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Personality Heterogeneity in Adolescents With Disruptive Behavior Disorders[1]

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Highlights

- Distinct personality types in adolescents with disruptive behavior disorders

- Personality types differ on clinically relevant variables

- Personality heterogeneity can inform assessment and treatment

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Abstract

We first confirmed adolescents diagnosed with disruptive behavior disorders (oppositional defiant, conduct disorder; $n = 158$) had lower constraint and higher negative emotionality, and greater psychiatric comorbidity and psychosocial dysfunction, relative to adolescents without ($n = 755$), in a population-based sample enriched for externalizing psychopathology (mean age = 17.90 years; 52% female). We then explored whether different personality types, defined by patterns of personality identified via latent profile analysis, were differently associated with clinical features in adolescents with a disruptive behavior disorder diagnosis. Four distinct personality types ("disinhibited," "high distress," "low distress," "positive") were meaningfully different from one another. Results highlight personality heterogeneity as a means of identifying individuals at greatest risk for the most deleterious forms of externalizing psychopathology.

Keywords: Personality; externalizing psychopathology; disruptive behavior disorders; adolescence.

Personality Heterogeneity in Adolescents With Disruptive Behavior Disorders

Externalizing psychopathology includes a constellation of aggressive, antagonistic, impulsive, and disinhibited symptoms and behavior. Decades of research document the origins of externalizing psychopathology in childhood and adolescence--problem behaviors are evidenced by oppositionality and conduct problems (aggression and rule-breaking) in even very young children, as well as substance use and other reckless/impulsive behavior in emerging adolescence and beyond (Achenbach & McConaughy, 1997). At the diagnostic level, externalizing psychopathology includes the disruptive behavior disorders of oppositional defiant disorder and conduct disorder. Oppositional defiant disorder is characterized by a persistent pattern of anger, irritability, arguing, defiance, and vindictiveness toward parents and other authority figures; conduct disorder is characterized by a persistent pattern of violation of age-appropriate social standards and rules and antisocial behaviors that violate the rights of others (American Psychiatric Association, 2013). These disruptive behavior disorders are among the most common psychiatric disorders in childhood and early adolescence (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003) and are associated with substantial impairment at both the individual (e.g., psychiatric comorbidity, psychosocial dysfunction) and societal levels (e.g., need for treatment, lost productivity, incarceration) in childhood, adolescence, and adulthood (Burt, Krueger, McGue, & Iacono, 2003; Chan, Dennis, & Funk, 2008; Kessler, Chiu, Demler, & Walters, 2005; Vermeiren, Jespers, & Moffitt, 2006).

Given the prevalence and impairment associated with disruptive behavior disorders and their implications for subsequent functioning, there has been considerable interest in identifying risk factors for their development. Individual differences in personality, or relatively stable normative patterns of thinking, feeling, and behavior, have shown considerable promise in this

regard. Links between personality and various forms of externalizing psychopathology in childhood, adolescence, and adulthood are well established. Low agreeableness is consistently found to be the strongest predictor of externalizing psychopathology (e.g., Jones, Miller, & Lynam, 2011; Samuel & Widiger, 2008; Vize, Miller, & Lynam, 2018). Big Three models of personality, which comprise negative emotionality (aspects of neuroticism and aggression proneness), positive emotionality (aspects of extraversion, surgency, and social closeness), and constraint (aspects of inhibition, conscientiousness, and agreeableness) (Tellegen, 1985), find low constraint and high negative emotionality to be the most consistent predictors of externalizing psychopathology (e.g., DeYoung, Peterson, Séguin, & Tremblay, 2008; Frick & Ray, 2015; John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994; Kotov, Gamez, Schmidt, & Watson, 2010; Meesters, Muris, & van Rooijen, 2007; Miller & Lynam, 2001; Muris, Meesters, & Blijlevens, 2007; Prinzie et al., 2004; Ruiz, Pincus, & Schinka, 2008; Settles et al., 2012; Trull & Sher, 1994).

A smaller body of research has focused on the utility of considering personality heterogeneity within externalizing disorder diagnoses. That is, among individuals with the same class of diagnosis, not only might different patterns of personality traits be evident, but different personality patterns might help identify and explain clinically useful features and outcomes (see Klein, Wonderlich, & Shea, 1993). For instance, different patterns of personality in two adolescents, both diagnosed with a disruptive behavior disorder, might provide important clues about their dysfunction, prognosis, likely comorbidities, and treatment response. If one youth's rule-breaking behavior primarily reflects a longstanding pattern of disregard for social norms (low constraint), whereas another's primarily reflects an angry lashing out in response to intense inner turmoil (high negative emotionality, low positive emotionality), we might be less sanguine

about the prognosis for the first than for the second. The treatment targets and approaches would also likely be quite different--it would be relatively more important to examine and target comorbid internalizing problems in the second than the first case. Thus, important clinical features and treatment targets may be parsimoniously understood in terms of personality heterogeneity, even among adolescents with the same disruptive behavior diagnosis.

Although there is strong and consistent evidence that personality variation is dimensional rather than categorical (Asendorpf, 2003; Eaton, Krueger, South, Simms, & Clark, 2011), one useful way of depicting personality heterogeneity in psychopathology is to identify different types of individuals with the same diagnosis as a function of different patterns of personality traits. This personality typology approach has been used to examine the importance of personality heterogeneity for key clinical features, including symptom severity, chronicity, psychiatric comorbidity, and dysfunction, among a number of internalizing disorders, including various forms of anxiety (Przeworski et al., 2011; Thomas et al., 2014; Wright, Pincus, Conroy, & Elliot, 2009), depression (Cain et al., 2012; Dawood, Thomas, Wright, & Hopwood, 2013), and eating disorders (Ambwani & Hopwood, 2009; Hopwood, Ansell, Fehon, & Grilo, 2010; Hopwood, Clarke, & Perez, 2007; Thompson-Brenner, Eddy, Satir, Boisseau, & Westen, 2008). Personality heterogeneity has been less frequently considered for externalizing disorders, though there are important literatures that emphasize as key features rule-breaking, aggression, and callous-unemotional traits in childhood and adolescence (cf. Frick et al., 2003; Moffitt, 1993). The distinction between adolescent-limited/rule-breaking and lifecourse-persistent/aggressive subtypes of externalizing psychopathology (Moffitt, 1993) has been extensively examined and has received considerable support (e.g., Burt & Donnellan, 2008; Burt & Neiderhiser, 2009). The former subtype is thought to be relatively free from childhood risk factors, is more evenly split

across males/females, and tends to include rule-breaking behaviors but not aggression, whereas the latter subtype is more likely to have an adverse childhood history, is predominantly male, and exhibits both aggressive and rule-breaking behavior. In a similar vein, among youth with conduct problems, those who are high in callous-unemotional traits (lack of remorse/guilt, callous use of others, shallow/deficient emotions) show more severe, aggressive, and antisocial behavior, are less reactive to threatening and emotionally distressing stimuli, and are more likely to evidence psychopathy in adulthood (e.g., Frick & White, 2008; Kimonis, Frick, Fazekas, & Loney, 2006; Lynam et al., 2009).

A few studies have examined personality features and externalizing disorders using comprehensive personality models, such as the Big Three model of negative emotionality, positive emotionality, and constraint (Tellegen, 1985). These studies suggest clinically meaningful differences as a function of personality heterogeneity among individuals with externalizing psychopathology. For instance, Decuyper et al. (2013) found that adolescent offenders who were higher in both constraint and negative emotionality were less likely to be aggressive or rule breaking but more likely to have internalizing problems than adolescent offenders with the opposite pattern. Worling (2001) found that adolescent sexual offenders who were lower in constraint and higher in negative emotionality were at greater risk for violent recidivism. Stoltz et al. (2013) found that children lower in positive emotionality were relatively more responsive to a school-based intervention for aggressive behavior than children higher in positive emotionality. However, to our knowledge, no study has thus far examined whether heterogeneity in patterns of Big Three personality traits can be used to explain important clinical features and outcomes among adolescents diagnosed with disruptive behavior disorders.

        In the present study, we first sought to (1) confirm that a disruptive behavior disorder

diagnosis in adolescence was associated with lower constraint and higher negative emotionality,

as well as clinical impairment, including greater psychiatric comorbidity and psychosocial

dysfunction. Next, given the potential clinical utility of using heterogeneity in personality traits

to explain within-diagnosis differences in clinically relevant features and outcomes, we then

sought to (2)(a) explore whether personality types defined by different patterns of personality

traits could be identified among adolescents diagnosed with a disruptive behavior disorder and

(b) examine whether different personality types were differently associated with clinically

important indicators. We addressed these two study aims in a large, population-based sample of

adolescent twins that had been enriched for the presence of externalizing psychopathology and

that had completed a comprehensive, multi-informant assessment that included psychiatric

diagnoses and indicators of functioning in a range of important domains. We selected disruptive

behavior disorders (oppositional defiant disorder, conduct disorder) as indicators of externalizing

psychopathology because of their relatively high rates in childhood/adolescence (Costello et al.,

2003).

        Although we expected to find that disruptive behavior disorders are generally associated

with lower constraint and higher negative emotionality, we also expected to find that different

personality types could be identified among adolescents with a disruptive behavior disorder

diagnosis based on different patterns of personality traits. Based on past research in the general

population (e.g., Asendorpf et al., 2001; Robins, John, Caspi, Moffitt, & Stouthamer-Loeber,

1996) and internalizing samples (e.g., Decuyper et al., 2013), we expected to find three

personality types: a "disinhibited" group defined by relatively low levels of constraint, a "high

distress" group defined by relatively high levels of negative emotionality and relatively low

levels of positive emotionality, and an "positive" group defined by relatively low negative

emotionality and relatively high constraint. Note that, because adolescents were diagnosed with a

disruptive behavior disorder, the term "positive" is relative here, indicating a more positive

personality profile in comparison with less positive profiles. We further expected to find

meaningful differences in psychiatric comorbidity and indicators of functioning as a function of

personality type, with the disinhibited group having higher rates of substance use, the high

distress group having higher rates of depression and anxiety, both the disinhibited and high

distress groups having worse functioning, and the positive group having lower rates of comorbid

psychiatric disorders and less dysfunction.

Methods

Participants and Procedures

Participants comprised a cohort of 998 monozygotic (60%) and dizygotic (40%) twins

(52% female, 499 same-sex twin pairs) from the Minnesota Twin Family Study (MTFS)

Enrichment Study (see Keyes et al., 2009). The Enrichment Study is one of several population-

based, longitudinal studies at the Minnesota Center for Twin and Family Research (MCTFR) that

was implemented to yield a genetically-informative sample of children at elevated risk for

substance misuse and related externalizing psychopathology. Twins identified from Minnesota

birth records (for birth years 1988 through 1994) were potentially eligible if they lived within a

day's drive of the University of Minnesota and had no developmental delays or physical

limitations that would interfere with study assessments. Twin pairs were randomly allocated to

an unscreened sample of twins (52%) and a screened sample of twins (48%). In the screened

sample, a parent (usually the mother) was interviewed regarding each twin's externalizing

symptoms and academic engagement, and the family was recruited to participate only if at least

one member of the twin pair met or exceeded a predetermined threshold that maximized

sensitivity for identifying disruptive behavior disorders. These recruitment methods were quite

successful in yielding a sample enriched for the presence of disruptive behavior disorders, with

25% of the screened sample of twins meeting diagnostic criteria for a disruptive behavior

disorder diagnosis at age 11 (compared to 8% of the unscreened sample). Consistent with the

demographics of Minnesota state during the targeted birth years, participating families were

predominantly Caucasian (91%). Participants in the Enrichment Study were first assessed at twin

age 11 ($M = 11.9$, $SD = 0.43$) and have been prospectively reassessed at target ages of 14 ($M =$

15.06, $SD = 0.55$) and 17 ($M = 17.90$, $SD = 0.47$); an age-24 assessment is currently ongoing.

Rates of retention across follow-up assessments have been universally high (> 90% across

assessments) and there is little evidence of bias due to attrition (Keyes et al., 2009). At each

assessment, twin participants (and their parents through the age-17 assessment) completed

comprehensive, multimodal, multi-informant assessments that included interview, questionnaire,

and laboratory components. The present report focuses on data collected at the age-17

assessment ($n = 913$, 52% female, 61% monozygotic), including psychiatric diagnoses,

personality, and several indicators of functioning; the number of participants who completed

each measure is indicated below. Informed consent/assent was obtained from all individual

participants included in the study. All participants completed an informed consent/assent process

(parental consent for their own participation and that of their children under 18 years, twin assent

before 18 years and consent after age 18 years). The University of Minnesota Institutional

Review Board approved the study protocols

Measures

  Psychiatric diagnoses. Psychiatric diagnoses were assessed using semi-structured

interviews with adolescents (n = 896) and their mothers (n = 892) at age 17. *Disruptive behavior disorders* (oppositional defiant disorder, conduct disorder), *substance use disorders* (alcohol, drug abuse and dependence), *major depressive disorder*, and *anxiety disorders* (social phobia, specific phobia, panic disorder with and without agoraphobia, generalized anxiety disorder) were assessed with adolescents using the Diagnostic Interview for Children and Adolescents— Revised (DICA-R; Reich & Welner, 1988), updated for *DSM-IV*; mothers also reported on adolescents using the DICA-R, and a best-estimate procedure was used to assign diagnoses if symptoms were endorsed by either adolescents or their mothers. Of note because participants in this study are twins, diagnostic criteria for oppositional defiant disorder specify that symptoms must be exhibited during interactions with at least one individual who is not a sibling; interviewers ensured that this stipulation was met when assessing the presence of each symptom. Diagnostic interviews were conducted by extensively trained interviewers with bachelor's or master's degrees in psychology or a related discipline. All diagnostic interviews were reviewed in case conferences with at least two advanced clinical psychology graduate students, and consensus was required prior to assigning each symptom. Rates of diagnoses (since the previous assessment at age 14) were 18% for disruptive behavior disorders (15% oppositional defiant disorder, 7% conduct disorder), 19% for substance use disorders, 16% for major depressive disorder, and 7% for anxiety disorders. Interrater reliability for psychiatric diagnoses, assessed on a randomly selected subsample of 600 MTFS participants, was good (mean kappa = .91).

Personality traits. Adolescents (n = 886) reported on their normal-range personality traits at age 17 using a brief version of the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008). This version of the MPQ used includes 198 items (1 = *definitely true*, 4 = *definitely false*) that yield scores on three higher-order dimensions of *negative emotionality*

(stress reaction, alienation, aggression), *positive emotionality* (well being, social potency, social closeness, achievement), and *constraint* (control, harm avoidance, traditionalism), each computed as weighted sums of lower-order subtraits (including absorption). Cronbach's alphas ranged from .77 to .90 across subtraits in the present sample.

Functioning. Adolescents and their mothers reported on several aspects of adolescents' functioning at age 17. Adolescents ($n = 869$), their mothers ($n = 866$), and their fathers ($n = 663$) reported on the quality of the parent-child relationship at age 17 using the Parental Environment Questionnaire (PEQ; Elkins, McGue, & Iacono, 1997), which includes 50 items (1 = *definitely true*, 4 = *definitely false*) that yield scores for adolescent, mother, and father involvement (e.g., my parent praises me when I do something well/I praise my child when s/he does something well), conflict (e.g., my parent often irritates me/I often irritate my child), regard (e.g., my parent loves me no matter what I do/I love my child no matter what s/he does), and structure (e.g., my parent makes it clear what s/he wants me to do or not do/I make it clear what I want my child to do or not do); ratings were standardized and averaged to create a *parent-child relationship* composite variable (mean *r* across informants = .29, mean *r* across subscales = .52, *r* across mothers/fathers = .51). Mothers ($n = 864$) and fathers ($n = 302$) reported on their knowledge regarding adolescents' activities using the Parental Knowledge Questionnaire (Eaton, Krueger, Johnson, McGue, & Iacono, 2009), which includes 15 items (1 = *never*, 5 = *always*) that yield scores for parental solicitation (e.g., I ask this child where he/she goes at night), parental knowledge (e.g., I know where this child goes at night), and child disclosure (e.g., this child tells me where he/she goes at night); ratings were standardized and averaged to create a *parental monitoring* composite variable (mean *r* across subscales = .55, *r* across mothers/fathers = .30). Adolescents ($n = 872$) reported on their peer group at age 17 using the Friends Inventory

(Walden, McGue, Burt, & Elkins, 2004), which includes 19 items (1 = *none of my friends are like that*, 4 = *all of my friends are like that*) that yield scores for *prosocial peers* (e.g., my friends work hard to get good grades in school) and *antisocial peers* (e.g., my friends break the rules). Cronbach's alphas were .81 and .86 for prosocial and antisocial peers in the present sample. Adolescents (*n* = 768) reported on substance use and misuse using a version of the Substance Abuse Module (SAM; Robins, Babor, & Cottler, 1987) of the Composite International Diagnostic Interview (CIDI; Robins et al., 1988), which assesses the use of alcohol, nicotine, marijuana, and other substances. Responses to 4 alcohol use items (frequency of drinking in the preceding 12 months, number of drinks typically consumed per occasion in the preceding 12 months, maximum number of drinks consumed in a single 24-hour period, number of times intoxicated in the lifetime) were summed (after transforming into ordinal measures to reduce skew and sparseness) (mean *r* across items = .44), yielding an *alcohol use index* composite variable (see McGue, Malone, Keyes, & Iacono, 2014), in addition to *nicotine ever used* and *marijuana ever used* variables. Adolescents (*n* = 787) reported on their sexual behavior using the Sexual Behavior Inventory (SBI; Huibregtse, Bornovalova, Hicks, McGue, & Iacono, 2011), which includes 4 items (1 = *never*, 4 = *more than 10 times*) that yield scores for *risky sexual behavior* (e.g., in the last 12 months, I have had unprotected sex because I was drinking or using drugs). Cronbach's alpha was .70 for risky sexual behavior in the present sample. Mothers (*n* = 894) reported on academic functioning at age 17 using the Academic History Questionnaire (AHQ; Johnson, McGue, & Iacono, 2006), which includes 13 items that yield scores for *academic engagement* (e.g., interest in and enjoyment of school, study habits) and *GPA*. Cronbach's alpha was .78 for academic engagement in the present sample. Mothers (*n* = 882) reported on adolescents' *mental health treatment* (ever treated for an emotional or mental health

problem) using the Life Events Interview (LEI; Bemmels, Burt, Legrand, Iacono, & McGue, 2008; Billig, Hershberger, Iacono, & McGue, 1996).

Data Analyses

We first examined whether adolescents with ($n = 158$) versus without ($n = 755$) a disruptive behavior disorder diagnosis differed in personality traits (negative emotionality, positive emotionality, constraint), demographic characteristics (age, sex), rates of other psychiatric disorders (rates of substance use disorders, major depressive disorder, anxiety disorders), or other indicators of functioning (parent-child relationship, parental monitoring, prosocial and antisocial peers, substance use/misuse, risky sexual behavior, academic engagement, GPA, mental health treatment). For continuous variables (i.e., mean levels), we used linear mixed models that accounted for the interdependent twin family data using the "lme4" package in R (Bates et al., 2015) and for dichotomous variables (i.e., proportions) we used Pearson's Chi-square analyses with Rao-Scott adjustment to account for the interdependent twin family data using the "survey" package in R (Lumley, 2018). All continuous personality and functioning variables were standardized as z scores ($M = 0$, $SD = 1.00$) in the total sample.

Analyses then proceeded in two steps. We conducted latent profile analyses (LPAs) to explore empirically the optimal number of personality-based profiles among adolescents with a diagnosis of a disruptive behavior disorder ($n = 158$). We then examined whether each personality type profile differed in personality traits, demographic characteristics, rates of other psychiatric disorders, and other indicators of functioning.

We examined whether within-diagnosis differences in clinical features among adolescents with a disruptive behavior disorder diagnosis could be accounted for by different patterns of personality traits by conducting LPA in Mplus 8 (Muthen & Muthen, 1998-2017),

accounting for the interdependent twin family data using the "CLUSTER" option. LPA is a

person-centered (versus variable-centered) technique that allows for the identification of latent

groups of individuals based on patterns of manifest indicators. We conducted LPAs using the

three higher-order MPQ personality traits of negative emotionality, positive emotionality, and

constraint as the manifest indicators.

We used the Akaike information criteria (AIC) and the Bayesian information criteria

(BIC) to evaluate model fit and determine the number of profiles to retain. The AIC and BIC

take different factors into consideration when evaluating model fit: The AIC tends to favor the

estimation of additional profiles and the consequent reduction in error, whereas the BIC imposes

a stricter penalty for additional profiles and thus tends to favor more parsimonious models

relative to the AIC. Given the relatively small sample, we applied sample size corrections to both

the AIC and BIC (i.e., AICc and BICc, respectively; Burnham & Anderson, 2004), and used

these as our primary indicators of model fit. We also considered the relative difference between

models by subtracting the lowest obtained AIC and BIC (and AICc and BICc) value from all

other models, which facilitates the interpretation of each value in terms of the best-fitting model;

models greater than |2.000| from the best-fitting model can be considered to have meaningfully

less support. We supplemented these indicators with substantive interpretability as well as

entropy, an indicator of the certainty of classification. Higher values are preferred; entropy

values approaching 1.00 more clearly place individuals into each profile (Celeux & Soromenho,

1996).

After determining the number of profiles to retain, we confirmed that the resulting

personality type profiles were meaningfully different from one another in terms of personality

traits (negative emotionality, positive emotionality, constraint) and examined differences across

personality type profiles in demographic characteristics (age, sex), psychiatric comorbidity (rates of substance use disorders, major depressive disorder, anxiety disorders), and functioning (parent-child relationship, parental monitoring, prosocial and antisocial peers, substance use/misuse, risky sexual behavior, academic engagement, GPA, mental health treatment). We first conducted omnibus tests of profile differences, for continuous variables (i.e., mean levels) using linear mixed models and for dichotomous variables (i.e., proportions) using Pearson's Chi-square analyses with Rao-Scott adjustment; we followed up significant omnibus tests with tests of between-profile differences. All continuous personality and functioning variables were standardized as z scores ($M = 0$, $SD = 1.00$) in the sample of adolescents with a disruptive behavior disorder diagnosis. Given the relatively high number of omnibus and between-group analyses conducted, to minimize Type I error, statistical significance was set at $p < .010$ for all analyses.

Results

Characteristics of Adolescents With a Disruptive Behavior Disorder Diagnosis

The disruptive behavior disorder group ($n = 158$) included 130 (82%) adolescents with a diagnosis of oppositional defiant disorder and 60 (38%) adolescents with a diagnosis of conduct disorder; 81 (51%) adolescents had a comorbid diagnosis of oppositional defiant disorder and conduct disorder. Personality, demographic, diagnostic, and functioning characteristics for adolescents with and without a disruptive behavior disorder diagnosis are presented in Table 1. No significant differences were observed for age or sex (note that the lack of significant sex effects reflects the success of the recruitment strategy for the Enrichment Study in increasing the number of female participants with a disruptive behavior disorder diagnosis, commonly underrepresented in the research literature). As expected, the disruptive behavior disorder group

had higher levels of negative emotionality and lower levels of constraint than the no disruptive

behavior disorder group; they also had lower levels of positive emotionality, though this was not

statistically significant ($p = .089$). The disruptive behavior disorder group had higher rates of

substance use (51%) and major depressive disorders (36%) than the no disruptive behavior

disorder group (12% and 11%, respectively), but did not differ in rates of anxiety disorders (9%

versus 6%). The disruptive behavior disorder group also had poorer functioning in all domains

examined, including lower quality parent-child relationship, lower parental monitoring, fewer

prosocial and more antisocial peers, greater alcohol use/misuse, higher rates of ever using

nicotine or marijuana, more risky sexual behavior, lower academic engagement and GPA, and

higher rates of mental health treatment. These results highlight the negative implications of

disruptive behavior disorders for multiple important aspects of functioning.

Disruptive Behavior Disorder Personality Type Profiles

We next examined whether different patterns of personality traits could account for

within-diagnosis differences among adolescents diagnosed with a disruptive behavior disorder.

Model fit and entropy statistics for LPA models with different numbers of profile solutions are

presented in Table 2. The AICc and BICc were in agreement with one another, with the lowest

values for the four-profile solutions, although some classification uncertainty was indicated by

the entropy statistic. The four-profile solution was deemed substantively interpretable and thus

retained for further analyses. We also conducted a set of supplementary LPA models using the

11 MPQ subtraits; again, the four-profile solution was deemed the best solution (see

Supplementary Table 1).

The four personality type profiles are depicted in Figure 1, with personality trait values

and results of difference tests presented in Table 3 (different superscripts in Columns 2 through 5

denote significant, $p < .010$, differences between profiles, after a significant omnibus test for

group differences). Profile 1 ($n = 56$) had the lowest constraint and relatively low negative

emotionality, whereas Profile 2 ($n = 66$) had the highest negative emotionality and the lowest

positive emotionality. These profiles generally conformed to our predictions and were labeled

"disinhibited" and "high distress," respectively. Profile 3 ($n = 16$) had particularly low negative

emotionality whereas Profile 4 ($n = 20$) had relatively high positive emotionality and constraint.

Profiles 3 and 4 are thus both adaptive groups in terms of personality traits (at least, relative to

Profiles 1 and 2). We labeled them "low distress" and "positive," respectively. Overall, these

results are consistent with our predictions, albeit with the predicted adaptive group split up into

two groups characterized by either low negative emotionality or high positive emotionality and

constraint. The four personality type profiles identified in the LPA of the 11 MPQ subtraits

followed a similar pattern of results (see Supplementary Table 2).

Characteristics of Personality Type Profiles

Demographic, diagnostic, and functioning characteristics for the personality type profiles

are presented in Table 3 (different superscripts in Columns 2 through 5 denote significant, $p <$

.010, differences between profiles, after a significant, $p < .010$, omnibus test for group

differences; statistics for all profile comparisons are given in Supplementary Table 3). No

significant differences were observed for age or sex. Rates of oppositional defiant disorder and

conduct disorder did not differ significantly across personality type groups. We predicted that the

disinhibited group would have the highest rates of comorbid substance use disorders. Substance

use disorder diagnoses were higher for this group (45%) than for the low distress and positive

groups (31% and 30%, respectively), though these differences were not statistically significant;

however, the high distress group had even higher rates of substance use disorders (68%) that

differed significantly from the low distress and positive groups, which did not differ significantly

from the disinhibited group or from one another. As predicted, comorbid depression diagnoses

were highest in the high distress group (55%) and significantly different from the disinhibited

group. The personality type groups did not differ in comorbid anxiety disorders, which tended to

be low (0% to 11%). We further predicted that the disinhibited and high distress groups would

have poorer functioning relative to the low distress and positive groups. This expectation was

generally borne out, though it was the high distress group that showed the poorest functioning,

followed by the disinhibited group and the low distress and positive groups. The high distress

group had lower quality parent-child relationship, higher rates of ever using nicotine or

marijuana, and lower academic engagement and GPA relative to the other groups. In contrast,

the low distress and positive groups generally had higher quality parent-child relationship, lower

rates of ever using nicotine or marijuana, and higher academic engagement and GPA values

relative to the high distress group. These results suggest that, despite sharing a diagnosis of a

disruptive behavior disorder, meaningful variation among adolescents in important aspects of

functioning can be accounted for by different patterns of personality traits.

Discussion

We attempted to account for within-diagnosis differences in important clinical features as

a function of personality heterogeneity in a sample of adolescents diagnosed with a disruptive

behavior disorder. At the aggregate level, and as expected, a disruptive behavior disorder

diagnosis was associated with low constraint and high negative emotionality, as well as

significant impairment, indexed by psychiatric comorbidity and dysfunction. However, we also

found meaningful differences among adolescents with a disruptive behavior disorders as a

function of different patterns of personality traits that speaks to the importance of different

patterns of personality traits for functioning even among adolescents with the same disruptive behavior disorder diagnosis.

We represented those different patterns of personality traits using a typological approach. Our LPA suggested the presence of four distinct personality types that are broadly consistent with those identified in other empirical examinations of personality typologies using comprehensive models of personality in childhood and adolescence (e.g., Asendorpf et al., 2001; Decuyper et al., 2013; Robins et al., 1996). The disinhibited group had low levels of constraint and relatively low negative emotionality (this group is most consistent with the "undercontrolled" group identified in previous research), whereas the high distress group had high levels of negative emotionality and low positive emotionality (this group is most consistent with the "overcontrolled" group identified in previous research). The low distress group had low levels of negative emotionality and the positive group was distinguished by high levels of constraint and positive emotionality (these groups are most consistent with the "resilient" group identified in previous research). It is worth noting that the low distress and positive groups were relatively small ($n = 16$ [10%] and $n = 20$ [13%], respectively). This may reflect lower likelihood for adolescents with disruptive behavior disorders to show these more resilient patterns of personality traits, but future research that replicates these personality types in other, independent samples is necessary to evaluate the meaningfulness and generalizability of these relatively small groups.

Critically, these different personality types showed meaningful differences in important indicators of functioning that aligned with their configurations of personality traits. That is, although all of the adolescents were diagnosed with a disruptive behavior disorder, they nonetheless showed variation in psychiatric comorbidity, as well as functioning in psychosocial

domains important in adolescence (aspects of the family and peer group, substance use/misuse, academics), and different patterns of personality accounted for this within-diagnosis variation. Of note, although the disinhibited group showed the classic low constraint characteristic of externalizing psychopathology, it was the high distress group, characterized by relatively high negative emotionality and low positive emotionality, that showed the greatest psychiatric comorbidity and the greatest dysfunction in the psychosocial domains considered here.

These findings have a number of important implications related to conceptualization, prognosis, assessment, and intervention. Although the normal-range personality traits we considered here are closely related to varied forms of psychopathology, in finding evidence that different patterns of personality traits are meaningfully associated with important indicators of functioning even among adolescents who all share a disruptive behavior disorder diagnosis, this study adds to the established understanding that personality traits are useful dimensional predictors of symptom type and severity by also providing evidence that personality traits can be used to differentiate in meaningful ways among individuals with the same symptoms. In terms of prognosis, the disruptive behavior evidenced in the disinhibited and high distress groups may be related to their personality profiles, which may suggest less optimistic outcomes. This is in contrast to the low distress and positive groups, who may be more likely to adopt increasingly more functional and prosocial behavior with maturation. Further assessment for possible co-occurring conditions would be particularly important in the disinhibited and high distress groups--particular areas of concern would be substance use in both groups and depression in the high distress group (see Armstrong & Costello, 2002; Costello et al., 2002). Although our data cannot speak directly to intervention strategies, personality may provide important information about treatment selection. For instance, it may be more effective to target underlying mood

dysregulation in the high distress group whereas more behavioral interventions geared toward

impulse control and environmental management might be indicated for the disinhibited group.

Taken together, these results suggest that knowing about individuals' unique patterns of

personality traits clinical implications beyond the information conveyed by their disruptive

behavior disorder diagnosis.

Coupled with the large body of research documenting associations between personality

and externalizing psychopathology, results of the present study suggests a two-stage strategy for

personality-guided assessment and treatment of adolescents with disruptive behavior problems.

In the first step, personality traits, specifically, low constraint and high negative emotionality,

could be used to identify youths who are particularly at risk for disruptive behavior disorders.

Having identified these youths and confirmed their diagnoses, the second step would involve

using personality variation, namely, their relative levels and patterns of constraint, negative

emotionality, and positive emotionality, to make predictions about prognosis, guide assessment

of likely forms of comorbidity and other areas of dysfunction, and inform the most effective

treatment approaches, as illustrated above. That is, a personality-based approach attempts to

situate patients within a hierarchy of liabilities that help us understand the particular constellation

of symptoms and problem behaviors being presented (Kotov et al., 2017). Patients' personality

traits can both influence the likelihood and severity of particular symptoms (e.g., adolescents

with lower constraint are more likely to engage in disruptive behavior) and to differentiate

individuals with the same symptoms (e.g., disruptive behavior may be consequent to low positive

mood following social rejection versus a tendency toward sensation seeking). We believe there is

considerable potential promise for improving current treatment models by better integrating both

symptoms/disorders and personality traits in assessment and treatment (Harkness, Reynolds, & Lilienfeld, 2014; Hopwood et al., in press).

It should be noted that norms, or the group against which an individual's scores are compared, must be considered carefully in this kind of strategy. In the first step, the relevant norm group would be the general population. In the present sample, adolescents with a diagnosis of a disruptive behavior disorder had low constraint and high negative emotionality relative to our population-based sample of adolescents. In the second step, the relevant norm group would be other individuals who share the diagnosis. This is why, in the present sample, personality scores are represented as within-sample (i.e., adolescents with disruptive behavior disorder diagnoses) *z*-scores in Table 3 and Figure 1: the relevant comparison is other adolescents in the diagnostic group, not the entire population. This is important because it is possible for a person to show the characteristic externalizing personality traits relative to the general population (low constraint, high negative emotionality) but to nonetheless be considered low distress or positive relative to other adolescents with disruptive behavior disorders (because of relatively low negative emotionality, high constraint, and/or high positive emotionality).

Although we focus in the present paper on exploring the utility of personality type profiles for explaining within-diagnosis differences in clinically relevant features or outcomes, it is important to note that we view personality typologies as useful heuristics rather than natural kinds. Typological models offer a practical way of distinguishing people based on their patterns of personality traits that allow for examinations of other kinds of differences with relative ease. However, research generally suggests that dimensional models explain more variation in outcomes (Asendorpf, 2003) and are more likely to replicate (Eaton, Krueger, South, Simms, & Clark, 2011) than typological models. Nonetheless, typologies can be quite useful in efficiently

communicating general patterns in data (Asendorpf, Borkenau, Ostendorf, & Van Aken, 2001;

Block, 2014) and they enable tests of subgroup differences on other, theoretically and practically

informative variables--here, psychiatric comorbidity and indicators of functioning in important

domains. We do not intend to argue that personality profiles are "better" than personality traits;

instead, we believe the value of the present study is our demonstration that adolescents

presenting with the same symptom profile (symptoms of oppositional defiant disorder and

conduct disorder) show clinically relevant variation in important indicators of psychiatric and

psychosocial functioning as a function of different patterns of personality traits.

The present study has a number of strengths. Our population-based sample, enriched for

the presence of externalizing psychopathology, allowed us to examine both how personality

traits distinguish adolescents with a disruptive behavior disorder diagnosis from those without,

and how different patterns of personality traits are associated with membership in meaningfully

different groups. We used a well-validated and popular model of personality, Tellegen's (1985)

Big Three model, that includes comprehensive assessment of traits relevant for externalizing and

other forms of psychopathology, and psychiatric diagnoses were based on highly reliable and

valid interviewing methods. We included multi-informant assessment of functioning in a number

of clinically important domains.

There are also a number of important areas of future research highlighted by the present

study and more generally. First, replication is needed among adolescents with disruptive

behavior disorders, as well as other externalizing disorders, and among individuals in different

developmental periods (e.g., early adolescence). Although oppositional defiant disorder and

conduct disorder share similarities in their symptom profiles and are highly comorbid, additional

research examining patterns of personality traits for each disorder will also be informative.

Second, prospective, longitudinal research is needed to evaluate the extent to which personality heterogeneity accounts for important aspects of the course, prognosis, and outcomes of disruptive behavior disorders and externalizing psychopathology more broadly (e.g., persistence and desistance of symptoms and behavior), as well as continuity across the lifespan (childhood, adolescence, adulthood). Although the present sample was representative of Minnesota State in race and ethnicity during the targeted birth years, future research should also focus on generalizing results to more racially and ethnically diverse populations. This was not a treatment-seeking sample and thus inferences about intervention are speculative; the association between personality and treatment variables is an important area for further work. Finally, a number of potentially important clinical features and outcomes that were not included in this study may be useful targets for ongoing research.

In conclusion, although the empirical literature on the importance of personality heterogeneity for externalizing psychopathology is relatively new, the field stands to gain much by considering the critical role of different patterns of personality traits for the nature, course, and prognosis of disruptive behavior disorders and broader externalizing psychopathology. At a more practical level, these results support the use of personality for both the identification of individuals at risk for disruptive behavior disorders and for clinically important within-diagnosis features and outcomes.

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Table 1

Personality, Demographic, Diagnostic, and Functioning Characteristics of Adolescents With and Without a Disruptive Behavior Disorder Diagnosis (Total N *= 913)*

Characteristic	Disruptive Behavior Disorder $n = 158$	No Disruptive Behavior Disorder $n = 755$	F/X^2	df	p
Personality trait					
Negative emotionality	0.41 (0.91)	-0.10 (1.00)	32.13	1, 837	< .001
Positive emotionality	-0.14 (1.00)	0.04 (1.00)	2.89	1, 849	.089
Constraint	-0.44 (0.99)	0.09 (0.98)	28.26	1, 841	< .001
Demographics					
Age	17.87 (0.46)	18.01 (0.50)	0.42	1, 460	.519
Sex	70 (44%)	400 (53%)	2.62	1, 498	.106
Diagnoses					
Substance use disorders	81 (51%)	93 (12%)	103.32	1, 498	< .001
Major depressive disorder	57 (36%)	82 (11%)	53.49	1, 498	< .001
Anxiety disorders	14 (9%)	44 (6%)	2.00	1, 498	.158
Functioning					
Parent-child relationship	-0.82 (1.17)	0.18 (0.86)	127.15	1, 895	< .001
Parental monitoring	-0.44 (1.12)	0.10 (0.95)	52.38	1, 649	< .001
Prosocial peers	-0.29 (1.18)	0.07 (0.94)	11.54	1, 825	< .001
Antisocial peers	0.53 (1.15)	-0.13 (0.92)	40.27	1, 854	< .001
Alcohol use index	0.69 (1.10)	-0.16 (0.90)	63.68	1, 743	< .001
Nicotine ever used[+]	102 (75%)	219 (35%)	54.91	1, 498	< .001
Marijuana ever used[+]	76 (56%)	140 (23%)	45.57	1, 498	< .001
Risky sexual behavior	0.64 (1.56)	-0.15 (0.73)	65.48	1, 716	< .001
Academic engagement	-0.68 (1.09)	0.16 (0.91)	83.67	1, 812	< .001
GPA	-0.56 (1.15)	0.13 (0.92)	50.22	1, 847	< .001
Mental health treatment	87 (55%)	141 (19%)	66.23	1, 498	< .001

Note. Summary statistics for personality, demographic, diagnostic, and functioning variables for adolescents with and without a disruptive behavior disorder diagnosis are presented in Columns 2 and 3. Results of tests for group differences are presented in Columns 4 to 6. Difference tests for continuous variables were linear mixed models and for dichotomous variables were Pearson's Chi-square tests with Rao-Scott adjustment that accounted for the interdependent twin family data. Age is mean (*SD*) age at the assessment (unstandardized). Sex is *n* (%) female. Diagnostic variables are *n* (%) with the diagnosis. Personality and continuous functioning variables are

standardized ($M = 0$, $SD = 1.00$) in the total sample so that positive values indicate higher levels

in the disruptive behavior disorder group relative to the no disruptive behavior disorder group

and negative values indicate lower levels in the disruptive behavior disorder group relative to the

no disruptive behavior disorder group; nicotine/marijuana ever used and mental health treatment

variables are n (%) endorsed. [+] Sample sizes for nicotine and marijuana ever used are $n = 136$ for

the disruptive behavior disorder and $n = 622$ for the no disruptive behavior disorder groups due

to missing data.

Table 2

Model Fit and Entropy Statistics for Latent Profile Analyses of Personality Traits Among Adolescents Diagnosed with a Disruptive

*Behavior Disorder (*n = *158).*

Solution	AIC (AIC Δ)	AICc (AICc Δ)	BIC (BIC Δ)	BICc (BICc Δ)	Entropy
One-profile	1354.144 (9.188)	1354.700 (4.823)	1372.520 (0.000)	1353.527 (10.423)	-
Two-profile	1353.132 (8.176)	1354.629 (4.752)	1383.758 (11.238)	1352.103 (8.999)	.558
Three-profile	1351.819 (6.863)	1354.756 (4.879)	1394.695 (22.175)	1350.379 (7.275)	.588
Four-profile	**1344.956 (0.000)**	**1349.877 (0.000)**	**1400.082 (27.562)**	**1343.104 (0.000)**	**.716**
Five-profile	1351.764 (6.808)	1359.260 (9.383)	1419.141 (46.621)	1349.500 (6.396)	.744

Note: AIC, AIC Δ, BIC, AIC Δ, and entropy values for each solution. AIC = Aikake information criterion. AICc = sample-corrected

AIC. BIC = Bayesian information criterion. BICc = sample-corrected BIC. AIC Δ and BIC Δ were computed by subtracting the lowest

obtained AIC/AICc and BIC/BICc value from all other solutions. The selected solution is indicated in bold. Entropy is not calculated

for one-profile solutions, as indicated with a dash.

Table 3

Personality, Demographic, Diagnostic, and Functioning Characteristics of Disruptive Behavior Disorder Personality Type Profiles

(Total n *= 158)*

Characteristic	1. Disinhibited $n = 56$	2. High Distress $n = 66$	3. Low Distress $n = 16$	4. Positive $n = 20$	F/X^2	df	p
Personality							
Negative emotionality	-0.55 (0.39)[abc]	0.93 (0.47)[ade]	-1.84 (0.47)[bdf]	-0.05 (0.43)[cef]	215.38	3, 151	< .001
Positive emotionality	-0.21 (0.93)[ab]	-0.26 (0.83)[cd]	0.46 (1.00)[ac]	1.08 (0.91)[bd]	13.42	3, 142	< .001
Constraint	-0.60 (0.74)[abc]	0.03 (0.83)[ad]	0.30 (0.97)[be]	1.35 (0.73)[cde]	28.22	3, 153	< .001
Demographics							
Age	17.85 (0.36)	18.05 (0.52)	18.26 (0.53)	18.10 (0.64)	1.50	3, 45	.228
Sex	20 (36%)	34 (52%)	8 (50%)	8 (40%)	1.15	3, 331	.323
Diagnoses							
Oppositional defiant disorder	44 (79%)	55 (83%)	15 (94%)	16 (80%)	0.72	3, 330	.538
Conduct disorder	21 (38%)	31 (47%)	4 (25%)	4 (20%)	2.02	3, 331	.111
Substance use disorders	25 (45%)	45 (68%)[ab]	5 (31%)[a]	6 (30%)[b]	4.80	3, 328	.003
Major depressive disorder	12 (21%)[a]	36 (55%)[a]	4 (25%)	5 (25%)	5.80	3, 331	< .001
Anxiety disorders	6 (11%)	7 (11%)	0 (0%)	1 (5%)	0.79	3, 330	.499
Functioning							
Parent-child relationship	0.03 (0.79)	-0.31 (1.16)[ab]	0.48 (0.80)[a]	0.57 (0.66)[b]	10.64	3, 148	.002
Parental monitoring	0.01 (1.09)	0.05 (0.93)	-0.17 (0.93)	-0.58 (1.03)	2.41	3, 126	.316
Prosocial peers	-0.09 (0.87)	-0.15 (1.05)	0.17 (1.16)	0.62 (0.87)	2.93	3, 138	.036
Antisocial peers	-0.07 (0.88)	0.30 (0.99)	-0.50 (1.00)	-0.40 (1.08)	2.12	3, 125	.101
Alcohol use index	0.01 (1.06)	0.27 (0.88)	-0.46 (0.96)	-0.71 (0.82)	4.63	3, 115	.044
Nicotine ever used[+]	40 (75%)	50 (88%)[ab]	5 (45%)[a]	7 (47%)[b]	5.43	3, 331	< .001
Marijuana ever used[+]	28 (53%)	40 (70%)[ab]	3 (27%)[a]	5 (33%)[b]	4.02	3, 329	.008
Risky sexual behavior	-0.01 (1.03)	0.22 (1.08)	-0.48 (0.62)	-0.41 (0.54)	4.46	3, 131	.120
Academic engagement	-0.05 (0.95)[a]	-0.27 (1.03)[b]	0.28 (1.00)	0.80 (0.52)[ab]	5.39	3, 122	.002
GPA	0.01 (0.84)	-0.28 (1.12)[a]	0.43 (0.94)	0.51 (0.77)[a]	4.19	3, 136	.007
Mental health treatment	27 (50%)	41 (63%)	10 (63%)	9 (45%)	1.13	3, 332	.337

Note. Summary statistics for personality, demographic, diagnostic, and functioning variables for disruptive behavior disorder

personality type profiles are presented in Columns 2 to 5. Results of omnibus tests for personality type profile differences are

presented in Columns 6 to 8. Omnibus tests for continuous variables were linear mixed models and for dichotomous variables were

Pearson's Chi-square tests with Rao-Scott adjustment that accounted for the interdependent twin family data. Significant omnibus

tests were followed up with tests of between-profile differences; values denoted by the same superscripts indicate significant ($p <$

.010) differences between profiles. Age is mean (*SD*) age at the assessment (unstandardized). Sex is n (%) female. Diagnostic

variables are n (%) with the diagnosis. Personality and continuous functioning variables are standardized ($M = 0$, $SD = 1.00$) in the

sample of adolescents diagnosed with a disruptive behavior disorder so that positive values indicate higher levels relative to the other

groups and negative values indicate lower levels relative to the other groups; nicotine/marijuana ever used and mental health treatment

variables are n (%) endorsed. [+] Sample sizes for nicotine and marijuana ever used for each profile are $n = 53$ for the Disinhibited, $n =$

57 for the High Distress, $n = 11$ for the Low Distress, and $n = 15$ for the Positive groups due to missing data.

Figure 1

Personality Type Profiles for Groups of Adolescents Diagnosed with a Disruptive Behavior Disorder (Total n *= 158, Disinhibited* n *= 56, High Distress* n *= 66, Low Distress* n *= 16, Positive* n *= 20)*
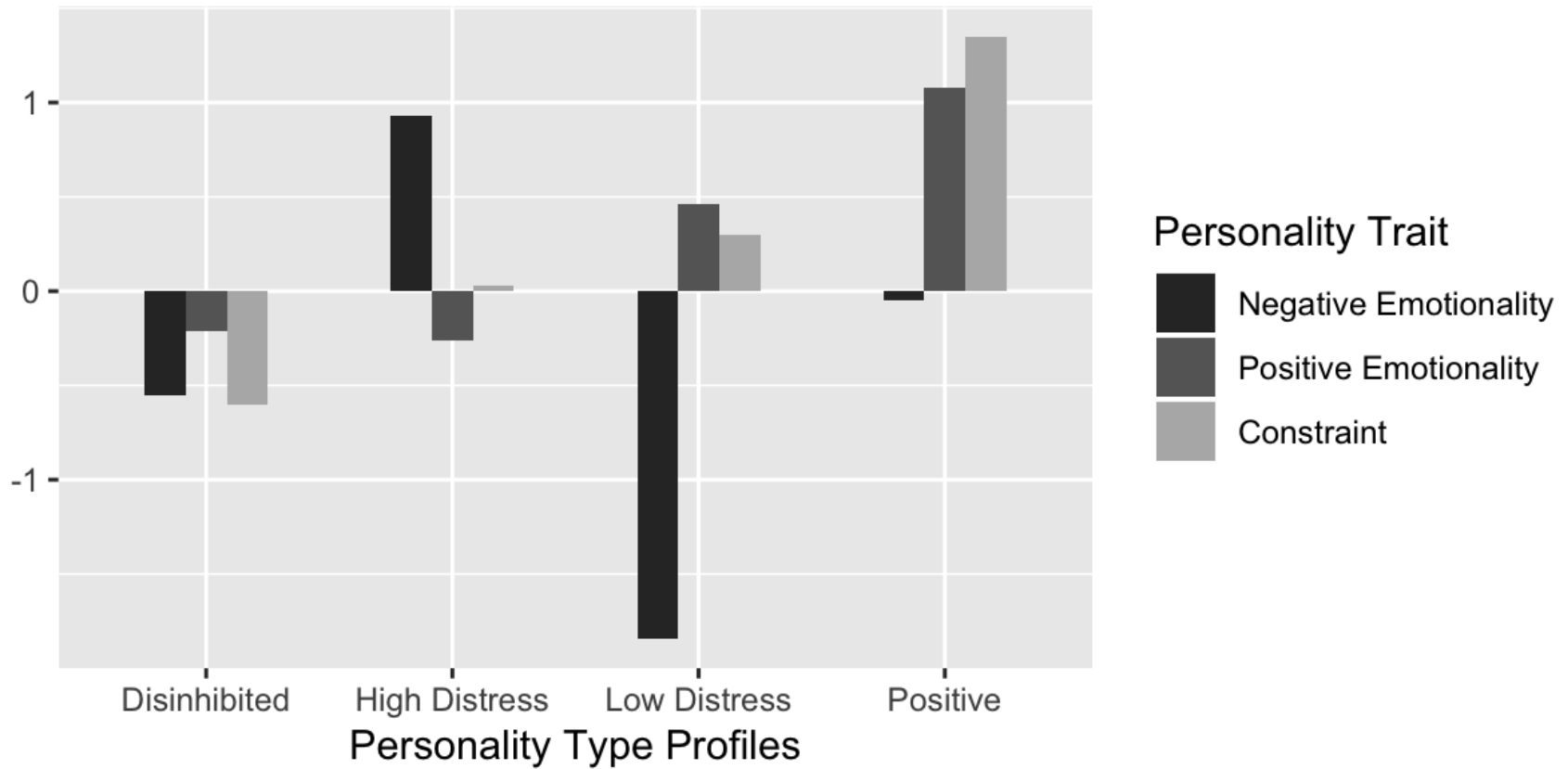
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