta = .05$ , 95% CI [-.44, .34],  $p = .800$ ). No Externalizing models showed significant vulnerability effects.

***Psychopathology → Personality Cross-Lagged Effects (Scar Model)***

Parameter estimates for cross-lagged effects of personality on psychopathology are represented in panel 2 of [Figures 4.2](#) and [4.3](#). Results showed some support for the scar model

during the developmental period under study. Among Internalizing models, no traits showed consistent and significant scar effects across all age periods, but there were several age-limited effects. Children who had increased Internalizing symptoms at age 9 evidenced lower Positive Emotions (E2;  $\beta = -.32$ , 95% CI [-.60, -.04]) and Activity Level (E4;  $\beta = -.46$ , 95% CI [-.70, -.23]) at age 10; this effect was not significant at later ages, however. Additionally, increased internalizing problems at age 12 tended to be followed by increased Fear (N1;  $\beta = .40$ , 95% CI [.19, .60]), Shyness (N2;  $\beta = .36$ , 95% CI [.18, .54]), and Distractibility (C3;  $\beta = .28$ , 95% CI [-.51, -.05]) at age 13. Among Externalizing models, children who showed increased Externalizing symptoms at earlier ages evidenced consistent decreases in Considerate (E3;  $\beta = -.28$ , 95% CI [-.52, -.03]), Activity Level (E4;  $\beta = -.27$ , 95% CI [-.52, -.02]), Organized (C1;  $\beta = -.20$ , 95% CI [-.38, -.02]), and Compliant (A3;  $\beta = -.27$ , 95% CI [-.49, -.06]) and increases in Distractibility (C3;  $\beta = .22$ , 95% CI [.41, .03]) and Antagonism (A1;  $\beta = .21$ , 95% CI [.36, .06]) at subsequent ages.

***Personality  $\leftrightarrow$  Psychopathology Correlations (Continuity/Common Cause Effects)***

Results that would be expected under a continuity/common cause model are divided into two components: between-person (i.e., correlations between random intercepts) and within-person (i.e., person-specific, age-specific residual correlations controlling for autoregressive and cross-lagged effects). Both sets of correlations and confidence intervals are depicted in [Figure 4.4](#).

**Between-Person Associations.** Results indicated strong support for continuity/common cause models at the between-person level. Among Internalizing models, there were very large between-person effects for four facets, including Fear (N1;  $r = .52$ , 95% CI [.40, .64]), Shyness (N2;  $r = .51$ , 95% CI [.40, .62]), Negative Affect (N3;  $r = .43$ , 95% CI [.32, .55]), and Sociability (E2;  $r = -.44$ , 95% CI [-.57, -.31]); a large effect for one facet, Activity Level (E4;  $r$

= -.38, 95% CI [-.51, -.26]); a medium effect for one facet, Strong Willed (A2;  $r = .23$ , 95% CI [.08, .39]); and small effects for four facets, including Positive Emotions (E1;  $r = -.18$ , 95% CI [-.32, -.03]), Antagonism (A1;  $r = .16$ , 95% CI [.01, .31]), Compliant (A3;  $r = -.18$ , 95% CI [-.31, -.06]), and Openness (O2;  $r = -.18$ , 95% CI [-.32, -.04]). Among Externalizing models, there were very large between-person effects for four facets, including Negative Affect (N3;  $r = .61$ , 95% CI [.52, .70]), Antagonism (A1;  $r = .68$ , 95% CI [.60, .77]), Strong Willed (A2;  $r = .71$ , 95% CI [.63, .79]), and Compliant (A3;  $r = -.52$ , 95% CI [-.62, -.41]); large effects for three facets, including Positive Emotions (E1;  $r = -.39$ , 95% CI [-.56, -.23]), Considerate (E3;  $r = -.40$ , 95% CI [-.56, -.24]), and Achievement Oriented (C2;  $r = -.32$ , 95% CI [-.49, -.14]); medium effects for three facets, including Shyness (N2;  $r = .20$ , 95% CI [.05, .35]), Organized (C1;  $r = -.21$ , 95% CI [-.36, -.07]), and Distractible (C3;  $r = .26$ , 95% CI [.13, .40]); and small effects for two facets, Fear (N1;  $r = .18$ , 95% CI [.02, .34]) and Intellect (O1;  $r = -.15$ , 95% CI [-.29, -.01]). No other between-person correlations were significant at  $\alpha = .05$ .

**Within-Person Associations.** Results demonstrated moderate support for continuity/common cause models at the within-person level. Among Internalizing models, there were large within-person effects for two facets, Fear (N1;  $r = .39$ , 95% CI [.21, .57]) and Shyness (N2;  $r = .31$ , 95% CI [.13, .49]); a medium effect for one facet, Distractible (C3;  $r = .20$ , 95% CI [.05, .36]); and a small effect for one facet, Strong Willed (A2;  $r = .15$ , 95% CI [.00, .28]). Among Externalizing models, there was a large within-person effect for one facet, Antagonism (A1;  $r = .38$ , 95% CI [.25, .50]); medium effects for seven facets, including Negative Affect (N3;  $r = .30$ , 95% CI [.15, .44]), Considerate (E3;  $r = -.22$ , 95% CI [-.38, -.06]), Organized (C1;  $r = -.26$ , 95% CI [-.38, -.14]), Achievement Oriented (C2;  $r = -.25$ , 95% CI [-.42, .08]), Distractible (C3;  $r = .25$ , 95% CI [.13, .37]), Strong Willed (A2;  $r = .22$ , 95% CI [.10,

.34]), and Compliant (A3;  $r = -.29$ , 95% CI [-.45, -.14]); and there were small effects for two facets, Fear (N1;  $r = .19$ , 95% CI [.07, .31]) and Shyness (N2;  $r = .31$ , 95% CI [.13, .49]).

### **Growth Factor Analyses**

To examine pathoplasty and stagnation models and provide a further test of the continuity/common cause model, I used a two-stage approach to evaluating relationships between personality and psychopathology growth factors<sup>2</sup>. In the first stage, I estimated univariate polynomial latent growth models for each personality facet and psychopathology domain (details on this approach mirror those of Brandes et al., 2021). Factor scores for all intercept and slope factors with significant variability (at  $\alpha = .05$ ) were then estimated using the regression method (Grice, 2001). In the second stage, I entered these growth factor scores into a series of ordinary least squares regressions. As a test of the pathoplasty model, each psychopathology slope was regressed on youth gender, the respective psychopathology intercept factor, each personality intercept factor, and each personality slope factor. As a test of the stagnation model, each personality slope was regressed on youth gender, the respective personality intercept, each psychopathology intercept factor, and each psychopathology slope factor. I interpreted semi-partial relationships between personality intercept and psychopathology slope as consistent with a pathoplasty effect, relationships between psychopathology intercept and personality slope as consistent with a stagnation effect, and relationships between

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<sup>2</sup> I preregistered a decision tree stipulating two possible approaches to these analyses, including a simultaneous approach (i.e., bivariate latent growth curve models) and the two-stage approach reported here. While the simultaneous approach is more parsimonious and avoids the problem of factor indeterminacy (e.g., Grice, 2001), the complexity of these models often results in estimation problems in samples that are relatively small or have a high degree of missingness. As this was the case for the present data, I proceeded with the two-stage approach.

psychopathology and personality slopes (i.e., correlated change) as necessary but not sufficient evidence in favor of a continuity/common cause effect.

### ***Univariate Latent Growth Models***

Five observations in internalizing latent growth models and three observations in externalizing latent growth models (with one overlapping individual between them) were identified as influential cases via generalized Cook's distance and the corresponding factor score analyses were conducted with these individuals excluded (see index plots at <https://osf.io/sjdfz/>).

Univariate psychopathology growth model results indicated that there were significant mean-level decreases in both Internalizing and Externalizing psychopathology. The average change was small at 1 T-score (T-score M = 50, SD = 10), and there was significant variability in both overall level of symptoms (intercept factors) and latent growth (slope factors) in for each symptom dimension. These results indicate that, on average, children decreased to a small degree in both Internalizing and Externalizing psychopathology, but individuals varied significantly in their developmental trajectories.

Univariate personality models revealed significant mean-level change in 12 of 15 facets. The size and direction of changes differed between facets but was in the small (1 to 3 T-score) range (see Brandes et al., 2021), and there was significant variance in all intercept factors. There was significant variance in slope factors for 10 of 15 facets. As growth factor relationships cannot be computed without sufficient variance, I retained the intercept-only model for all 5 facets lacking significant linear growth variance (Shyness [N2], Negative Affect [N3], Distractible [C3], Strong Willed [A2], and Compliant [A3]).

### ***Psychopathology Slope $\leftarrow$ Personality Level Regressions (Pathoplasty Effects)***

Standardized parameter estimates and confidence intervals for the regression of psychopathology slope factor scores on personality intercept factor scores are summarized in panel 1 of [Figures 4.5](#) and [4.6](#), and full results for all regression models are available on the OSF page. Results demonstrated moderate support for a pathoplasty model among select facets. Internalizing slopes were significantly associated with intercepts of Fear (N1;  $\beta = .24$ , 95% CI [.13, .34]), Shyness (N2;  $\beta = .26$ , 95% CI [.15, .36]), Negative Affect (N3;  $\beta = .11$ , 95% CI [.00, .21]), Positive Emotions (E1;  $\beta = -.11$ , 95% CI [-.20, -.01]), Sociable (E2;  $\beta = -.19$ , 95% CI [-.29, -.10]), Activity Level (E4;  $\beta = -.15$ , 95% CI [-.25, -.05]), and Strong Willed (A2;  $\beta = .12$ , 95% CI [.02, .22]). Externalizing slopes were significantly associated with intercepts of Positive Emotions (E2;  $\beta = -.13$ , 95% CI [-.20, -.05]), Considerate (E3;  $\beta = -.15$ , 95% CI [-.24, -.07]), Strong Willed (A2;  $\beta = .19$ , 95% CI [.10, .28]), and Compliant (A3;  $\beta = -.11$ , 95% CI [-.19, -.02]).

### ***Personality Slope $\leftarrow$ Psychopathology Level Regressions (Stagnation Effects)***

Standardized parameter estimates and confidence intervals for the regression of personality slope factor scores on psychopathology intercept factor scores are depicted in panel 2 of [Figures 4.5](#) and [4.6](#). Results demonstrated moderate to strong support for a stagnation effect among select facets. Internalizing intercepts were significantly associated with all but one of the included personality slope factors, including Fear (N1;  $\beta = -.34$ , 95% CI [-.43, -.24]), Positive Emotions (E1;  $\beta = -.23$ , 95% CI [-.33, -.14]), Sociable (E2;  $\beta = -.15$ , 95% CI [-.25, -.05]), Considerate (E3;  $\beta = -.47$ , 95% CI [-.55, -.39]), Activity Level (E4;  $\beta = -.16$ , 95% CI [-.26, -.06]), Achievement Oriented (C2;  $\beta = .14$ , 95% CI [.05, .24]), Antagonism (A1;  $\beta = .14$ , 95% CI [.04, .23]), Intellect (O1;  $\beta = -.35$ , 95% CI [-.44, -.26]), and Openness (O2;  $\beta = -.33$ , 95% CI [-.42, -.24]). Externalizing intercepts were significantly associated with the same personality slope

factors as for Internalizing, and these relationships were very similar in degree. These slope factors included Fear (N1;  $\beta = -.29$ , 95% CI [-.38, -.21]), Positive Emotions (E1;  $\beta = -.26$ , 95% CI [-.35, -.17]), Sociable (E2;  $\beta = -.11$ , 95% CI [-.21, -.02]), Considerate (E3;  $\beta = -.47$ , 95% CI [-.56, -.39]), Activity Level (E4;  $\beta = -.09$ , 95% CI [-.19, .00]), Achievement Oriented (C2;  $\beta = .13$ , 95% CI [.04, .23]), Antagonism (A1;  $\beta = .15$ , 95% CI [.04, .26]), Intellect (O1;  $\beta = -.35$ , 95% CI [-.44, -.26]), and Openness (O2;  $\beta = -.31$ , 95% CI [-.40, -.22]).

### ***Correlated Change (Continuity/Common Cause Effects)***

Standardized parameter estimates and confidence intervals of the regression of psychopathology slope factor scores on personality slope factor scores are depicted in panel 3 of [Figures 4.5](#) and [4.6](#); a detailed summary of intercept-intercept relationships can be found on the OSF page, but this information is largely overlapping with between-person effects in the RI-CLPMs. Results evidenced moderate to strong evidence consistent with continuity/common cause models among a variety of facets. Internalizing slopes were significantly associated with slope factors for Fear (N1;  $\beta = .43$ , 95% CI [.34, .52]), Sociability (E2;  $\beta = -.16$ , 95% CI [-.25, -.07]), Activity Level (E4;  $\beta = -.18$ , 95% CI [-.28, -.09]), Achievement Oriented (C2;  $\beta = -.10$ , 95% CI [-.20, .00]), Antagonism (A1;  $\beta = .13$ , 95% CI [.04, .23]), and Intellect (O1;  $\beta = -.11$ , 95% CI [-.21, -.01]). Externalizing slopes were significantly associated with all personality slope factors, including Fear (N1;  $\beta = .16$ , 95% CI [.08, .23]), Positive Emotions (E1;  $\beta = -.32$ , 95% CI [-.32, -.18]), Sociable (E2;  $\beta = -.11$ , 95% CI [-.18, -.04]), Considerate (E3;  $\beta = -.30$ , 95% CI [-.37, -.22]), Activity Level (E4;  $\beta = -.10$ , 95% CI [-.17, -.03]), Antagonism (A1;  $\beta = .35$ , 95% CI [.28, .41]), Intellect (O1;  $\beta = -.14$ , 95% CI [-.21, -.06]), and Openness (O2;  $\beta = -.12$ , 95% CI [-.19, -.04]).

## **Discussion**

The present study evaluated several explanatory models for explaining the robust cross-sectional association between personality traits and broad dimensions of psychopathology. I examined facet-level personality traits to further isolate specific longitudinal dynamics that could give rise to trait-symptom links. I replicated a variety of prior research establishing robust and specific associations between facet-level personality traits and the internalizing *spectrum* and externalizing *superspectrum* (e.g., Watson et al., 2018). I also observed that there were few robust directional effects during the transition to adolescence; that is, trait changes did not consistently predict subsequent psychopathology changes, and psychopathology changes predicted relatively few subsequent trait changes. Instead, personality and psychopathology were associated irrespective of time point, and their development often occurred in lockstep. Internalizing psychopathology was most consistently related to all facets of neuroticism and two of four extraversion facets: Sociable (E2), and Activity Level (E4). Externalizing psychopathology was most robustly related to one of three neuroticism facets, Negative Affect (N3); two of four extraversion facets, Positive Emotions (E1) and Considerate (E3); all facets of conscientiousness; and all facets of agreeableness. These results have several implications for the conceptualization of personality within dimensional models of youth psychopathology.

### **The Vulnerability Model**

The present study was arguably the most severe test of the vulnerability model that has been completed, and results suggested that vulnerability is not the primary explanation behind the personality-psychopathology relationship. A vulnerability effect—whereby traits predict future psychopathology—was observable for only one facet-psychopathology pairing in the present study: Distractible (C3) and Internalizing. This vulnerability effect was only observable for a limited set of age groups, suggesting that it may not be robust across developmental stages

or samples. These results stand in contrast to prior research on this topic, and one interpretation of this non-replication is that existing evidence for the vulnerability model is artificially inflated as a result of inadequate statistical control for continuity/common cause effects. The majority of previous studies have employed traditional cross-lagged panel models that do not control for time-invariant overlaps between personality and psychopathology. As a result, estimates of cross-lagged effects in these models therefore reflect a mix of true vulnerability or scarring effects and continuity/common-cause effects (see Hamaker et al., 2015; Lucas, 2022). Further, most prior studies of the vulnerability model have not used a strong inference approach (Platt, 1964); that is, they do not control for or even evaluate any alternative explanatory models (c.f., De Bolle et al., 2012). The present study was thus the first to subject the vulnerability model to very risky tests.

However, other interpretations of the present vulnerability analyses are equally plausible. Personality may indeed serve as a vulnerability marker for future psychopathology, but this vulnerability may convert to psychopathology at earlier (e.g., during early childhood) or later (e.g., during young adulthood) ages than were included in this study. We are unable to distinguish between early vulnerability effects and common (e.g., genetic) causes in the present design; however, this is somewhat unlikely given that the average age of onset for many internalizing and externalizing disorders is during the period under study (Kessler et al., 2007). Alternatively, it is possible that trait level alone is not sufficient to capture vulnerability; indeed, some evidence suggests that traits only lead to psychopathology when combined with environmental moderators, such as stressful life events (i.e., a diathesis-stress effect; Flett et al., 1995). Future longitudinal work spanning earlier ages and including robust measurement of

environmental moderators such as adverse childhood experiences is needed to test these alternative explanations.

### **The Continuity and Common Cause Models**

The results of the present study are most (but not exclusively) consistent with continuity or common cause models, as has been demonstrated in prior research using domain-level traits (De Bolle et al., 2012, 2016). I observed a striking degree of overlap between some facet-level traits and symptom dimensions both between and within-persons. That is, not only were there links between the stable component of traits and symptoms across the study, but many traits and symptoms changed in lockstep together over time. As expected, these overlaps were largest for traits and symptoms that were most conceptually similar (e.g., Fear and Internalizing, Antagonism and Externalizing). Several explanations may underlie these findings. First, consistent with a continuity model, personality and psychopathology could reflect the same fundamental processes—that is, children’s emotional and behavioral problems may reflect normative variation in personality rather than a qualitatively separate psychological phenomenon. This explanation is particularly likely for the traits and symptoms with the highest degrees of overlap; according to the review by Durbin and Hicks (2014), associations between traits and symptoms are expected to be relatively large under a continuity model and relatively small under a common cause model. Notably, the magnitude of some between-person correlations in the present study approached reliability (e.g., Strong Willed and Externalizing;  $r = .71$ , 95% CI [.63, .79]).

However, both between- and within-person correlations between personality and psychopathology may instead arise due to shared measurement effects rather than true continuity (Nicholls et al., 1982). Indeed, item overlap between psychopathology and personality

assessments can be substantial; however, prior studies have found that connections between traits and symptoms go beyond shared measurement (e.g., De Bolle et al., 2012). Additionally, shared measurement could be a *direct consequence* of continuity between traits and psychopathology, rather than an artifact. The present personality measure, the ICID-S, is a lexically-derived measure based on parental free-descriptions of their children. Insofar as these free-descriptions included emotional and behavioral dysfunction, the lexical hypothesis (Allport & Odbert, 1936) item overlap with symptom measures would suggest that general personality includes both functional and dysfunctional traits. Finally, the connections I observed between traits and symptoms may reflect common causes, or third variable effects. This possibility is more likely for traits and symptoms with moderate to small degrees of overlap, and those that were correlated at between- but not within-person levels (e.g., Internalizing and Negative Affect [N3]; Durbin & Hicks, 2014). Common causes at the between-person level—such as genetic pleiotropy—could influence stable individual differences in both symptoms and traits. Common causes at the within-person level—such as pubertal developmental events or traumatic experiences—could influence either temporary or sustained deviations in both symptoms and traits. Future research using causally informative designs and momentary methods are needed to determine the extent of causal and/or experiential overlap between normative and pathological individual differences in this age group.

### **Other Models**

In the present study, stagnation effects were also quite consistent across a variety of traits. Higher levels of emotional and behavioral problems tended to foreshadow decreases in socially desirable traits (e.g., Positive Emotions [E1] and Considerate [E3]). By contrast, typically developing children tend to show normative personality maturation, or increases across a variety

of socially desirable traits from childhood to adulthood (Bleidorn et al., in press; Brandes et al., 2021). Personality maturation is thought to arise as young people increasingly adopt mature social roles at work and in their personal lives, a hypothesis termed *social investment theory* (Bleidorn et al., 2013; Lodi-Smith & Roberts, 2007). Social investment theory has not yet been extended to child or early adolescent samples, but this extension might shed light on the present results. One speculative interpretation of the present stagnation results is that children who experience psychopathology may not seek out or engage in age-appropriate social roles (e.g., investment in peer groups, caring for younger siblings, independently monitoring schoolwork and hygiene) to the same extent as their peers, resulting in a lack of normative maturation or regression. In addition to personality and psychopathology assessments, future research would benefit from incorporating longitudinal measurement of children's investment (or alternatively, specific impairment) at school, with peers, and at home to test this hypothesis.

In addition to the fairly robust evidence consistent with continuity/common cause and stagnation models, I found some limited evidence consistent with scar and pathoplasty models, as well. However, these effects were only apparent for select trait-symptom pairings (e.g., a pathoplastic effect was found for Strong Willed [A2] and Externalizing, but not Antagonism [A1] and Externalizing). Due to the relatively large number of tests and modest sample size for within-person effect estimation, these results should be interpreted with caution prior to out-of-sample replication. One thing that is relatively clear, though is that there is likely that more than one mechanistic model underlies the personality-psychopathology relationship. The present results paint a picture of relatively complex longitudinal dynamics between personality and psychopathology that requires much further investigation.

## **Limitations**

There are nonetheless several limitations to this study. One limitation of the present study had much greater power to detect between-person effects relative to within-person residual or cross-lagged effects, owing to three factors. First, the sample size for within-person effects was often around half of the between-person (i.e., total) sample size, owing to the accelerated longitudinal nature of the present design. Second, the variance for within-person effects was also approximately 50-60% of that of between-person effects. This finding is consistent with prior research on within- versus between-person trait variability (Fleeson, 2004), showing that people tend to differ from one another more than they differ from themselves over time. Third, within-person residuals in the RI-CLPM contain both true age-specific, person-specific deviations as well as measurement error. Thus, within-person residual relationships may be attenuated. Another chief limitation of the present study is the granularity of follow up assessments. It may be the case that traits and symptoms conform to a vulnerability, scar, or some other time-lagged model, but that these dynamics occur on a shorter timescale (e.g., month-to-month, week-to-week) or a much longer one (e.g., across the entirety of childhood). However, to the degree that null effects can be interpreted, the present study suggests that this dynamic likely does not unfold on a year-to-year basis.

## **Conclusion**

The present study provided a thorough test of several explanatory theories that may underlie the relationship between normative personality and broadband dimensions of psychopathology. I found that, in line with a speculative position advanced by HiTOP's Normative Personality Workgroup (Widiger et al., 2019), evidence was most consistent with either a continuity or a common cause model. Select personality facets within each domain—those that were consistent with the results of Study 2—showed striking longitudinal coordination

with internalizing and externalizing psychopathology in youth. However, I also found that no single model explained all connections between personality and psychopathology. Rather, psychopathology predicted personality maturational trajectories, and to a small degree, future personality level. These results suggest that personality and psychopathology are deeply intertwined, and that much remains to be known about the precise causal dynamics underlying the personality-psychopathology relationship.

## Chapter 5: General Discussion

In summary, this dissertation interrogated the validity of a dimensional, hierarchical model of youth psychopathology through its connections to normative personality. Study 1 examined the construct validity of one candidate psychopathology *component*, relational aggression, vis-à-vis its connections with normative traits, psychopathology, and personality pathology. Study 2 comprehensively mapped the relationships between facet-level personality traits, specific *syndromes*, and higher-order dimensions of psychopathology. Finally, Study 3 examined multiple explanatory models underlying the connection between personality traits, the internalizing *spectrum* and the externalizing *superspectrum*; namely, this study investigated whether personality foreshadows psychopathology development, whether psychopathology affects future personality development, or whether these two domains develop simultaneously over time. This dissertation is useful in illustrating how personality may bridge the gap between existing dimensional models of child psychopathology (e.g., Achenbach, 1966; Tackett, Daoud, et al., 2013) and the current (primarily adult) HiTOP model (Kotov et al., 2017). Further, this dissertation sheds further light on potential reasons *why* psychopathology dimensions are related to personality traits in youth.

The present dissertation has several implications for basic scientific understanding of psychopathology structure across age groups. HiTOP has not yet established a separate structural model for developing populations, though this is an imminent directive for the Developmental Workgroup. There is evidence both from prior research (e.g., Achenbach, 1966; Achenbach & Rescorla, 2001) and this dissertation (e.g., Fear/Distress subfactor overlap in Study 2) that this structure will likely have both similarities and differences between age groups. Thus, the studies of this dissertation collectively suggest that general personality could serve as a necessary *lingua*

*franca* between adult and child structural models. For example, while personality disorders are rarely studied or diagnosed in young people (Conway et al., 2017), they comprise major spectra in HiTOP (i.e., antagonism, detachment). In Study 1, I demonstrated how the personality features that are common to the antagonism spectrum form a critical thread in the nomological network of relational aggression; thus, even if narcissistic personality pathology is not included in HiTOP for younger groups (see Reardon et al., 2017), these normative personality features may facilitate continuity and communication across child and adult versions of the model. In Study 2, I similarly established facet-level trait profiles for a variety of syndromes and spectra. These trait profiles may also have utility, for example, when comparing the nomological network of the adult oppositionality construct in HiTOP (Mullins-Sweatt et al., 2019) to the construct as it manifests in children. Relatedly, in Study 3, I also demonstrated that personality accounted for a substantial portion of the longitudinal stability (i.e., between-person effects) in the internalizing *spectrum* and externalizing *superspectrum*. These results suggest that while the specific manifestations of psychopathology included in child versus adult HiTOP models may diverge, common personality features may underlie this heterotypic continuity.

The present dissertation also has several related implications for the assessment of psychopathology in applied settings, as it underscores the deep connections between normative personality traits and psychopathology. First, personality assessments are often well-established, broadband measures that can be administered in a relatively short period of time, with little effort on the part of the clinician or patient. Rather than requiring a comprehensive symptom battery for every newly admitted patient, clinical providers may administer personality inventories as a “first line” or screening assessment to inform which specific instruments may be subsequently needed. In addition, as personality measures capture both adaptive and maladaptive features, and

thus may allow assessors to take a holistic, strengths-based approach to identifying client difficulties and aptitudes (e.g., conscientious patients are likely to be compliant with therapy homework; open patients are likely to be willing to try unfamiliar treatment approaches). Second, personality assessments can be scored for both higher- and lower-order traits; as such, these traits may point to the degree of comorbidity vs. “purity” of the presenting problems. For example, while elevation across all facets of neuroticism may indicate that a patient is likely to present with comorbid internalizing and externalizing problems, a profile demonstrating specific elevation in anger may point to more specific externalizing problems.

The results of the present dissertation also suggest that personality may be useful in the selection and development of psychological treatments. As discussed by HiTOP’s Clinical Utility Workgroup (Ruggero et al., 2019), there is growing evidence that transdiagnostic treatments targeting spectra are efficacious at reducing symptoms (e.g., the *Unified Protocol for the Transdiagnostic Treatment of Emotional Disorders*; Barlow et al., 2017; Farchione et al., 2012) and neuroticism itself (Sauer-Zavala et al., 2021). Targeting transdiagnostic features of psychopathology—including personality traits—increases the efficiency of intervention assignment, as choosing between an increasing number of disorder-specific treatment protocols is burdensome for clinicians. The present dissertation advances our understanding of which personality traits may be targeted by transdiagnostic interventions versus those that may require additional, specific forms of treatment. In addition, transdiagnostic treatments have great potential for translation to prevention programs (e.g., in schools). The results of the present dissertation suggest that normative personality and psychopathology likely occupy a shared continuum or have common causes; thus, children with difficult personality features likely do not

differ qualitatively from children who meet criteria for formal diagnoses. Thus, they may benefit from early intervention all the same.

### **Limitations and Constraints on Generality**

There are several shared limitations to the studies included in the present dissertation. One limitation is that the majority of measures used across the three studies were parent-report. Parents exhibit an over-reliance on observable manifestations of personality and psychopathology, as they lack access to some of their child's private thoughts and emotions (Herjanic & Reich, 1982). These observational biases may partially account for the relatively weaker connections between personality and internalizing (vs. externalizing) psychopathology in Studies 2 and 3, as internalizing symptoms are inherently less observable. Relatedly, correlations between personality and psychopathology that rely on a single informant are subject to evaluative consistency (e.g., halo) biases that could be better controlled for with multi-informant methods (Campbell & Fiske, 1959). In addition, none of the study designs in this dissertation are conducive to causal inference. Prior research has sought to explain the connection between personality and psychopathology through behavior genetic designs, and future work would benefit from a combination of longitudinal and other experimental or quasi-experimental designs. For example, future studies could track personality dynamics at multiple points throughout psychological treatment, preferably while accounting for the non-randomized nature of treatment seeking using propensity score approaches.

There are also several limitations in the extent to which these results may be generalized (Simons et al., 2017). The present studies include some diversity in terms of race and ethnicity, sex assigned at birth, and geographic region. However, these samples are primarily North American, and location information was not available for Sample 5 (online-only). There is some

evidence supporting the cross-cultural generalizability of higher-order internalizing and externalizing psychopathology factors (Cheung et al., 2011; de Jonge et al., 2018; Krueger et al., 2003), but emic (i.e., indigenous) studies have shown that the FFM personality structure does not appear in some cultures outside of North America and Western Europe (e.g., Cheung et al., 2011; Church, 2016; Gurven et al., 2013; Thalmayer, Job, et al., 2021). Thus, I do not anticipate that the present results would exactly replicate outside of the United States, Canada, and other Western, Industrialized, Rich, and Democratic nations (Henrich et al., 2010). In addition, the present studies employed both questionnaire and interview measures of psychopathology. However, I do not anticipate that the present results would generalize to behavioral measures of either domain given the lack of correspondence between questionnaire/interview-based and task-based measures of personality and psychopathology (Dang et al., 2020).

## **Conclusions**

The results of this dissertation highlight the utility of personality as a tool for understanding comorbidity between children's psychiatric problems. The present studies echo prior work demonstrating that comorbidity between children's psychiatric symptoms can be captured by a hierarchy of transdiagnostic factors ranging from highly specific patterns of thinking, feeling, and behaving, up to very broad, cross-situationally and cross-temporally consistent patterns of dysfunction. The present dissertation found that the psychological nature of these transdiagnostic factors was largely overlapping with normative personality in youth. That is, the studies in the present dissertation largely do not support traditional clinical theories stating that personality and psychopathology are qualitatively separate phenomena, but instead show that normative individual differences and child psychiatric symptoms have a great deal in common.

## Tables and Figures

Table 1.1

*Sample Demographics, Procedures, and Measure Versions*

| Characteristic                 | Sample 1                               | Sample 2                                        | Sample 3                               | Sample 4                      | Sample 5                       | Sample 6                                        |
|--------------------------------|----------------------------------------|-------------------------------------------------|----------------------------------------|-------------------------------|--------------------------------|-------------------------------------------------|
| Total N                        | 442                                    | 350                                             | 491                                    | 195                           | 1350                           | 304                                             |
| % Collected                    | 100                                    | 100                                             | 100                                    | 100                           | 100                            | 100                                             |
| N Collection Waves             | 4                                      | 2                                               | 2                                      | 1                             | 1                              | 1                                               |
| Years Collected                | 2007-2013                              | 2012-2018                                       | 2008-2011                              | 2014-2017                     | 2016-2018                      | 2016-2019                                       |
| Youth Age M (SD)               | 10.48 (1.23)                           | 9.81 (0.66)                                     | 12.1 (3.57)                            | 12.67 (3.13)                  | 10.38 (3.42)                   | 9.81 (0.66)                                     |
| Youth Gender (% Female)        | 50.7                                   | 52.9                                            | 51.4                                   | 54.4                          | 47.8                           | 52.9                                            |
| Youth Race/Ethnicity (% White) | 67.4                                   | 30.2                                            | 61.2                                   | 66.2                          | 60.2                           | 30.2                                            |
| Informant (% Mother)           | 85.7                                   | 98.0                                            | 72.2                                   | 84.5                          | 88.4                           | 98.0                                            |
| Recruitment Source             | Flyers & Participant Pool<br>Metro, SE | Flyers & School Directory<br>Metro, SE          | Flyers & Participant Pool<br>Metro, SE | School Directory<br>Metro, SE | mTurk & Insighta<br>Mixed, USA | Flyers<br>Metro, NE                             |
| Geographic Region              | Ontario, CA                            | Texas, USA                                      | Ontario, CA                            | Texas, USA                    | USA                            | Illinois, USA                                   |
| Survey Modality                | In-lab/Mail                            | In-lab                                          | In-lab/Mail<br>Gift card; CI           | Online                        | Online                         | In-lab                                          |
| Compensation                   | CAD \$; gifts                          | Gift Card                                       | Credit <sup>a</sup>                    | Gift Card                     | Variable*                      | Gift card                                       |
| ICID Version (Items)           | Long (144) & Short (50) <sup>b</sup>   | Short (50)<br>Full (13) & RAgg (5) <sup>b</sup> | Long (144)                             | Short (50)                    | Short (50)                     | Short (50)<br>Full (13) & RAgg (5) <sup>b</sup> |
| CSBS Version (Items)           | Full (13)                              |                                                 | Full (13)                              | RAgg (5)                      | RAgg (5)                       |                                                 |

*Note.* Statistics represent the total sample collected (no exclusions applied), as the subsample included in each study will differ based on data missingness. <sup>a</sup>CI Credit = Interested high school students were offered credit toward Ontario Secondary School Diploma community involvement requirements; <sup>b</sup> Different versions were administered (a) across different longitudinal collection waves, (b) across different informants, or (c) across both wave and informant. RAgg = Relational Aggression subscale only.

Table 2.1

*External Validity Measures*

| Measure Name                                   | Reference                                             | Informant(s)   | N<br>Items | Item<br>Scale | Anchor (low)                     | Anchor (high)                    |
|------------------------------------------------|-------------------------------------------------------|----------------|------------|---------------|----------------------------------|----------------------------------|
| <i>Relational Aggression</i>                   |                                                       |                |            |               |                                  |                                  |
| Children's Social Behavior Scale               | Crick, 1995                                           | Parent & Youth | 13         | 1-5           | Never true                       | Almost always true               |
| Social Relations Questionnaire                 | Lahey, Applegate, Waldman, Loft, Hankin, & Rick, 2004 | Parent & Youth | 7          | 1-4           | Not at all                       | Very much                        |
| Forms and Functions of Aggression              | Little, Henrich, Jones, & Hawley, 2003                | Parent         | 36         | 1-4           | Not at all                       | Very much                        |
| <i>Psychopathology</i>                         |                                                       |                |            |               |                                  |                                  |
| Child Behavior Checklist                       | Achenbach & Rescorla, 2001                            | Parent         | 194        | 0-2           | Never                            | Very often                       |
| Youth Self-Report                              | Achenbach & Rescorla, 2001                            | Youth          | 194        | 0-2           | Never                            | Very often                       |
| Pediatric Symptom Checklist-17                 | Gardner et al., 1999                                  | Parent         | 17         | 0-2           | Never                            | Often                            |
| Inventory of Callous-Unemotional Traits        | Frick, 2004                                           | Parent & Youth | 24         | 0-3           | Not at all true                  | Definitely true                  |
| Dimensional Personality Symptom Item Pool      | De Clercq et al., 2006                                | Parent & Youth | 172        | 1-5           | Not characteristic               | Highly characteristic            |
| DIPSI--Markers Form                            | Verbeke & De Clercq, 2014                             | Parent         | 96         | 1-5           | Not characteristic               | Highly characteristic            |
| DIPSI--Short Form                              | Reardon & Tackett, 2018                               | Parent         | 81         | 1-5           | Not characteristic               | Highly characteristic            |
| <i>Personality/Temperament</i>                 |                                                       |                |            |               |                                  |                                  |
| Inventory of Children's Individual Differences | Halverson et al., 2003                                | Parent & Youth | 144        | 1-7           | Much less than the average child | Much more than the average child |

|                                               |                                                                               |                |     |                       |                                            |                                           |
|-----------------------------------------------|-------------------------------------------------------------------------------|----------------|-----|-----------------------|--------------------------------------------|-------------------------------------------|
| ICID--Short Form                              | Deal et al., 2007                                                             | Parent & Youth | 50  | 1-7                   | Much less than the average child           | Much more than the average child          |
| Big Five Inventory                            | John, Donahue & Kentle, 1991                                                  | Parent & Youth | 44  | 1-5                   | Disagree strongly                          | Agree strongly                            |
| Big Five Inventory-2                          | Soto & John, 2017                                                             | Parent & Youth | 60  | 1-5                   | Disagree strongly                          | Agree strongly                            |
| Early Adolescent Temperament Questionnaire    | Ellis & Rothbart, 2001                                                        | Parent & Youth | 62  | 1-5                   | Almost always untrue                       | Almost always true                        |
| Temperament in Middle Childhood Questionnaire | Simonds & Rothbart, 2004                                                      | Parent         | 157 | 1-5                   | Almost always untrue                       | Almost always true                        |
| <i>Interpersonal Functioning</i>              |                                                                               |                |     |                       |                                            |                                           |
| Child Behavior Checklist                      | Achenbach & Rescorla, 2001                                                    | Parent         | 6   | Variable <sup>a</sup> | Variable <sup>a</sup>                      | Variable <sup>a</sup>                     |
| Youth Self-Report                             | Achenbach & Rescorla, 2001                                                    | Youth          | 6   | Variable <sup>a</sup> | Variable <sup>a</sup>                      | Variable <sup>a</sup>                     |
| Friendship Quality Questionnaire              | Parker & Asher, 1993                                                          | Youth          | 21  | 1-5                   | Not at all true                            | Really true                               |
| Friends                                       | Munholland, 1996                                                              | Parent & Youth | 17  | 1-5                   | None of my [child's] friends are like that | All of my [child's] friends are like that |
| <i>Other</i>                                  |                                                                               |                |     |                       |                                            |                                           |
| Satisfaction with Life                        | Diener, Emmons, Larsen, & Griffin, 1985 (adapted)                             | Parent & Youth | 3   | 1-7                   | Much less than the average youth           | Much more than the average youth          |
| Life Stressors                                | Billig, Hershberger, Iacono, & McGue, 1996 (adapted); Kushner & Tackett, 2017 | Parent & Youth | 49  | 0-1                   | Absent                                     | Present                                   |

*Note.* <sup>a</sup> ASEBA Social Competencies scores consist of multiple different kinds of items, including counts, frequencies, and Likert-scale items. Thus, they cannot be represented by single values here, but this scale will be calculated according to the ASEBA manual scoring.

Table 2.2

*Measurement Invariance of CSBS Relational Aggression*

| Grouping Variable      | Invariance Level | $\Delta\chi^2^a$ | $p(\Delta\chi^2)$ | $\Delta CFI$   | $\Delta TLI$   | $\Delta RMSEA$ |
|------------------------|------------------|------------------|-------------------|----------------|----------------|----------------|
| Parent-Report          |                  |                  |                   |                |                |                |
| Gender                 | Strict           | 3.96             | 0.555             | 0 <sup>b</sup> | 0 <sup>b</sup> | 0 <sup>b</sup> |
| Race/Ethnicity         | Strong           | 31.42            | 0.050             | 0.004          | <b>0.016</b>   | 0 <sup>b</sup> |
| Age Group              | Metric           | 51.26            | 0.005             | 0.006          | 0 <sup>b</sup> | 0 <sup>b</sup> |
|                        | Strong           | 136.45           | <.001             | <b>0.023</b>   | <b>0.010</b>   | 0.010          |
|                        | Strict           | 130.18           | <.001             | <b>0.026</b>   | 0.005          | 0.004          |
| Time (Collection Wave) | Strict           | 9.7              | 0.842             | 0.008          | 0.002          | 0.003          |
| Youth-Report           |                  |                  |                   |                |                |                |
| Gender                 | Metric (partial) | 1.54             | 0.673             | 0 <sup>b</sup> | 0 <sup>b</sup> | 0 <sup>b</sup> |
| Race/Ethnicity         | Metric           | 18.53            | 0.552             | 0 <sup>b</sup> | 0 <sup>b</sup> | 0 <sup>b</sup> |
|                        | Strong           | 28.15            | 0.106             | <b>0.011</b>   | 0.003          | 0.002          |
| Age Group              | Metric           | 17.14            | 0.144             | 0.004          | 0.005          | <b>0.018</b>   |

*Note.* Relative fit indices reflect a comparison between the most constrained model that was retained relative to the previous model (e.g., for those that achieved strong invariance, differences in fit are reported between metric and strong invariance models). Due to the robust estimator, some scaled global fit statistics show *increased* fit for the more constrained model. Bolded values exceed preregistered thresholds.

<sup>a</sup>Values are differences between standard (not robust) statistics, but a Satorra-Bentler scaled chi-square difference test was applied.

<sup>b</sup>Model fit evidenced a negligible degree of *improvement*, though this was determined to be due to the use of robust statistics and changes were insubstantial.

Table 2.3

*CSBS Relational Aggression Predictive Validity by Parent-Report*

| Variable (T1)                                             | <i>B</i>   | <i>SE<sub>B</sub></i> | 95% <i>CI<sub>B</sub></i> | $\beta$    | <i>R</i> <sup>2</sup> | <i>F</i>     |
|-----------------------------------------------------------|------------|-----------------------|---------------------------|------------|-----------------------|--------------|
| Model 1: ASEBA Social Problems                            |            |                       |                           |            |                       |              |
| Social Problems                                           | <b>.48</b> | .05                   | [.38, .58]                | <b>.57</b> | .31                   | <b>51.47</b> |
| CSBS RAgg                                                 | -.12       | .21                   | [-.54, .30]               | -.03       |                       |              |
| Model 2: ASEBA Social Competencies                        |            |                       |                           |            |                       |              |
| Social Competencies                                       | <b>.60</b> | .06                   | [.49, .71]                | <b>.59</b> | .34                   | <b>55.66</b> |
| CSBS RAgg                                                 | .18        | .24                   | [-.29, .66]               | .04        |                       |              |
| Model 3: Callous-Unemotional Traits (CU Traits)           |            |                       |                           |            |                       |              |
| CU Traits                                                 | <b>.65</b> | .08                   | [.49, .81]                | <b>.54</b> | .35                   | <b>40.69</b> |
| CSBS RAgg                                                 | .10        | .05                   | [.00, .19]                | .14        |                       |              |
| Model 4: LEQ Nonindependent Non-Family Life Events (NINF) |            |                       |                           |            |                       |              |
| LEQ NINF                                                  | <b>.32</b> | .06                   | [.20, .44]                | <b>.30</b> | .15                   | <b>25.75</b> |
| CSBS RAgg                                                 | <b>.28</b> | .09                   | [.11, .45]                | <b>.18</b> |                       |              |

*Note.* The variable at the second time point (T2) was regressed on CSBS Relational Aggression (RAgg) at the first time point (T1) and the variable at T1.

Bolded values indicate  $p < .01$ .

Table 3.1

*Psychopathology Confirmatory Factor Model Fit and Parameter Estimates*

| Characteristic                            | Two-Factor Model                |                                 | Three-Factor Model        |                            |                                 |
|-------------------------------------------|---------------------------------|---------------------------------|---------------------------|----------------------------|---------------------------------|
|                                           | Internalizing<br>$\lambda$ (SE) | Externalizing<br>$\lambda$ (SE) | Anxiety<br>$\lambda$ (SE) | Distress<br>$\lambda$ (SE) | Externalizing<br>$\lambda$ (SE) |
| CDISC SAD                                 | 0.60 (0.06)                     |                                 | 0.68<br>(0.08)            |                            |                                 |
| CDISC Social Phobia                       | 0.47 (0.08)                     |                                 | 0.52<br>(0.06)            |                            |                                 |
| CDISC GAD                                 | 0.62 (0.11)                     |                                 |                           | 0.69<br>(0.09)             |                                 |
| CDISC MDD                                 | 0.56 (0.13)                     |                                 |                           | 0.64<br>(0.11)             |                                 |
| CDISC ODD                                 |                                 | 0.77 (0.06)                     |                           |                            | 0.77 (0.06)                     |
| CDISC Conduct Disorder                    |                                 | 0.40 (0.05)                     |                           |                            | 0.41 (0.05)                     |
| CDISC ADHD                                |                                 | 0.58 (0.06)                     |                           |                            | 0.58 (0.06)                     |
| Model Fit                                 |                                 |                                 |                           |                            |                                 |
| CFI/TLI                                   | 0.96/0.94                       |                                 | 0.98/0.97                 |                            |                                 |
| RMSEA [90% CI]                            | 0.04 [0.02, 0.06]               |                                 | 0.03 [0.00, 0.05]         |                            |                                 |
| SRMR                                      | 0.04                            |                                 | 0.03                      |                            |                                 |
| Factor Correlations & Omega Reliabilities |                                 |                                 |                           |                            |                                 |
| Internalizing                             | 0.63                            |                                 |                           |                            |                                 |
| Externalizing                             | 0.41                            | 0.54                            |                           |                            |                                 |
| Anxiety                                   | -                               | -                               | 0.52                      |                            |                                 |
| Distress                                  | -                               | -                               | 0.70                      | 0.61                       |                                 |
| Externalizing                             | -                               | -                               | 0.39                      | 0.33                       | 0.54                            |

*Note.* All models included sample as a covariate (omitted for clarity).  $\lambda$  = Standardized factor loading; CDISC = Computerized Diagnostic Interview Schedule; SAD = Separation Anxiety Disorder; GAD = Generalized Anxiety Disorder; MDD = Major Depressive Disorder; ODD = Oppositional Defiant Disorder; ADHD = Attention Deficit Hyperactivity Disorder; SE = Standard Error; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; SRMR = Standard Root Mean Square Residual; Omega hierarchical reliability is reported on the diagonal, while latent correlations are on the lower diagonal.

Table 3.2

*Model Fit and Parameter Estimates for Two-Factor Psychopathology Structural Model*

| Characteristic        | Internalizing  |                            |             |                                      | Externalizing |                            |             |                                      |
|-----------------------|----------------|----------------------------|-------------|--------------------------------------|---------------|----------------------------|-------------|--------------------------------------|
|                       | <i>r</i>       | 95% CI <sub><i>r</i></sub> | $\beta$     | 95% CI <sub><math>\beta</math></sub> | <i>r</i>      | 95% CI <sub><i>r</i></sub> | $\beta$     | 95% CI <sub><math>\beta</math></sub> |
| N1: Fear              | <b>.51</b>     | [.41, .61]                 | <b>.39</b>  | [.25, .54]                           | <b>.28</b>    | [.18, .38]                 | .1          | [-.01, .20]                          |
| N2: Shyness           | <b>.39</b>     | [.26, .51]                 | .11         | [-.05, .26]                          | <b>.19</b>    | [.09, .29]                 | <b>-.11</b> | [-.21, -.01]                         |
| N3: Negative Affect   | <b>.33</b>     | [.24, .43]                 | <b>.14</b>  | [.03, .24]                           | <b>.62</b>    | [.54, .69]                 | <b>.62</b>  | [.54, .70]                           |
| CFI/TLI               | .96 / .94      |                            |             |                                      |               |                            |             |                                      |
| RMSEA [90% CI]        | .04 [.03, .06] |                            |             |                                      |               |                            |             |                                      |
| SRMR                  | 0.04           |                            |             |                                      |               |                            |             |                                      |
| E1: Positive Emotions | <b>-.15</b>    | [-.27, -.02]               | -.13        | [-.33, .07]                          | <b>-.34</b>   | [-.44, -.23]               | <b>-.25</b> | [-.45, -.06]                         |
| E2: Sociability       | <b>-.30</b>    | [-.42, -.17]               | -.26        | [-.44, -.09]                         | -.10          | [-.20, .00]                | .13         | [.00, .26]                           |
| E3: Considerate       | -.04           | [-.16, .08]                | <b>.21</b>  | [.04, .38]                           | <b>-.33</b>   | [-.43, -.23]               | <b>-.20</b> | [-.39, -.02]                         |
| E4: Activity          | <b>-.26</b>    | [-.37, -.15]               | -.12        | [-.26, .01]                          | -.06          | [-.17, .05]                | .00         | [-.12, .12]                          |
| CFI/TLI               | .97 / .94      |                            |             |                                      |               |                            |             |                                      |
| RMSEA [90% CI]        | .05 [.03, .06] |                            |             |                                      |               |                            |             |                                      |
| SRMR                  | 0.04           |                            |             |                                      |               |                            |             |                                      |
| C1: Organized         | <b>-.16</b>    | [-.28, -.03]               | .05         | [-.09, .19]                          | <b>-.54</b>   | [-.61, -.46]               | <b>-.27</b> | [-.37, -.18]                         |
| C2: Achievement Or.   | <b>-.23</b>    | [-.35, -.11]               | <b>-.17</b> | [-.32, -.02]                         | <b>-.47</b>   | [-.55, -.39]               | -.09        | [-.19, .01]                          |
| C3: Distractible (R)  | <b>-.24</b>    | [-.36, -.12]               | <b>-.18</b> | [-.34, -.02]                         | <b>-.58</b>   | [-.65, -.50]               | <b>-.38</b> | [-.47, -.29]                         |
| CFI/TLI               | .94 / .90      |                            |             |                                      |               |                            |             |                                      |
| RMSEA [90% CI]        | .06 [.05, .07] |                            |             |                                      |               |                            |             |                                      |
| SRMR                  | 0.04           |                            |             |                                      |               |                            |             |                                      |
| A1: Antagonism (R)    | <b>-.20</b>    | [-.32, -.08]               | -.06        | [-.22, .10]                          | <b>-.62</b>   | [-.72, -.53]               | <b>-.23</b> | [-.39, -.07]                         |
| A2: Strong Willed (R) | <b>-.20</b>    | [-.33, -.06]               | -.10        | [-.27, .06]                          | <b>-.60</b>   | [-.68, -.52]               | <b>-.31</b> | [-.41, -.21]                         |
| A3: Compliant         | <b>-.21</b>    | [-.33, -.08]               | -.13        | [-.28, .02]                          | <b>-.60</b>   | [-.68, -.51]               | <b>-.34</b> | [-.47, -.22]                         |
| CFI/TLI               | .95 / .92      |                            |             |                                      |               |                            |             |                                      |
| RMSEA [90% CI]        | .05 [.04, .07] |                            |             |                                      |               |                            |             |                                      |
| SRMR                  | 0.04           |                            |             |                                      |               |                            |             |                                      |
| O1: Intellect         | <b>-.22</b>    | [-.37, -.08]               | -.20        | [-.40, -.01]                         | <b>-.27</b>   | [-.39, -.14]               | <b>-.45</b> | [-.61, -.28]                         |
| O2: Openness          | <b>-.16</b>    | [-.27, -.04]               | -.03        | [-.19, .13]                          | .03           | [-.07, .13]                | <b>.30</b>  | [.17, .43]                           |
| CFI/TLI               | .92 / .88      |                            |             |                                      |               |                            |             |                                      |
| RMSEA [90% CI]        | .06 [.05, .07] |                            |             |                                      |               |                            |             |                                      |
| SRMR                  | 0.04           |                            |             |                                      |               |                            |             |                                      |

*Note.* Bolded estimates were significant at Holm-corrected alpha of .05. Italicized estimates were significant at uncorrected alpha of .05.

N = Neuroticism; E = Extraversion; C = Conscientiousness; A = Agreeableness; O = Openness to Experience; Achievement Or. = Achievement Oriented; R = Reverse-Scored.

Table 3.3

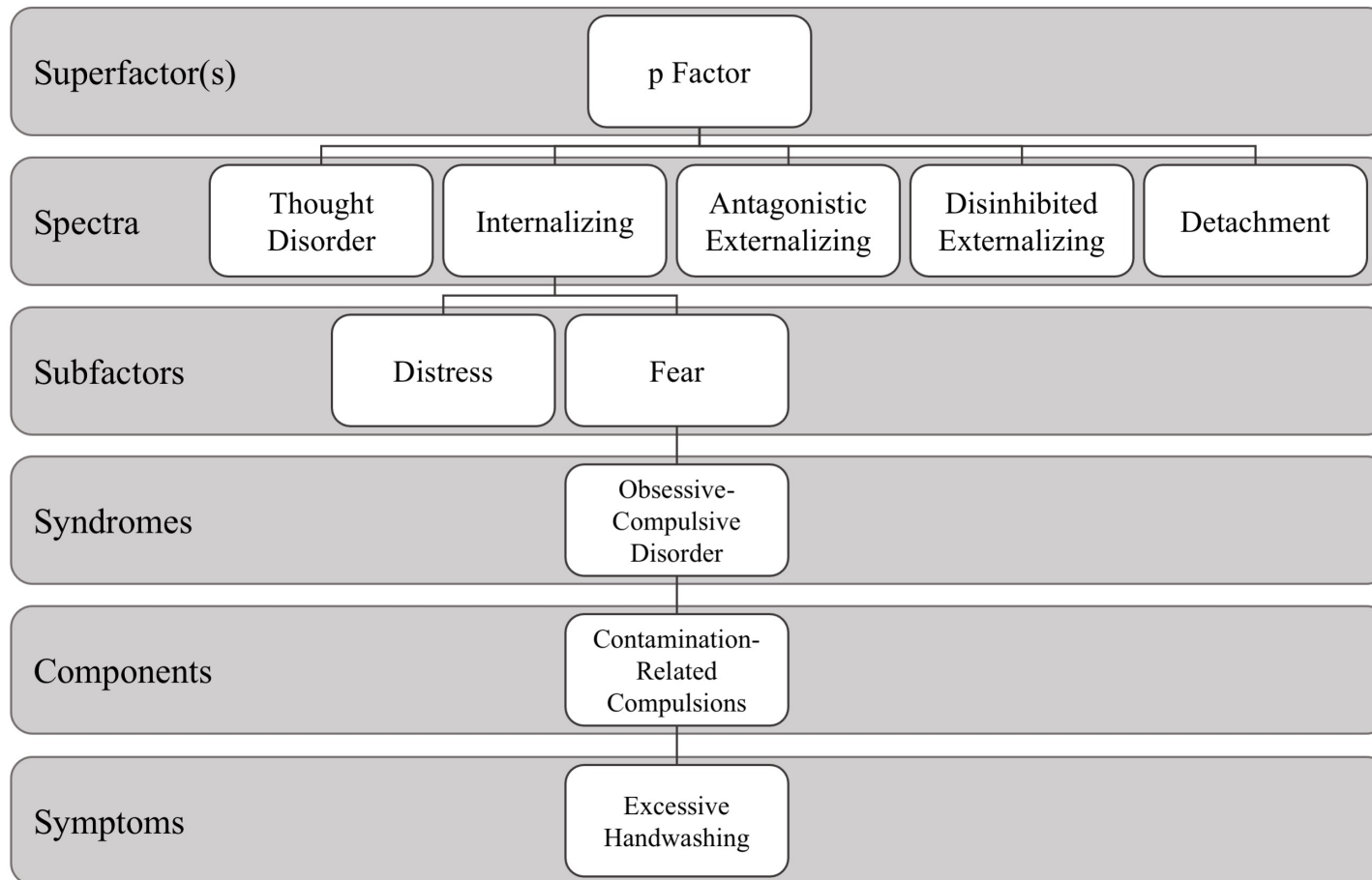
*Model Fit and Parameter Estimates for Three-Factor Psychopathology Structural Model*

| Characteristic        | Anxiety        |                            |             |                                      | Distress    |                            |         |                                      |
|-----------------------|----------------|----------------------------|-------------|--------------------------------------|-------------|----------------------------|---------|--------------------------------------|
|                       | <i>r</i>       | 95% CI <sub><i>r</i></sub> | $\beta$     | 95% CI <sub><math>\beta</math></sub> | <i>r</i>    | 95% CI <sub><i>r</i></sub> | $\beta$ | 95% CI <sub><math>\beta</math></sub> |
| N1: Fear              | <b>.52</b>     | [.42, .62]                 | <b>.45</b>  | [.30, .61]                           | <b>.33</b>  | [.22, .44]                 | .17     | [.05, .29]                           |
| N2: Shyness           | <b>.35</b>     | [.20, .50]                 | .06         | [-.13, .24]                          | <b>.31</b>  | [.16, .46]                 | .14     | [-.03, .30]                          |
| N3: Negative Affect   | <b>.29</b>     | [.18, .40]                 | .09         | [-.02, .20]                          | <b>.32</b>  | [.20, .44]                 | .2      | [.08, .32]                           |
| CFI/TLI               | .98 / .96      |                            |             |                                      |             |                            |         |                                      |
| RMSEA [90% CI]        | .04 [.02, .05] |                            |             |                                      |             |                            |         |                                      |
| SRMR                  | .03            |                            |             |                                      |             |                            |         |                                      |
| E1: Positive Emotions | -.08           | [-.22, .05]                | -.04        | [-.28, .20]                          | -.20        | [-.35, -.06]               | -.21    | [-.42, .00]                          |
| E2: Sociability       | <b>-.23</b>    | [-.37, -.08]               | -.20        | [-.41, .01]                          | <b>-.31</b> | [-.46, -.17]               | -.26    | [-.45, -.07]                         |
| E3: Considerate       | -.02           | [-.14, .10]                | .14         | [-.09, .37]                          | -.08        | [-.20, .05]                | .23     | [.08, .39]                           |
| E4: Activity          | <b>-.21</b>    | [-.33, -.09]               | -.12        | [-.27, .03]                          | -.25        | [-.36, -.15]               | -.1     | [-.24, .03]                          |
| CFI/TLI               | .97 / .94      |                            |             |                                      |             |                            |         |                                      |
| RMSEA [90% CI]        | .05 [.03, .06] |                            |             |                                      |             |                            |         |                                      |
| SRMR                  | .03            |                            |             |                                      |             |                            |         |                                      |
| C1: Organized         | -.17           | [-.30, -.04]               | .02         | [-.14, .18]                          | -.10        | [-.22, .02]                | .07     | [-.06, .20]                          |
| C2: Achievement Or.   | <b>-.22</b>    | [-.34, -.10]               | -.13        | [-.27, .02]                          | -.19        | [-.31, -.06]               | -.19    | [-.36, -.03]                         |
| C3: Distractible (R)  | <b>-.26</b>    | [-.37, -.15]               | -.21        | [-.36, -.06]                         | -.14        | [-.26, -.02]               | -.08    | [-.24, .08]                          |
| CFI/TLI               | .95 / .90      |                            |             |                                      |             |                            |         |                                      |
| RMSEA [90% CI]        | .06 [.05, .08] |                            |             |                                      |             |                            |         |                                      |
| SRMR                  | .04            |                            |             |                                      |             |                            |         |                                      |
| A1: Antagonism (R)    | -.16           | [-.28, -.04]               | -.02        | [-.20, .15]                          | -.20        | [-.34, -.06]               | -.09    | [-.26, .08]                          |
| A2: Strong Willed (R) | -.16           | [-.29, -.03]               | -.09        | [-.26, .09]                          | -.19        | [-.35, -.03]               | -.10    | [-.28, .09]                          |
| A3: Compliant         | -.19           | [-.33, -.06]               | -.15        | [-.32, .02]                          | -.17        | [-.30, -.04]               | -.08    | [-.21, .05]                          |
| CFI/TLI               | .96 / .91      |                            |             |                                      |             |                            |         |                                      |
| RMSEA [90% CI]        | .06 [.04, .07] |                            |             |                                      |             |                            |         |                                      |
| SRMR                  | .03            |                            |             |                                      |             |                            |         |                                      |
| O1: Intellect         | <b>-.25</b>    | [-.39, -.12]               | <b>-.26</b> | [-.43, -.09]                         | -.11        | [-.25, .04]                | -.05    | [-.24, .15]                          |
| O2: Openness          | -.15           | [-.27, -.03]               | .01         | [-.14, .16]                          | -.13        | [-.26, -.01]               | -.10    | [-.27, .07]                          |
| CFI/TLI               | .93 / .89      |                            |             |                                      |             |                            |         |                                      |
| RMSEA [90% CI]        | .06 [.04, .07] |                            |             |                                      |             |                            |         |                                      |
| SRMR                  | .03            |                            |             |                                      |             |                            |         |                                      |

*Note.* Bolded estimates were significant at Holm-corrected alpha of .05. Italicized estimates were significant at uncorrected alpha of .05.

N = Neuroticism; E = Extraversion; C = Conscientiousness; A = Agreeableness; O = Openness to Experience; Achievement Or. = Achievement Oriented; R = Reverse-Scored.

Figure 1.1

*Hierarchical Taxonomy of Psychopathology Levels of Analysis and Sample Dimensions*

*Note.* Figure represents only selected, sample dimensions from the taxonomy. For a full representation of all proposed dimensions, see Kotov et al. (2017), Figure 2.

Figure 2.1

*Distribution of CSBS Relational Aggression Split-Half Reliabilities by Informant*

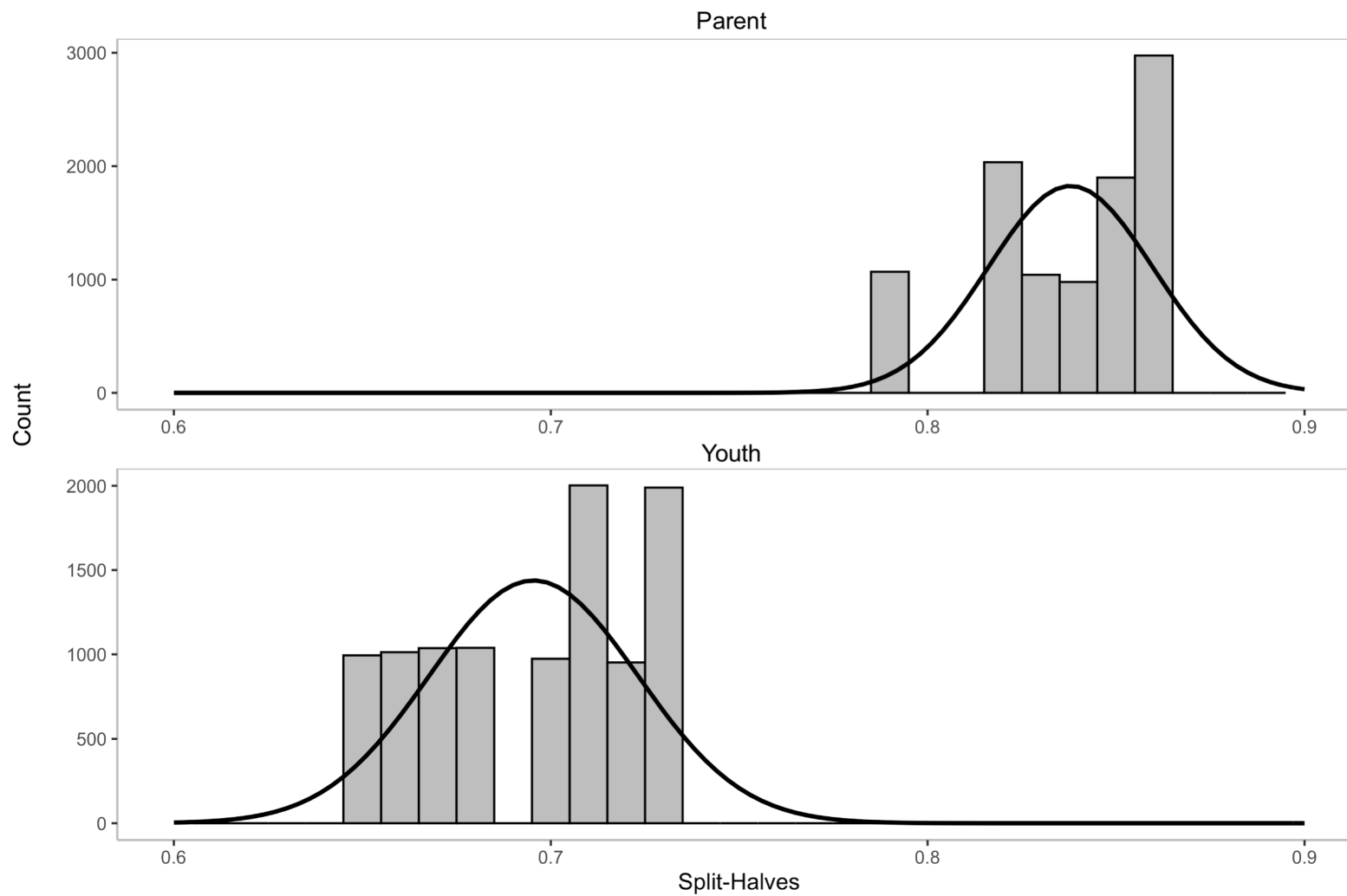
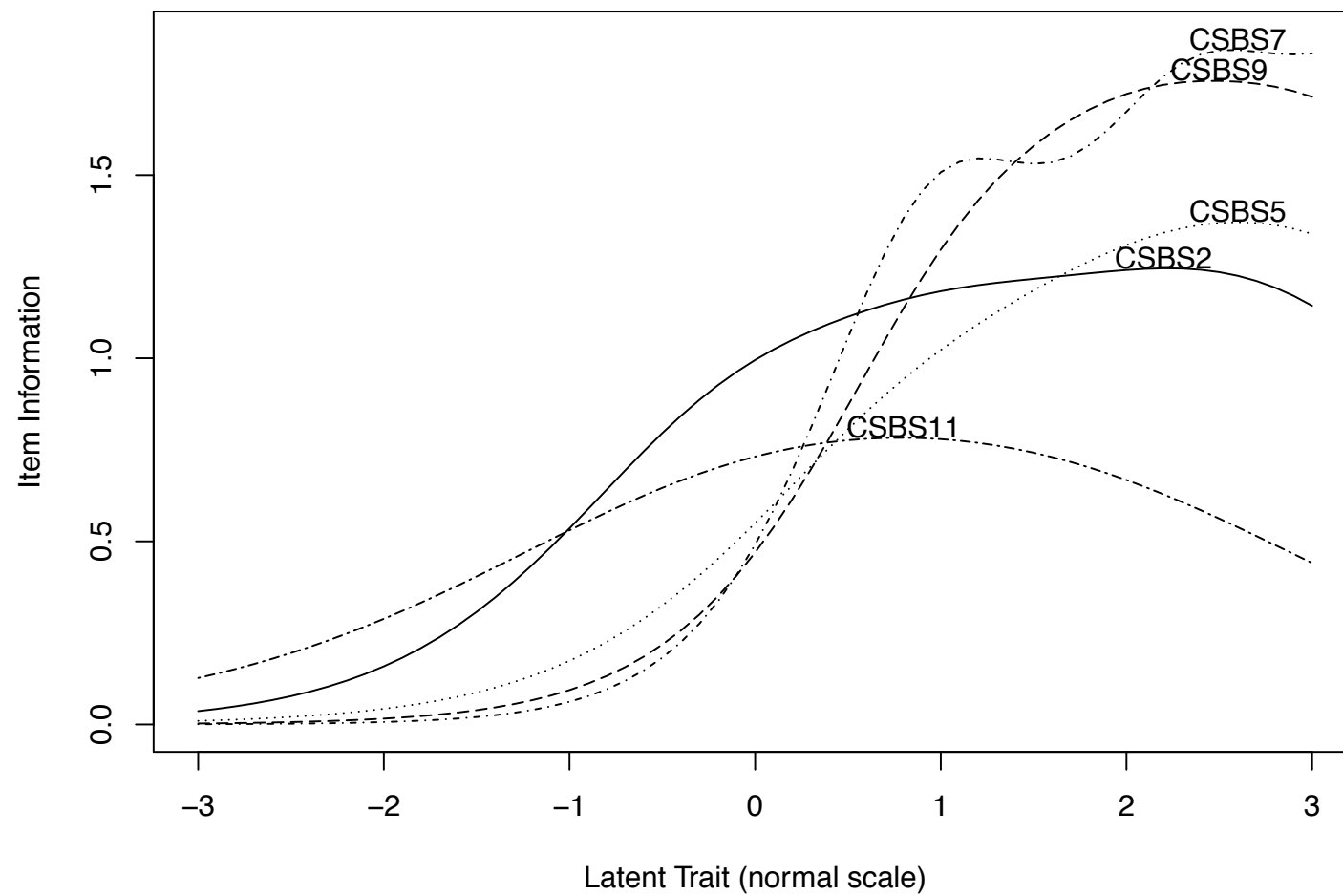


Figure 2.2

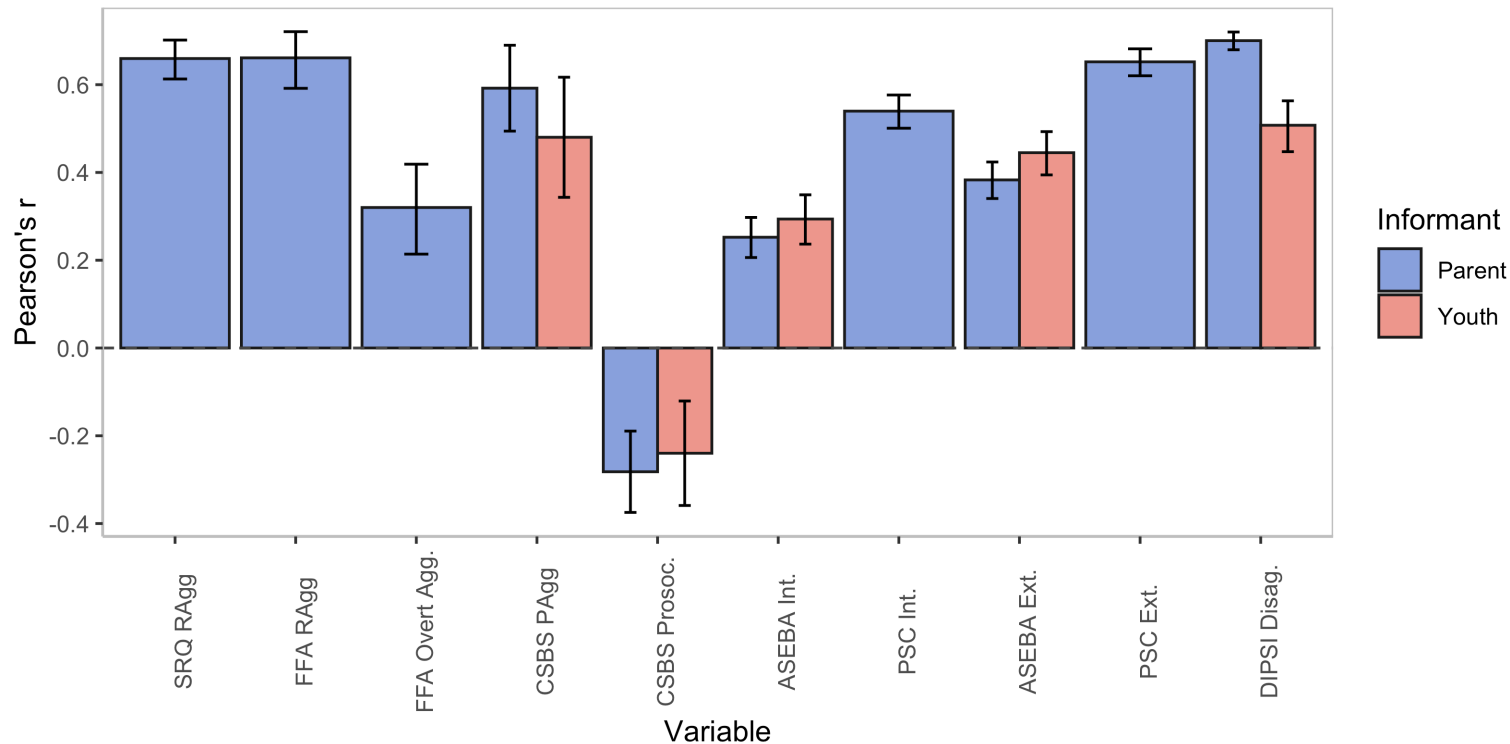
*CSBS Relational Aggression Item Information via Parent Report*



*Note:* CSBS = Children's Social Behavior Scale

Figure 2.3

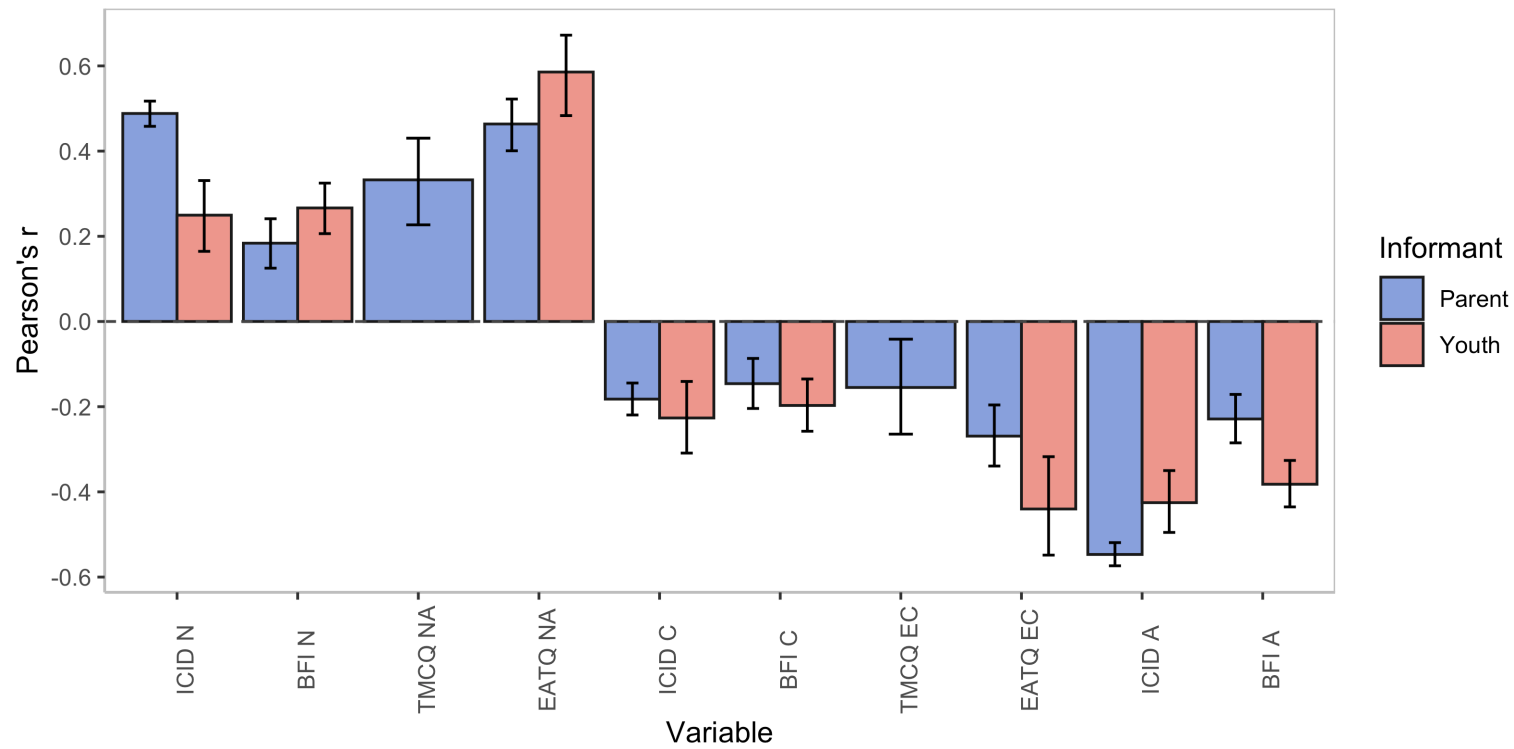
*CSBS Relational Aggression Convergent-Discriminant Correlations with Aggression and Psychopathology for Parent and Youth Informants*



*Note.* SRQ = Social Relations Questionnaire; FFA = Forms and Functions of Aggression; ASEBA = Achenbach System of Empirically Based Assessment; PSC = Psychiatric Symptom Checklist-17; DIPSI = Dimensional Personality Symptom Item Pool RAgg = Relational Aggression; Overt Agg. = Overt Aggression; PAgg = Physical Aggression; Int. = Internalizing Problems; Ext. = Externalizing Problems; Disag. = Disagreeableness. Bars represent 95% confidence intervals.

Figure 2.4

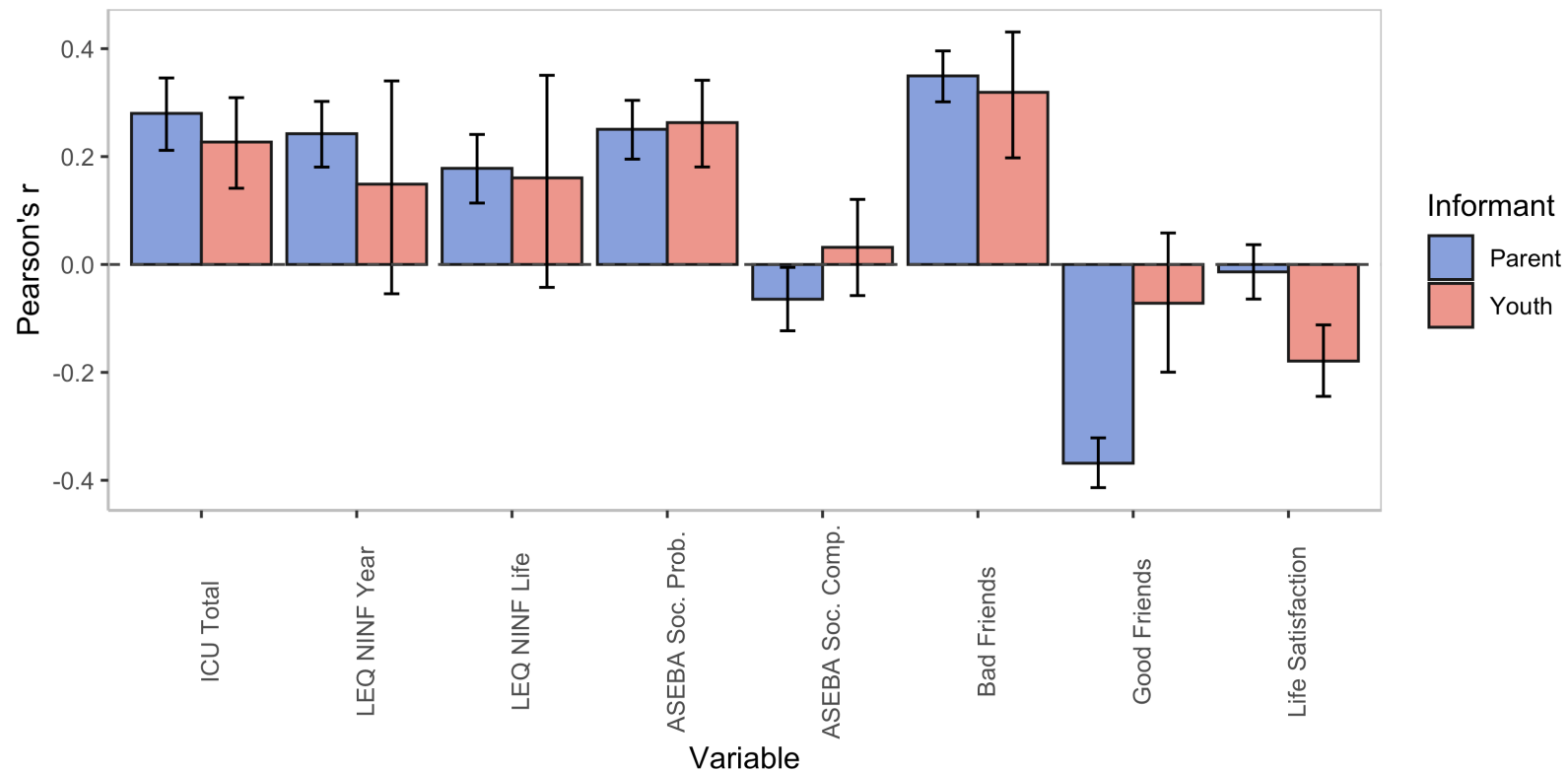
*CSBS Relational Aggression Convergent-Discriminant Associations with Trait Measures for Parent and Youth Informants*



*Note.* ICID = Inventory of Children's Individual Differences; BFI = Big Five Inventory; TMCQ = Temperament in Middle Childhood Questionnaire; EATQ = Early Adolescent Temperament Questionnaire. N = Neuroticism; NA = Negative Affectivity; C = Conscientiousness; EC = Effortful Control; A = Agreeableness.

Figure 2.5

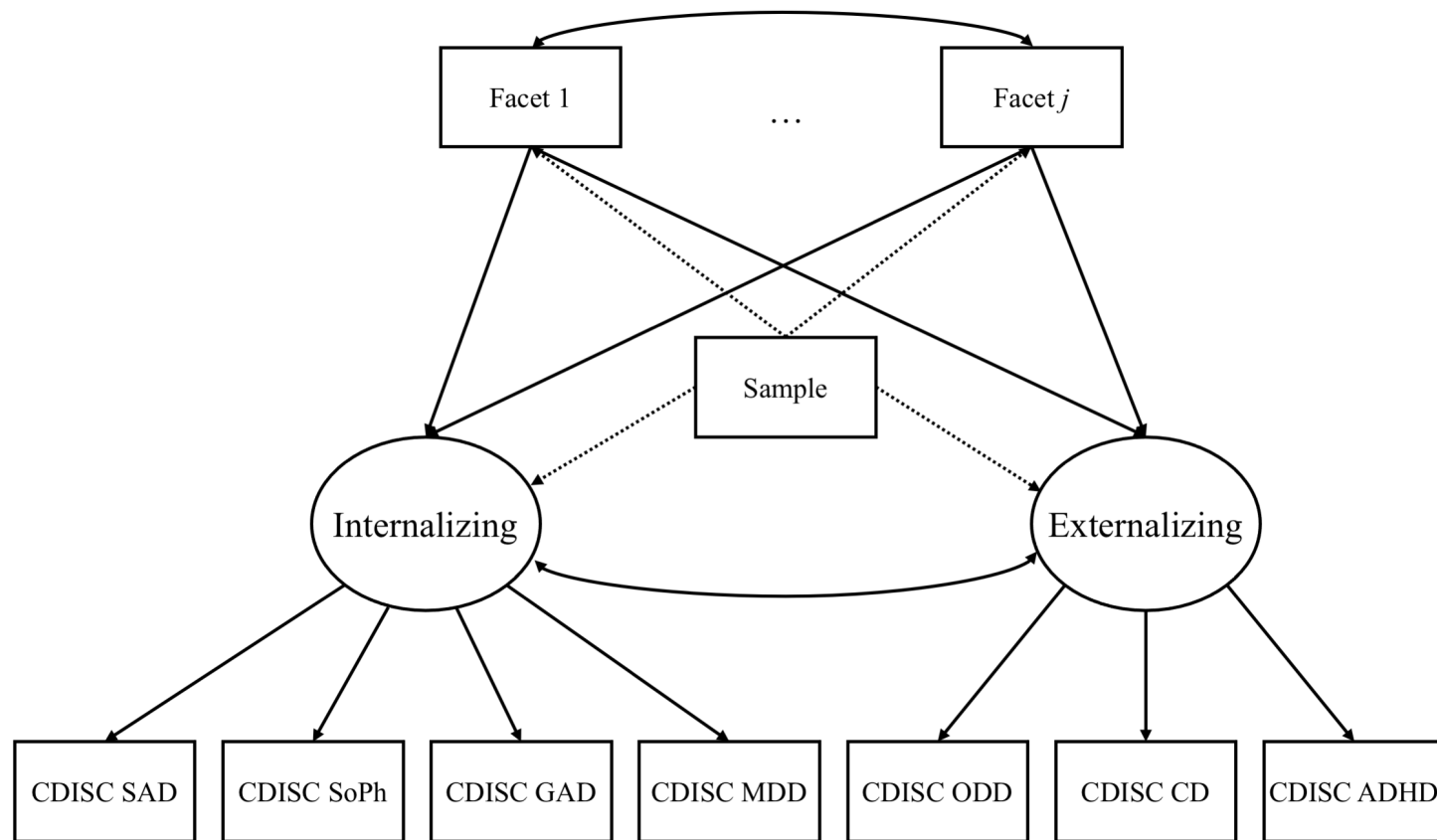
*CSBS Relational Aggression Cross-Sectional Criterion Associations with Life Outcomes for Parent and Youth Informants*



*Note.* ICU = Inventory of Callous-Unemotional Traits; LEQ = Life Events Questionnaire; ASEBA = Achenbach System of Empirically Based Assessment. NINF = Non-Independent Non-Family Life Events; Soc. Prob. = Social Problems; Soc. Comp. = Social Competencies.

Figure 3.1

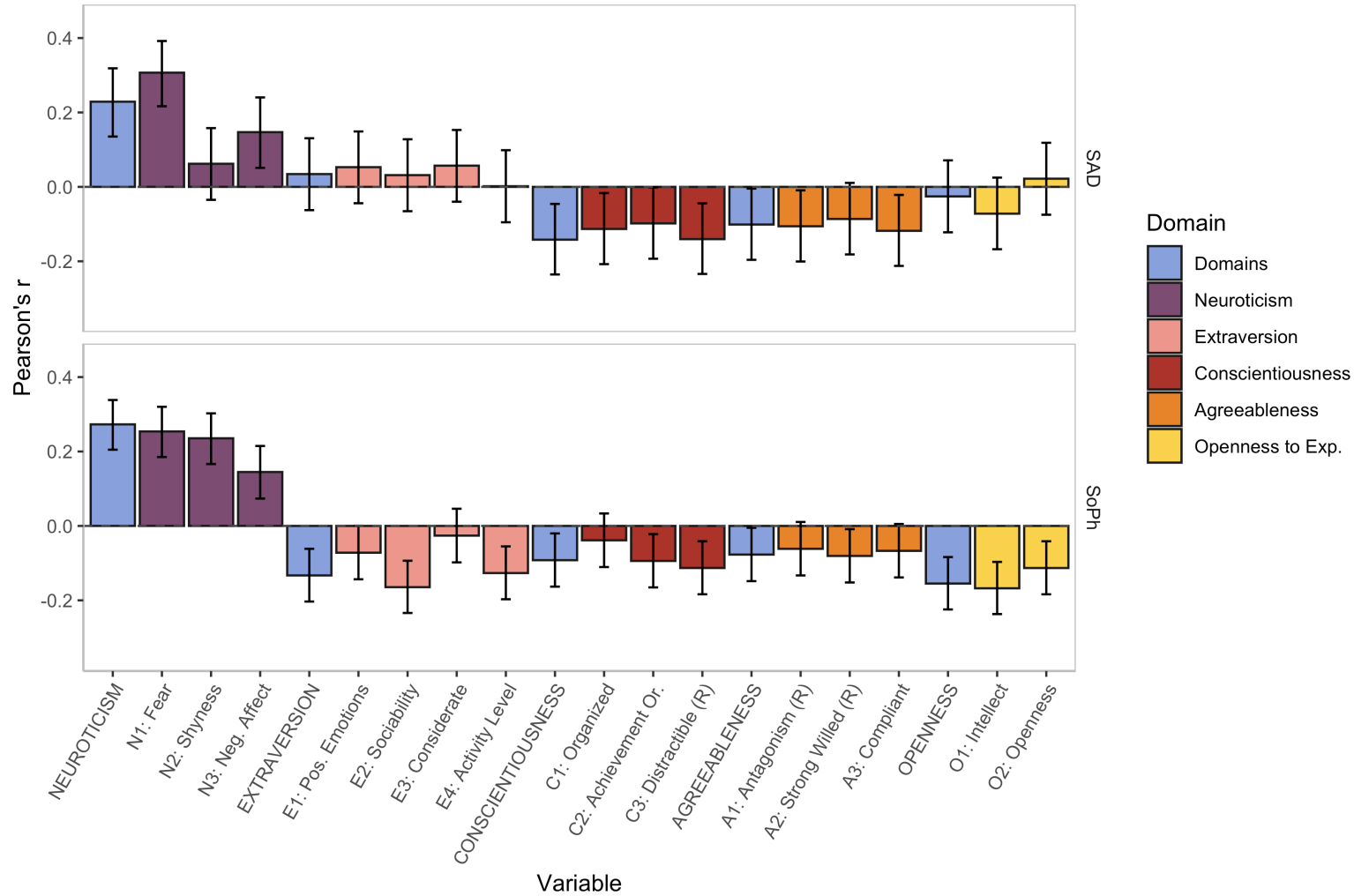
*Two-Factor Structural Regression Model for Personality Domain with  $j$  Facets*



*Note.* Number of facets ( $j$ ) varied by domain; Neuroticism, Conscientiousness, and Agreeableness  $j = 3$ ; Extraversion  $j = 4$ ; Openness to Experience  $j = 2$ . All indicators were residualized for gender and age. Dashed lines indicate covariate (non-focal) parameters, solid lines indicate focal parameters.

Figure 3.2

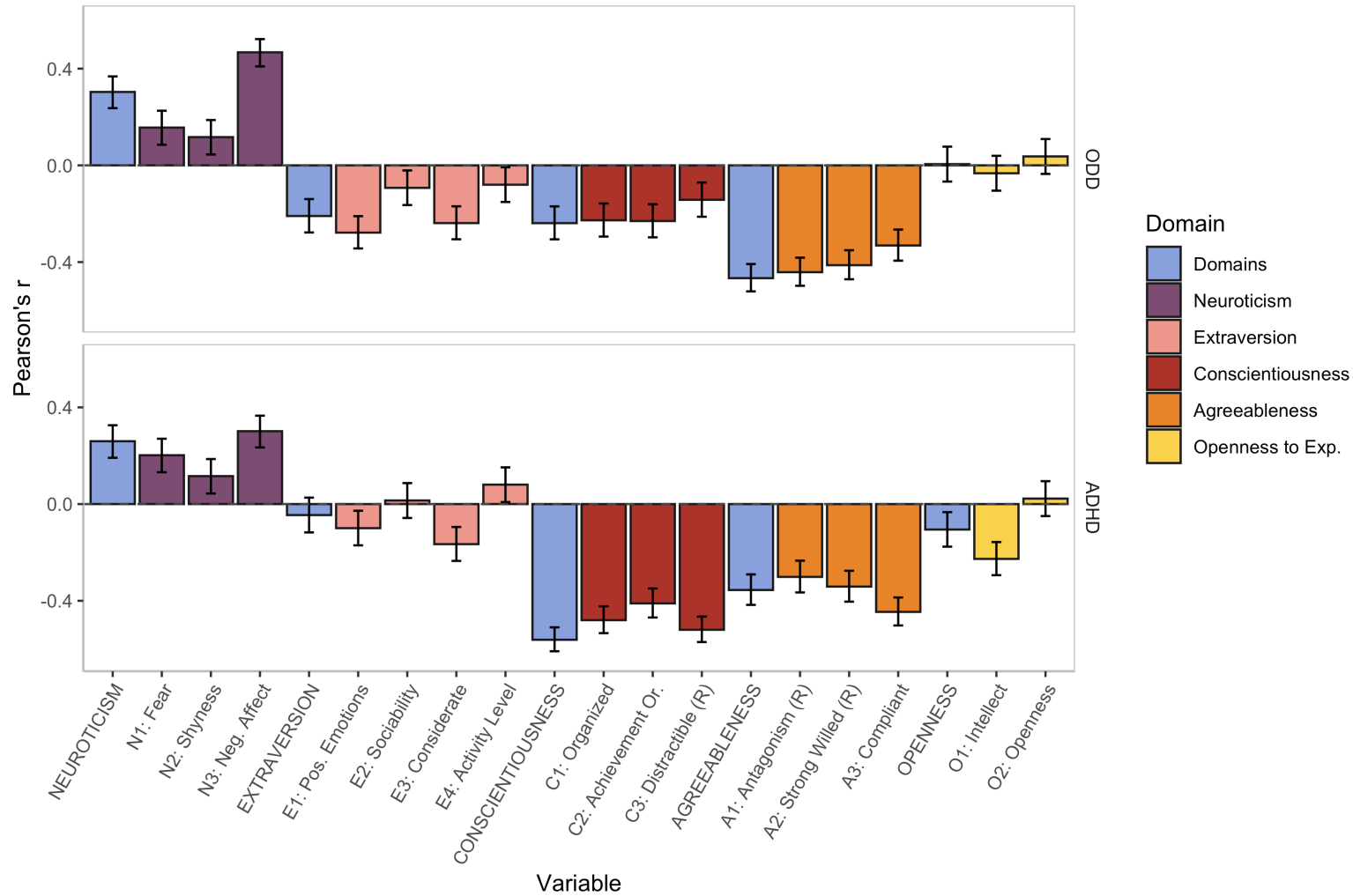
*Correlations Between Personality Facets and Separation Anxiety, Social Phobia*



*Note.* All correlations are partialled for age, gender, and sample.

Figure 3.3

*Correlations Between Personality Facets and Oppositional Defiant Disorder, Attention Deficit/Hyperactivity Disorder*



*Note.* All correlations are partialled for age, gender, and sample.

Figure 3.4

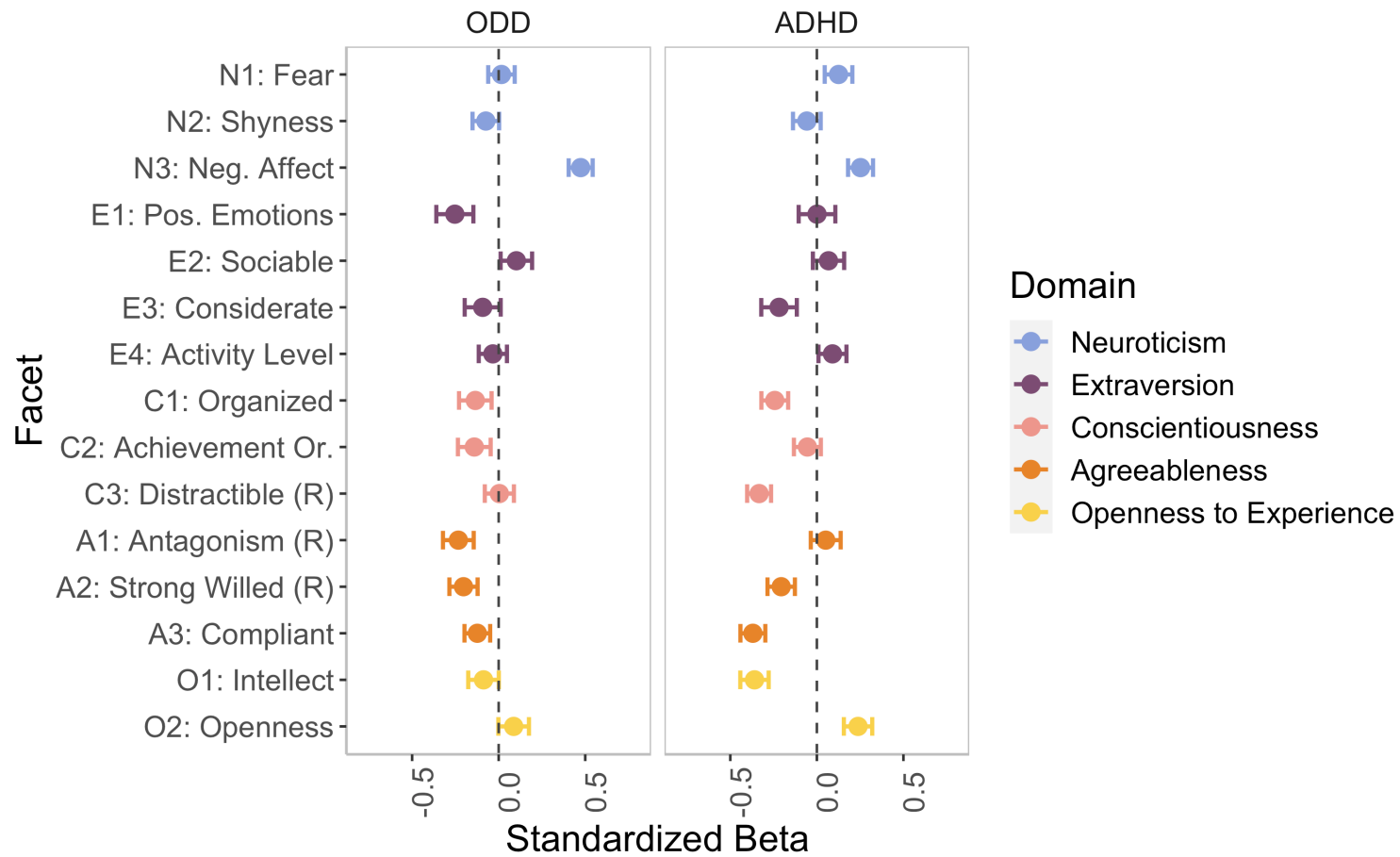
*Standardized Betas for Regression of Personality Facets on Separation Anxiety Disorder, Social Phobia*



*Note.* SAD = Separation Anxiety Disorder; SoPh = Social Phobia. For each regression model, all facets within each domain were entered as predictors alongside age, gender, and sample.

Figure 3.5

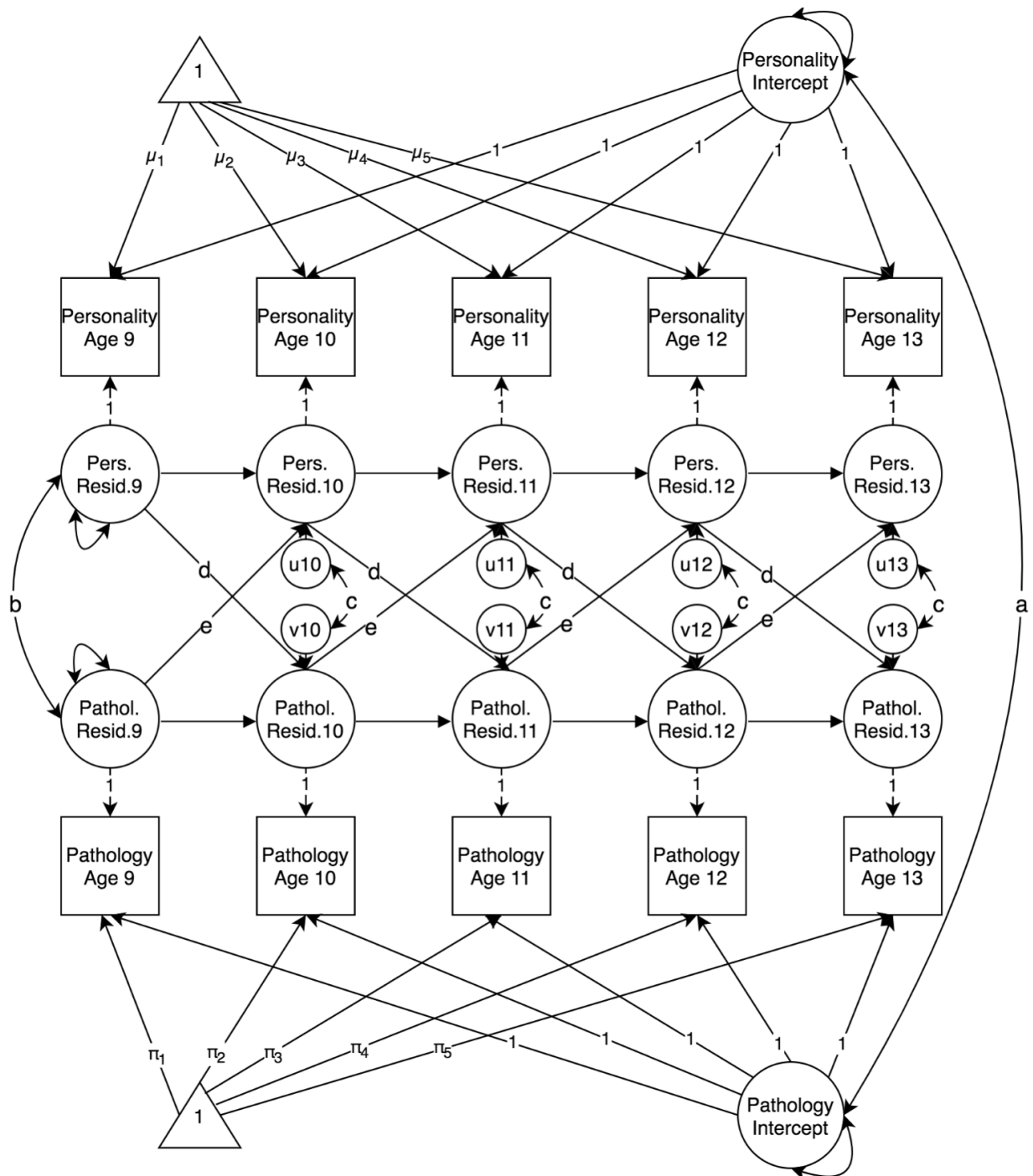
*Standardized Betas for Regression of Personality Facets on Oppositional Defiant Disorder, Attention Deficit/Hyperactivity Disorder*



*Note.* ODD = Oppositional Defiant Disorder; ADHD = Attention Deficit/Hyperactivity Disorder. For each regression model, all facets within each domain were entered as predictors alongside age, gender, and sample.

Figure 4.1

*Random-Intercept Cross-Lagged Panel Model and Parameters of Interest*



*Note.* Pers. = Personality; Pathol. = Psychopathology; Resid. = Residual

$\mu$  and  $\pi$  represent age-specific means;  $u$  and  $v$  represent residuals controlling for age, overall trait level, and all cross-lagged effects;  $a$  = correlation between personality and psychopathology intercepts (necessary for *continuity/common cause model*);  $b$  = correlation between age-specific, person-specific personality and psychopathology at age 9 (necessary for *continuity/common cause model*);  $c$  = correlation between personality and psychopathology residuals, controlling for age, overall trait level, and all cross-lagged effects (necessary for *continuity/common cause model*);  $d$  = regression of psychopathology residual at time  $T$  on  $T-1$  personality residual (evidence for *vulnerability model*);  $e$  = regression of personality residual at time  $T$  on  $T-1$  psychopathology residual (evidence for *scar model*)

Figure 4.2

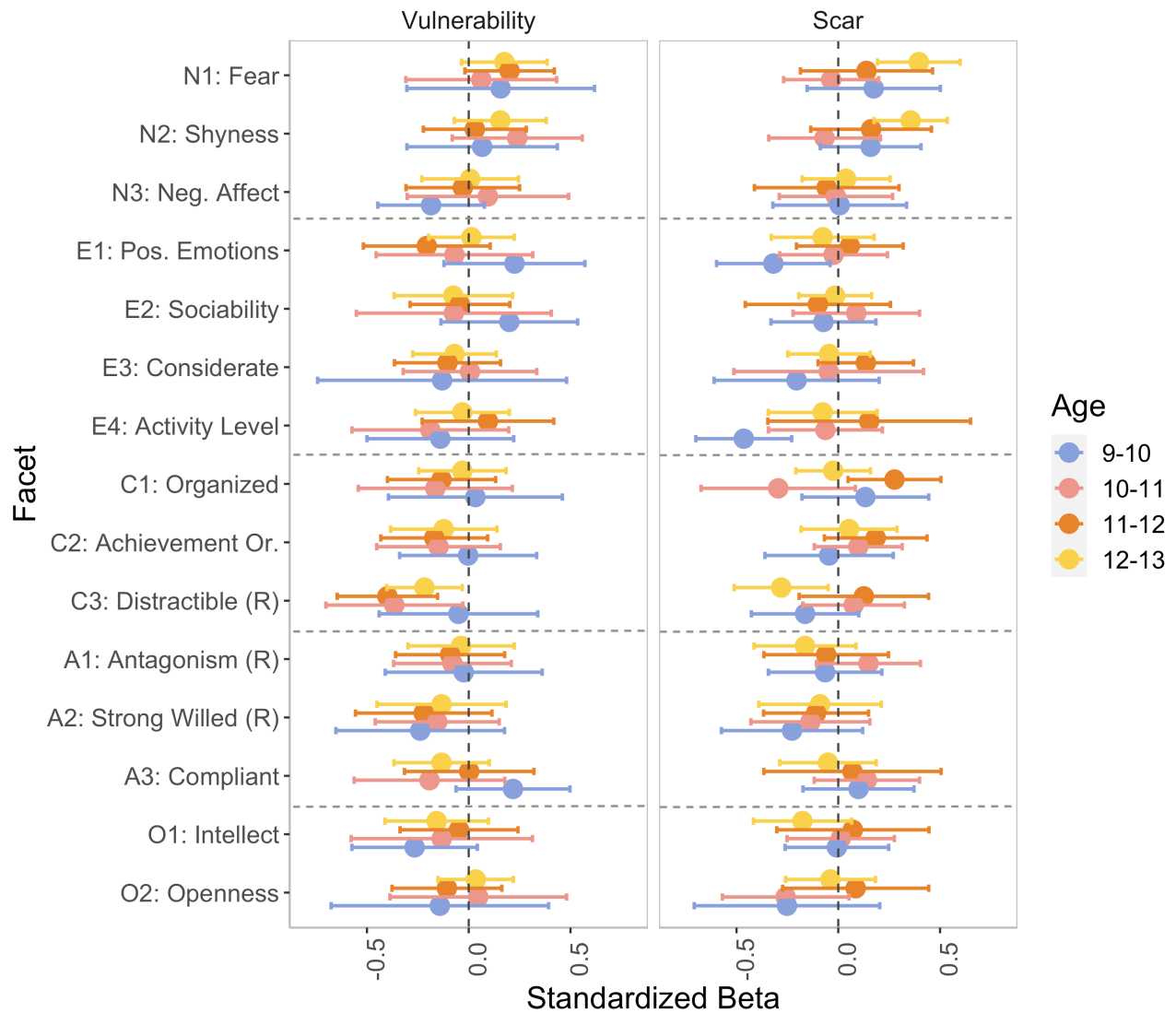
*Cross-Lagged Associations Between Personality Facets and Internalizing Psychopathology*

Figure 4.3

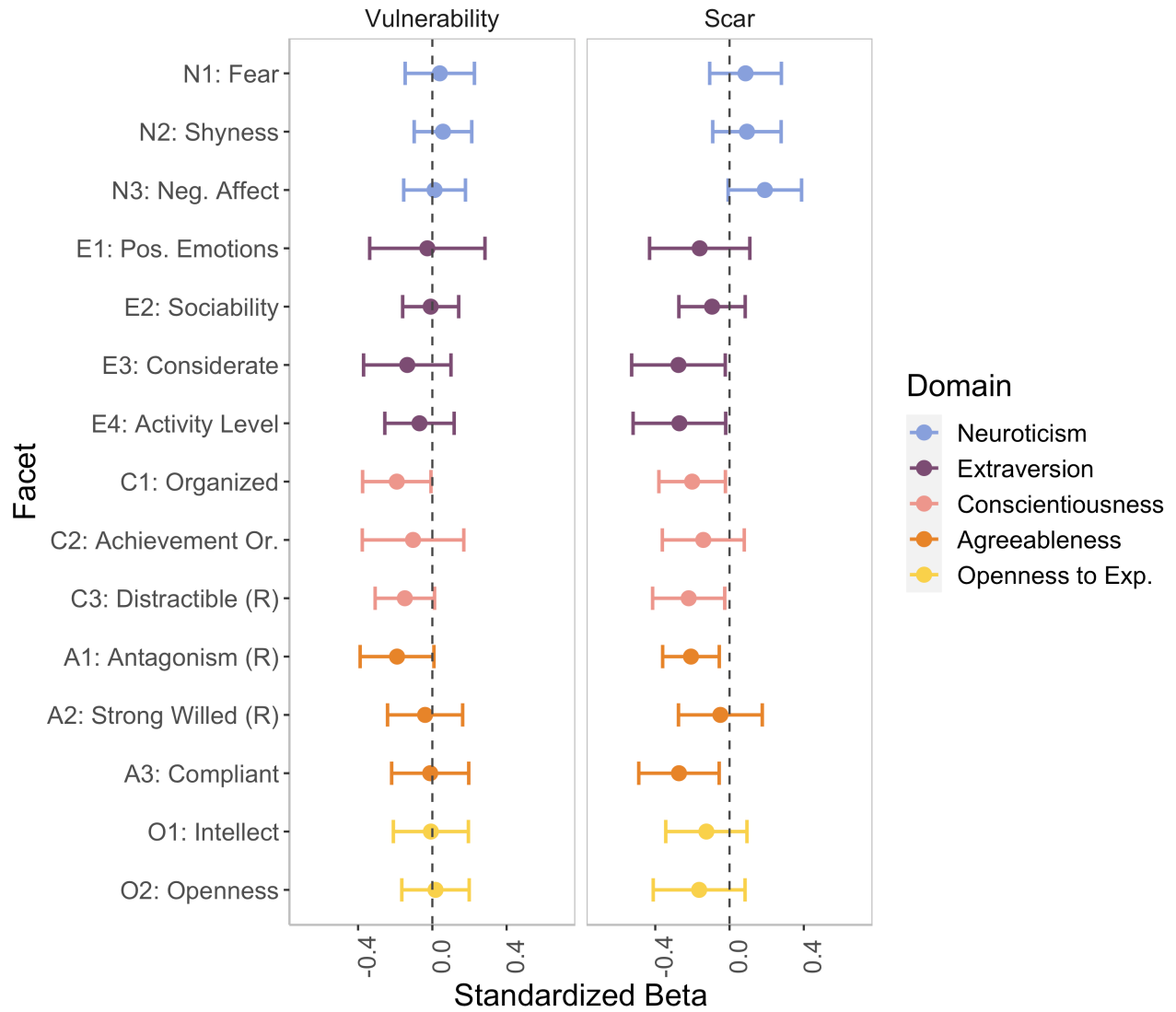
*Cross-Lagged Associations Between Personality Facets and Externalizing Psychopathology*

Figure 4.4

*Between- and Within-Person Correlations Between Personality Facets and Psychopathology Spectra*

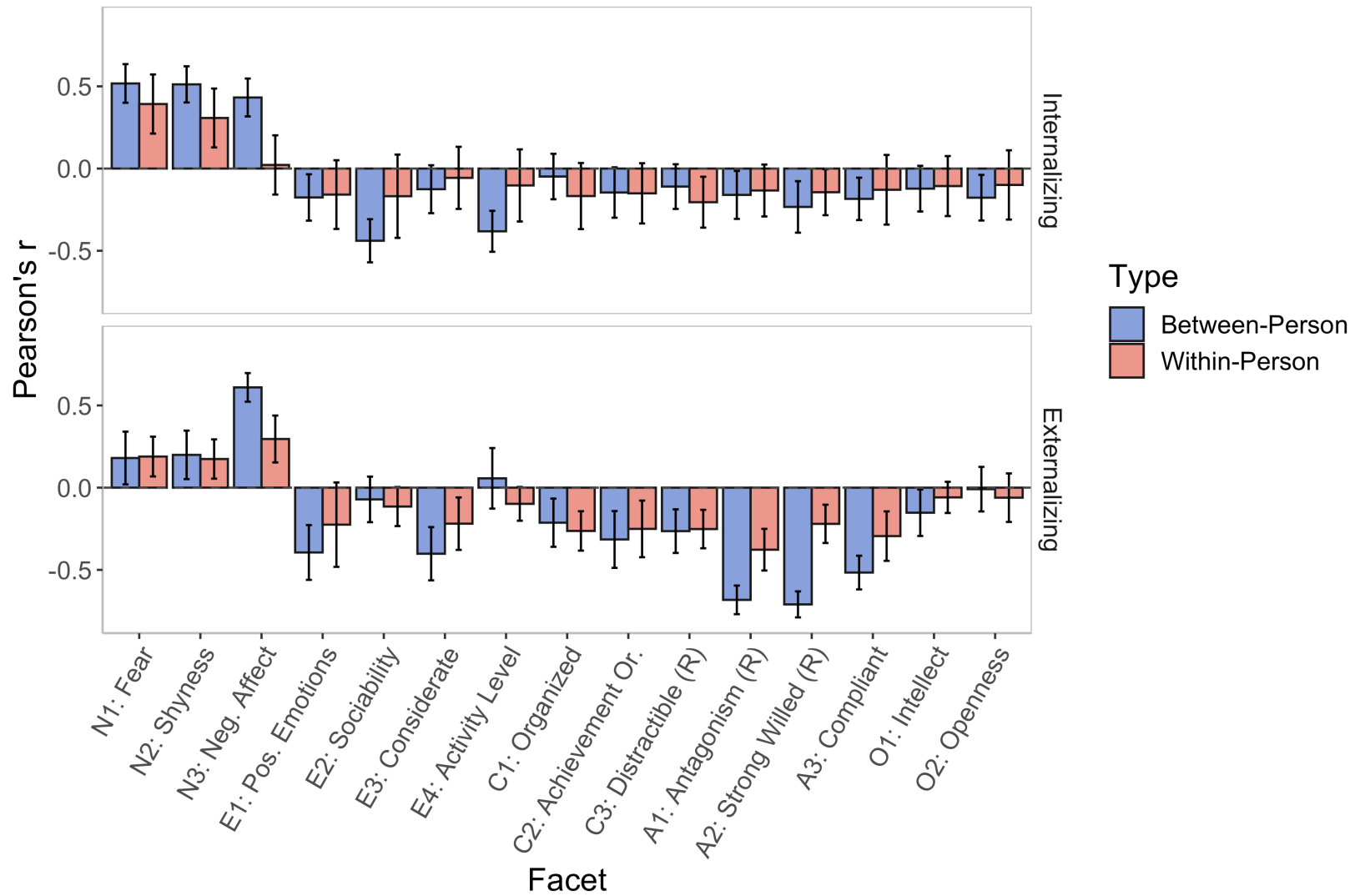
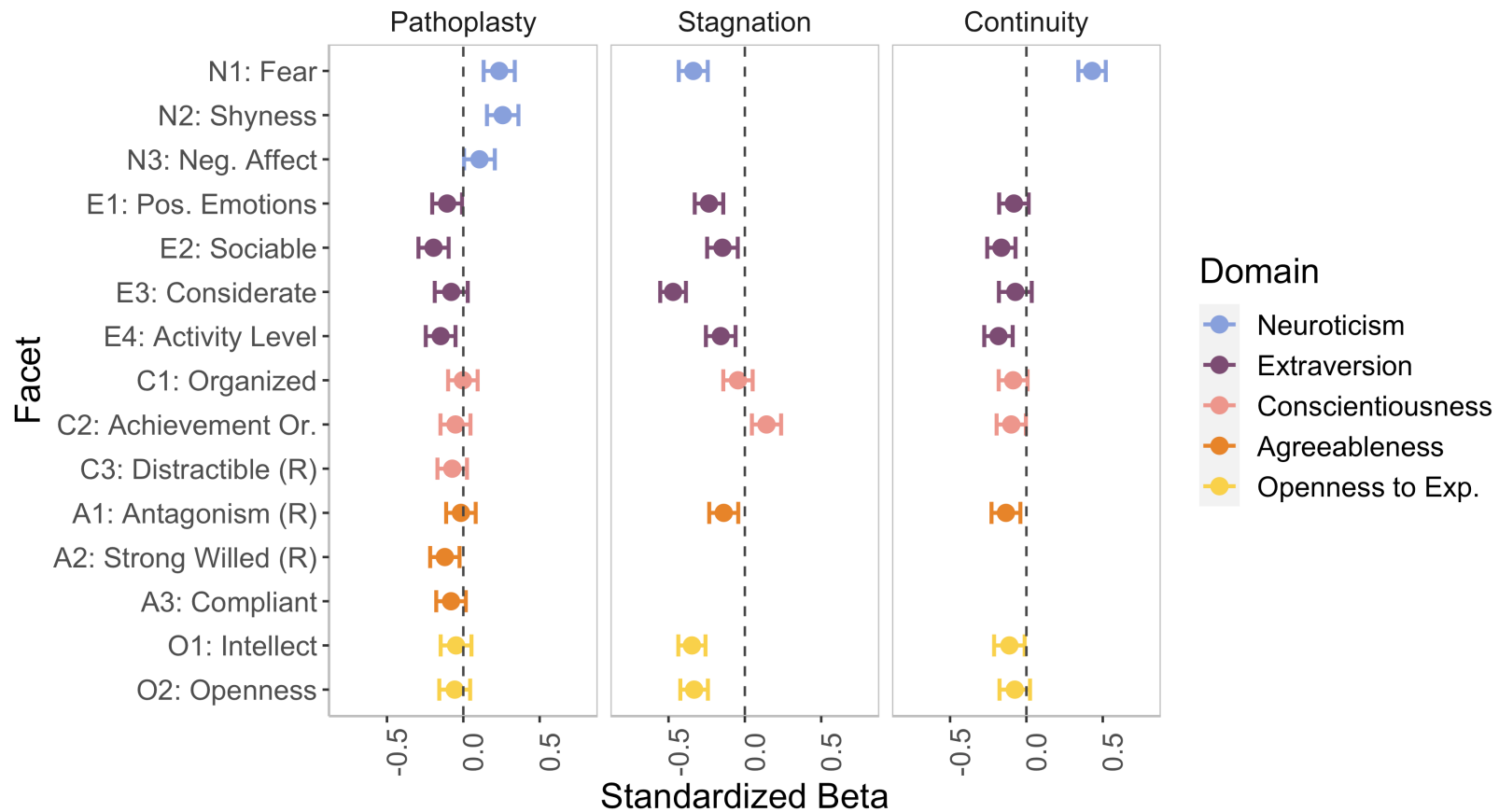


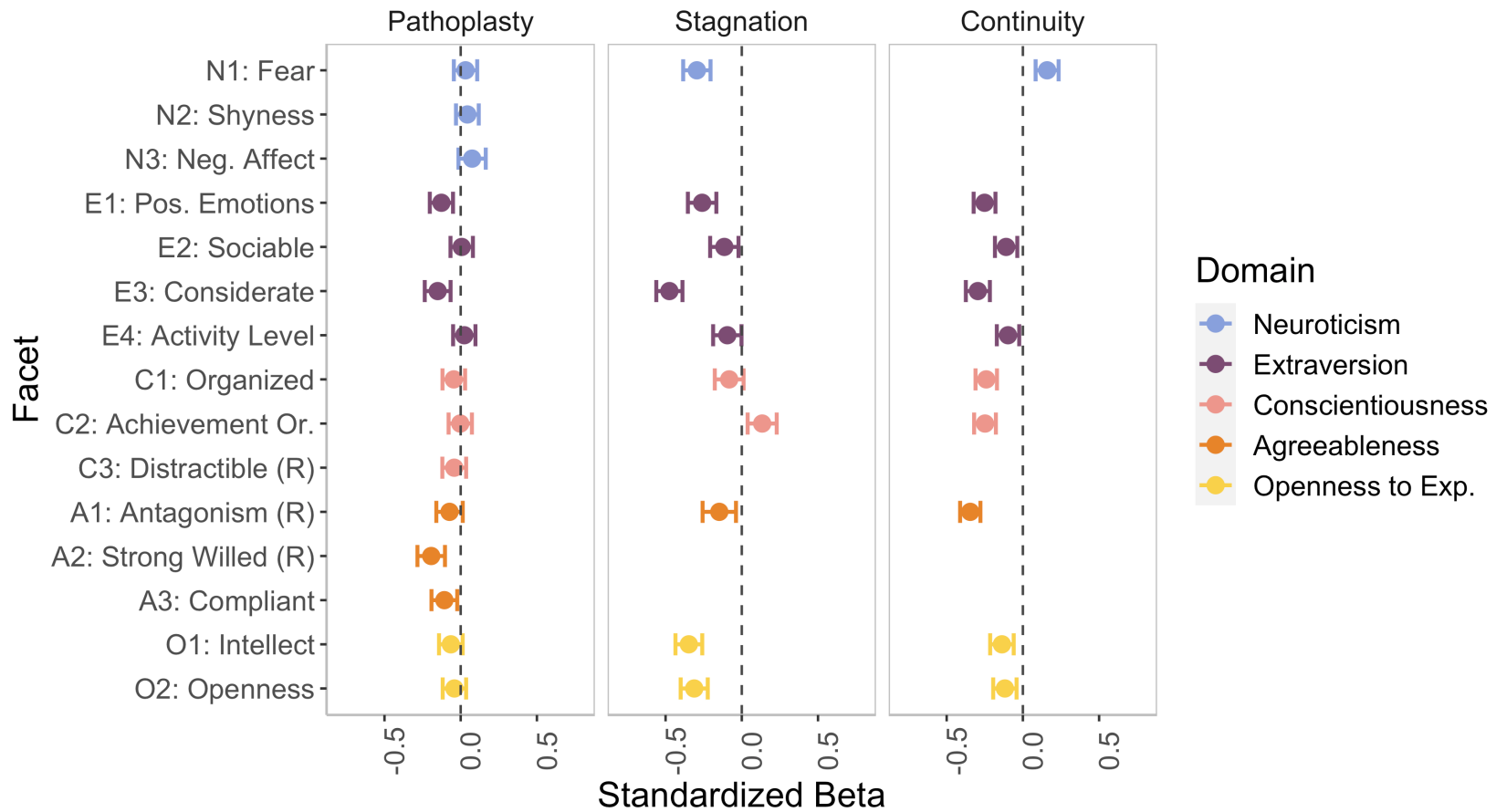
Figure 4.5

*Standardized Betas for Internalizing Growth Factor Score Regressions*

*Note.* Effects in the Pathoplasty column represent the effect of personality level, regressed on psychopathology slope. Effects in the Stagnation column represent the effect of psychopathology level, regressed on personality slope. Effects in the Continuity column represent the effect of personality slope, regressed on psychopathology slope.

Figure 4.6

*Standardized Betas for Externalizing Growth Factor Score Regressions*



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