Dynamic Features of Affect and Interpersonal Behavior in Relation to General and Specific Personality Pathology

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A model of personality pathology including both general and specific components distinguishes severity of personality dysfunction from the characteristic style of its expression. This model has been proposed as an empirically-based, dimensional alternative to categorical models. In this study, we evaluated this conceptual structure by examining associations between general and specific features of personality pathology and momentary interpersonal dynamics. By assessing whether dynamic variability reflects general impairment or a specific trait style, we also sought to link existing findings of heterogeneity in behavior and affect among persons diagnosed with categorical borderline personality disorder with dimensional models. We examined these issues in a large sample of adults (N = 605) drawn from two protocols—an initial exploratory study and a pre-registered replication. Ambulatory assessment was used to measure affect and dominant and warm behavior of self and other during everyday interpersonal interactions. We examined individuals' average affects, behaviors, and perceptions of the others' behaviors, as well as variability in these constructs in relation to personality pathology using multilevel structural equation modeling. To our knowledge, this is the first study to examine maladaptive traits or general personality pathology in relation to momentary measures. Results supported the incremental validity of general and specific features and suggested that variability is most closely associated with general personality pathology.

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1.0 Introduction

The way personality pathology is understood and measured is controversial, with numerous innovations introduced in the past 15 years (Krueger, 2013; Trull & Durrett, 2005). Shortcomings of categorical personality disorder models used to inform diagnosis and research are now well-established, and have revealed fundamental problems in conceptualization (Clark, 2007; Widiger & Samuel, 2005). This recognition has led to development of empirically-based models that more accurately reflect different expressions of personality pathology.

One prominent theoretical model posits that personality pathology has a shared core of dysfunction that manifests in distinct, characteristic ways. This model has strong precedents in clinical theory (e.g., Kernberg, 1984; Livesley & Jang, 2000, Pincus, 2005), and there have been numerous efforts to instantiate it empirically. The Alternative Model for Personality Disorders (AMPD) in the *Diagnostic and Statistical Manual for Mental Disorders*, *5th Edition*, Section III (DSM-5; American Psychiatric Association, 2013) represents one such effort. Instead of using discrete personality disorders, the AMPD includes a dimension of general personality functioning (Criterion A) and five maladaptive trait domains (Criterion B). Criterion A captures severity of problems in intimacy, empathy, identity, and self-direction, reflecting a literature that defines general personality impairment as deficits in self and interpersonal functioning (Blatt, 2008; Parker et al., 2004). Criterion B specifies how the dysfunction is expressed. The domains included in Criterion B derive from numerous factor analytic studies which find that Detachment, Disinhibition, Antagonism, Negative Affectivity, and Psychoticism account for covariation in personality disorder symptoms (Krueger et al., 2012; Widiger & Simonsen, 2005). To illustrate, general personality dysfunction reflected by impairments in intimacy involves limited capacity for

positive and enduring connections. However, this impairment can be displayed in specific distinctive ways—in a patient who only establishes superficial relationships to maintain fragile self-esteem, in a mistrustful patient who is preoccupied with fear of abandonment, or in a patient who uses intimidation to control others.

Despite its intuitive appeal, developing a structural model of personality pathology with both general and specific components has proven to be a challenge psychometrically. When personality functioning and traits are measured with separate instruments as proposed in the AMPD protocol (e.g., Bastiaansen et al., 2013; Berghuis et al., 2014; Clark & Ro, 2014), there is mixed support for distinct functioning and trait factors, largely due to redundancy in scale content (Widiger et al., 2018). In contrast, studies have had greater success when they statistically partition variance in personality pathology, thus circumventing the issue of high covariance among functioning and trait measures. Such studies have largely supported the existence of general and specific factors associated with unique developmental trajectories and outcomes (Hopwood et al., 2011; Ringwald et al., 2019; Sharp et al., 2015; Williams et al., 2018; Wright et al., 2016).

The majority of research evaluating the validity of models incorporating both general and specific features has focused on associations with other cross-sectional measures. A comprehensive model, however, must not only account for the nomothetic structure of personality pathology, but also the characteristic, contextualized processes of perceiving and responding that defines them (Hopwood, 2018a). Ambulatory assessment (AA), which involves repeated assessment throughout the day, enables more proximal measurement of pathological processes as they unfold in daily life, thus providing insight distinct from cross-sectional measures (Rauthmann et al., 2019). AA leverages intensive repeated measurement in naturalistic settings (e.g., smartphone-based surveys) to sample participants' affect, cognition, behaviors, and situational

features closer to real time.

Cross-sectional measures assess how a person *tends* to feel, think, and act (i.e., their average), whereas AA allows for quantification of averages and *variability* in affect or behavior over time and across situations—that is, how frequently and by what magnitude individuals' affect or behavior deviates from their average. Self and interpersonal dysfunction (i.e., general personality pathology) is theorized to be driven, in part, by an unstable self-concept and perception of others, which leads to reactive fluctuations in behavior and affect that characterize pathological processes. Questionnaires have been designed to measure affective or behavioral variability, yet the relationship between these measures and variability as observed more directly using AA is modest (Solhan et al., 2009), with AA-measured affective variability being more predictive of pathology than retrospective self-report (Anestis et al., 2010). Capturing experiences within the everyday situations that shape and maintain pathology, in near real time, aligns closely with how these processes are defined clinically and provide greater ecological validity. Although variability is not a direct measure of pathological processes, it is often a precondition for them, and establishing the presence of variability across situations using AA affords insight into personality dynamics that are not possible with cross-sectional methods.

There is a literature examining emotional and behavioral variability in patients with personality pathology compared to those in other clinical and non-clinical control groups. The majority of this research has focused on individuals diagnosed with borderline personality disorder (BPD). It has been shown consistently that patients diagnosed with BPD report significantly greater variability in daily negative affect than non-clinical controls (Houben et al., 2015; Ebner-Priemer, 2007; Hepp et al., 2018) and patients with bipolar disorder or depression (Trull et al., 2008; Mniemne et al., 2018; Jahng et al., 2011), despite overlapping symptoms such as negative

emotionality and mood lability. Patients with BPD diagnoses also report more variability in state self-esteem than non-clinical groups (Santangelo, 2017), and undergraduates with a greater number of BPD symptoms compared to those with fewer symptoms report more variability of self-esteem and negative affect (Zeigler-Hill & Abraham, 2006). Most relevant to the current investigation, patients with BPD report more acute changes in negative affect in response to interpersonal challenges than patients with bipolar disorder or depression (Mniemne et al., 2018), and show more variability in interpersonal behaviors compared with non-clinical controls (Russell et al., 2007).

Variability evident across all these studies is not representative of random fluctuations; the highs and lows of behavior and affect are prompted by internal and external events that provide insight into the fundamental nature of personality pathology. For the study of personality pathology, the most theoretically meaningful situations are *interpersonal*, which most theories of normative and disordered personality posit are the primary context in which personality is developed and expressed (Benjamin, 1996; Blatt, 2008; Hopwood et al., 2013; Pincus & Wiggins, 1990). Basic motives for security and self-esteem are satisfied in interpersonal situations where individuals effectively communicate their needs and adaptively perceive the needs and behavior of others. Enduring patterns of behaving and perceiving that persistently fail to achieve these goals lead to dysregulation and distress characteristic of personality pathology (Hopwood et al., 2019).

The research cited above has been useful for systematically studying processes that were previously described only in clinical theory, but it has been focused on the categorical diagnosis of BPD. There is no disagreement that the symptoms associated with BPD represent severe personality pathology, but it is difficult to interpret results based on BPD because of its heterogeneous clinical presentation. Consistent with clinical observation, BPD criteria tend to

spread across different trait dimensions in exploratory factor analyses of personality disorder symptoms instead of cohering into a specific factor (e.g., Muñoz-Champel et al., 2018); yet, in many reported bifactor models, BPD criteria are strong indicators of the general factor (Jahng et al., 2011; Oltmanns et al., 2018; Ringwald et al., 2019; Sharp et al., 2015; Williams et al., 2018; Wright et al., 2016). The literature showing BPD criteria only form a single latent dimension when a general factor is modeled has been interpreted by some investigators to suggest these symptoms, namely self and interpersonal difficulties, reflect a continuum of general personality dysfunction that cut across different manifestations of personality pathology (Clark, Nuzum, & Ro, 2018; Sharp et al., 2016; Zandersen et al., 2019).

This interpretation of general personality pathology as a set of core deficits has been questioned on the grounds that the reported general factors are not exclusively marked by symptoms related to self and interpersonal dysfunction, and often include symptoms with opposing surface characteristics (e.g., emotional detachment and emotional lability; Williams et al., 2018). Alongside evidence that general personality pathology shares substantial variance with general psychopathology (i.e., the "p-factor"; Oltmanns et al., 2018), it has been argued that these general factors are an artifact of correlated, maladaptive outcomes resulting from distinct processes (e.g., both emotional detachment and emotional lability could lead to having few close relationships but for different reasons) rather than arising from a shared, fundamental dysfunction (Smith et al., 2020). It is unlikely that structural studies alone can determine whether general personality pathology has a shared basis of impairment because the question is whether it relates to a particular pattern of functioning in everyday life (versus relating to many, non-overlapping patterns). One way to evaluate the possibility that this cross-cutting pattern is the emotional and behavioral dysregulation thought to underlie self and interpersonal impairment in BPD would be to map the

key indicator of variability onto general and specific dimensions of personality pathology. Studying variability in a dimensional framework could also help connect research on BPD as a discrete syndrome and the dimensional models that have proven to be psychometrically and possibly clinically superior (Bach et al., 2015).

Two AA studies have investigated day-to-day variability (i.e., one assessment per day) in relation to dimensional measures. Using an undergraduate sample, Roche, Jacobson, and Pincus (2016) reported that AMPD Criterion A and some measures of Criterion B predict lower variability in daily personality impairment. In contrast, Wright and Simms (2016) examined associations between dimensional ratings of the AMPD maladaptive traits and daily levels of personality disorder features (e.g., hostility, impulsivity) in a clinical sample and found that patients with higher maladaptive trait levels reported greater variability in daily personality disorder features over 100 days. Taken together, it is unclear whether personality pathology predicts more variability from day-to-day. Approaching variability at a different time scale, Wright et al. (2015) examined variability of interpersonal problems associated with maladaptive traits across five measurement points over the course of a year. In that study, only Disinhibition and Antagonism were associated with instability in problems. Pathological processes unfold on the order of moments, days, months, and years with shared and distinct mechanisms operating at different time scales. Variability has been investigated in relation to maladaptive traits and general personality pathology at the daily, monthly, and yearly (Wright et al., 2016; Hopwood et al., 2011) level, but not at the momentary (i.e., cross-situational) level; yet, studying dynamics at each of these levels is necessary for understanding personality pathology.

This study had two, broad aims. First, we sought to evaluate the incremental validity of a general and specific model of personality pathology by examining whether these features have

unique associations with external criterion measures. Specifically, we looked at associations with momentary interpersonal behavior, perception of other's behavior, and affect in everyday life using AA. Additionally, given the importance of affective and behavioral variability for understanding BPD, in conjunction with correspondence between BPD and general personality pathology, we focused on associations with variability to clarify the extent to which variability is characteristic of general and specific pathologies. We conducted exploratory analyses of these questions in one sample, then followed up with a pre-registered replication in a separate sample with nearly identical procedures and measures. For the current study, we combined these samples to maximize generalizability. The pre-registration document is available on the Open Science Framework (OSF) https://osf.io/bnsug/ along with all other supplementary material.

We had two principal hypotheses: we expected general and specific features of personality pathology to have distinct associations with momentary interpersonal functioning outcomes consistent with the proposed structural model. Additionally, we hypothesized that interpersonal and affective variability would be associated primarily with general personality pathology rather than specific trait domains. More detailed hypotheses were pre-registered and can be found on the OSF page.

2.0 Method

2.1 Participants

The sample used for this study consisted of 672 adults drawn from two samples. To increase the reliability of the AA variability measures, participants with fewer than ten reported interactions were excluded. As a result, the final sample size was 605. Informed consent was obtained in accordance with approved protocol guidelines of the University of Pittsburgh Institutional Review Board. The sample was mostly white (86%) and slightly over half female (56%) with a mean age of 23 (SD = 5.8). This study is a secondary analysis of a sample that was collected for different aims than our current focus, but they were designed to capture varying levels of personality pathology within the age range when these problems typically emerge.

The exploratory sample was composed of undergraduate students (N = 294) from introductory psychology courses at the University of Pittsburgh. In this sample, participants received course credit for completing the baseline questionnaires and AA protocol. Full credit was awarded to individuals who completed 60% or more of the 50 AA surveys administered.

The follow-up sample was composed of community members (N = 311) recruited through posted flyers and online postings for a study of personality and daily life. For inclusion in this sample, participants had to be between 18 and 40 years of age and users of a smartphone running iOS or Android software. Individuals were not eligible if they were enrolled in a full-time undergraduate program. Participants who completed baseline questionnaires were entered into prize drawings for $75 Amazon gift cards. Following these questionnaires, participants could elect to participate in the AA portion of the study. Participants who completed 90% or greater of the

total surveys administered during the study period received $100 Amazon gift cards. Gift cards of prorated value (for example, $65 was given for 65% participation) were given to those who completed less than 90% of surveys. All participants in this sample were pre-screened to ensure a gender-balanced sample as well as adequate representation of personality traits of interest for the larger study. The NEO Personality Inventory – Revised (NEO-PI-R; Costa, 1992) was used to assess modesty in the pre-screen. Low modesty was oversampled such that a 2:1:1 ratio of low, moderate, and high levels of modesty within each gender were recruited for the purpose of investigating antagonistic traits as part of a separate project.

2.2 Procedure

In both samples, participants completed baseline questionnaires and a ten-day AA protocol. Study orientation and participation were conducted entirely online without direct contact with study staff. Following the baseline questionnaires, participants viewed a video training presentation explaining the AA procedures and instructions for downloading the MetricWire smartphone application. A short comprehension quiz was given following the training to check for understanding. Failure to show adequate comprehension lead to exclusion from further participation.

AA surveys were initiated within a few days of the baseline questionnaires. Surveys were delivered on a randomly initiated schedule between 9AM and 9PM, with a minimum of 90 minutes between surveys. Participants in the exploratory sample received five surveys per day, whereas those in the follow-up sample received seven surveys per day. This sampling schedule was chosen to balance maximizing the number of data points gathered over the course of a day with participant

burden. In total, 19,274 interactions were reported.

A push notification alerted participants to answer each survey, which were then completed using the MetricWire smartphone application. After completing a set of items administered with every AA survey regarding current feelings and thoughts, participants were asked if a social interaction had occurred since the last survey. Interpersonal interactions were defined as real-time, direct conversations between the participant and one or more other individuals that lasted for at least five minutes, including in-person, voice, video and text-based conversations. If participants indicated an interaction occurred, they reported on features of the situation. If participants indicated an interaction did not occur, they answered a different set of questions. For this study, only data reported from the interaction condition will be used.

2.3 Measures

Personality Inventory for DSM-5 – Short Form (PID-5-SF) The PID-5-SF (Maples et al., 2015) is a self-report assessment of the Criterion B traits of the AMPD. This is an abbreviated version of the 220-item PID-5 provided by the American Psychiatric Association (Krueger et al., 2012). The PID-5-SF has been shown to have comparable reliability and validity to the parent instrument (Maples et al., 2015). It is comprised of 100 items rated on a four-point Likert scale from 0 (Very False/ Often False) to 3 (Very True or Often True). Items are used to generate dimensional scores for Negative Affect (ω = .91), Detachment (ω = .87), Antagonism (ω = .89), Disinhibition (ω = .86), and Psychoticism (ω = .87).

Level of Personality Functioning Scale (LPFS-SR) The LPFS-SR (Morey, 2017) is a self-report instrument developed to measure Criterion A of the AMPD. Each item is rated on a four-

point scale from 1 (Totally False/Not at all true) to 4 (Very true). Items are weighted and averaged to produce a single, global measure of personality functioning (ω = .85). This instrument has been introduced only recently, but there is preliminary evidence for its construct validity and test-retest reliability (Hopwood et al, 2017).

Momentary interpersonal behavior. Participants rated their own behavior and the behavior of their interaction partner on two 101-point slider scales (-50 to +50) that referred to the two basic dimensions of interpersonal behavior, Dominance and Affiliation (Wiggins, 1979). The scales asked the degree to which each party (self or other) expressed behaviors of dominance ("Accommodating/Submissive/Timid" to "Assertive/Dominant/Controlling") or affiliation ("Cold/Distant/Hostile" to "Warm/Friendly/Caring").

Momentary affect. Participants also rated the degree to which they felt three positive emotions and three negative emotions derived from the Positive and Negative Affect Schedule (Watson, Clark & Tellegen, 1988). The original PANAS includes adjectives assessing positive (Happy, Excited, and Relaxed) and negative (Nervous, Sad, and Angry) affect rated on a Likert scale. Items were re-worded in the AA surveys to read "How ADJECTIVE did you feel during the interaction?" and rated on a slider scale from 0 (Not at All) to 100 (Extremely) for each adjective. Scale reliabilities for positive affect were $\omega_{\text{within-person}}$ = .80, $\omega_{\text{between-person}}$ = .85, and reliabilities for negative affect were $\omega_{\text{within-person}}$ = .69, $\omega_{\text{between-person}}$ = .93.

2.4 Analytic Plan

Multi-level structural equation modeling (MSEM) was used to examine associations between general and specific personality pathology and AA measures of interpersonal behavior,

perception, and affect during interactions. Considering psychometric issues raised in previous empirical work, we review how the between-person structural elements (i.e., general and specific features) were conceptualized and measured prior to a more detailed description of the models.

To provide a basis of comparison for successive models, we first examined whether maladaptive traits and the LPFS-SR were associated with average interpersonal behavior, perception, and affect as well as variability in those same variables using separate models (i.e., zero-order associations). Then to address our primary aim of evaluating whether general and specific components contain unique information, thus supporting its incremental validity, we statistically partitioned shared and specific variance in these measures. In the first of these models, all the traits were included as covariates to evaluate associations between the outcome variables and specific trait variance, adjusting for shared variance. Then to look at associations with their shared variance, a latent, general personality pathology factor was estimated from the maladaptive traits and was used as a predictor. In the final set of models, we included all traits and the LPFS-SR as covariates to determine whether each of these measures were associated with unique interpersonal and affective outcomes over and above their shared variance.

Figure 1 depicts the statistical models described below. MSEM was conducted using Mplus Version 8.4 (2019). Using this method, total variance in the observed measures of interpersonal behavior, perception, and affect was decomposed into within- and between-person latent variables. In MSEM, both outcomes and predictors have both within- and between-person variance. In addition, within-person (i.e., Level 1) residuals were modeled as heterogenous across individuals (i.e., Level 2 units). This enables the residual coefficients to vary between individuals (i.e., individual differences in level of variability) and become outcomes at the between-person level (i.e., to examine trait predictors of variability). Residuals can be interpreted as the individual's

variability around their own mean over time and individual differences in the random intercept reflect person-specific averages. Bayesian estimation was used because it allows modeling of heterogeneity in residual variances of outcome variables at the within-person level. No prior information about parameter values were specified (i.e., we used non-informative/diffuse priors that are the default in Mplus).

To account for potential effects of time trends on behavior and affect, which could affect individual differences in variance, the fixed effect of outcome variables (i.e., interpersonal behavior and affect) regressed on day of week and study day were included at the within-person level. By detrending the data in this way, the residual variances can be more readily interpreted as "true" variability rather than normative shifts in behavior and affect such as a spike in positive emotions over the weekend. Due to concerns about the confound of variable means and variability (Baird et al., 2006), we adjusted for their association by regressing within-person residual variance of the outcome variables on the person-specific mean of the same variables.

MSEM with Bayes estimation and random effects does not provide traditional global model fit indices because the model is fully saturated. For this reason, models were evaluated on the basis of point estimates and associated credibility intervals.

3.0 Results

Descriptive statistics for the combined sample as well as each separate sample are provided in the supplementary materials. Results for each separate sample are also available in supplementary materials. To index the degree of replication, we calculated correlations between the entire set of results for each measure of personality pathology (i.e., across zero-order and multivariate models) in the exploratory and confirmatory samples. The mean correlation between results in the two samples was .77 (Antagonism = .92, Detachment = .82, Disinhibition = .65, Negative Affectivity = .71, Psychoticism = .69, LPFS-SR = .72, general personality pathology latent variable = .89) indicating that although there were some differences between them, the overall patterning of results was markedly similar. We conducted a series of post-hoc sensitivity analyses probing possible sources of variability which revealed no major, systematic differences between samples that influenced our findings, suggesting differing results were largely due to random sampling variance. Results from these analyses are also available in the supplementary materials.

To account for sampling heterogeneity, reduce the volume of information needed to interpret the results, and maximize power to detect significant effects, we proceeded with pooling the data across studies using a meta-analytic procedure (Tackett et al., 2017). Because the methods and measures used in these studies were practically identical, and we did not find evidence of moderating variables, the samples were combined into a single dataset and analyzed.

Results from the combined sample can be found in Table 1. In the zero-order models, the LPFS-SR was associated with less affiliative and less dominant behavior, less perceived affiliation, more negative affect, and less positive affect. The LPFS-SR was also associated with variability in every criterion variable except positive affect. Antagonism, Detachment, and Disinhibition were

associated with less affiliative behavior and perceived affiliation on average. Negative Affectivity and Disinhibition were associated with less dominant behavior. All traits were associated with more negative affect, and Detachment, Disinhibition, and Negative Affectivity were associated with less positive affect during interactions. Except for Detachment, all traits were associated with more variability in dominance and perceived dominance.

Next, we looked at the shared and unique effects of the maladaptive traits. General personality pathology (i.e., the latent variable estimated from shared trait variance) was associated with less dominant behavior, less affiliative behavior, and less perceived affiliation, as well as more negative affect and less positive affect. It was also associated with more variability in dominant behavior, perceived dominance, and negative affect. After adjusting for covariance between traits, some trait effects were attenuated compared to the zero order models, but those remaining are suggestive of the specific trait style. Antagonism was associated with more dominant behavior as well as more variability in dominance and perceived dominance, less affiliative behavior and perceived affiliation, and more affective arousal overall. Detachment was associated with less affiliative behavior and perceived affiliation, less overall and more consistently low positive affect, as well as low variability in dominant behavior, perceived dominance, and affiliation. Disinhibition was associated with more negative affect during interactions and was not associated with variability. Negative Affectivity was associated with less dominant behavior, more negative affect, and increased variability in every outcome measure. Finally, the only specific association with Psychoticism was more positive affect.

In the next series of models adjusting for covariance between traits and the LPFS-SR, most associations between the LPFS-SR and variability shown in the zero-order models became non-significant, as did most of the associations between traits and variability. These results suggest

associations with variability are largely driven by a general personality pathology factor. In these models, specific variance in the LPFS-SR was associated with less dominant and less affiliative behavior, more negative affect, and less positive affect. It was also associated with more variability in dominant behavior and positive affect, over and above the maladaptive traits. Associations between traits and means were essentially unchanged from the models adjusting only for their shared variance. After adjusting for covariance with the LPFS-SR, only Detachment was associated with decreased variability, and Negative Affectivity with increased variability in affect. These results are summarized in Figure 2 to highlight the unique associations between the LPFS-SR and traits.

4.0 Discussion

The purpose of this study was to evaluate a model of general and stylistic personality maladaptive dimensions by determining whether its components account for unique variance in momentary interpersonal dynamics. Additionally, building on two existing lines of research showing that (a) BPD is associated with affective and behavioral variability and (b) BPD may be better conceptualized as general personality pathology, we directly examined the relationship between variability and general and specific features. We found support for our hypotheses related to each of these aims, as discussed in greater detail below.

Findings from this study support the incremental validity of general and specific pathology: shared and specific variance between traits each showed unique patterns of association with external criteria, and the LPFS-SR captured variance over and above the maladaptive traits. General personality pathology operationalized as shared trait variance or the LPFS showed nearly identical patterns of associations, thus substantiating its conceptual coherence. As expected by clinical description, general pathology was associated with fewer enjoyable interactions, and interactions that tend to be characterized by low affiliation and distress. Additionally, as hypothesized, general personality pathology was associated with more behavioral and affective variability.

The maladaptive traits shared ample non-specific features, but the remaining pattern of associations adjusting for their shared variance suggested separate patterns of functioning that aligned well with how the traits are understood clinically. Antagonism is defined by combative, controlling interpersonal behavior, and attention-seeking. Consistent with this, Antagonism in this study was associated with a tendency to be colder and more dominant. Antagonism involves both

grandiosity and hostility, which may be reflected in associations with more negative *and* positive affect. Antagonism was also associated with more variability in dominance and perceived dominance in others, possibly suggestive of reactive self-enhancement behaviors associated with this trait. These latter associations were weakened after accounting for the LPFS-SR, which suggests processes implied by this variability are more characteristic of general personality functioning.

Detachment involves social withdrawal, general lack of pleasure or interest, and limited emotional experience. In this study, Detachment was associated with colder interactions that evoke less positive affect. Detachment was not clearly associated with overall negative affect, which is in line with the relative lack of distress associated with this trait. It was associated with low variability in all affects, indicating consistently low engagement, as would be expected by hallmark features of restricted affiliation, restricted affectivity, and anhedonia. Detachment was also associated with low variability in dominant behavior and perceived dominance, possibly due to generally constrained social experiences.

A less clear interpersonal signature was found for Disinhibition, perhaps because Disinhibition is conceived as being problematic at both high *and* low levels (Krueger et al., 2012). While high Disinhibition relates to externalizing behaviors, low disinhibition relates to rigidly controlled behaviors or constraint (Widiger & Simonsen, 2005) that have traditionally defined obsessive-compulsive personality. We examined quadratic effects to determine whether associations with Disinhibition differed at each extreme. Results can be found in the supplementary materials. The only significant effect across samples indicated that both high and low Disinhibition were associated with decreased variability in negative affect, providing limited evidence for impact of the trait's bipolarity. Another consideration is that in the PID-5,

Disinhibition items do not reference interpersonal situations. Conceptually, problems with impulsivity and carelessness may be less specifically interpersonal (Wright et al., 2012) although they can certainly have social precipitants and consequences (e.g., Ro & Clark, 2013).

Trait Negative Affectivity refers to the tendency to experience unstable and extreme unpleasant emotions. In this study, Negative Affectivity was associated with submissiveness, experiencing more negative emotions during interactions, and more variability in affect, consistent with processes of emotional reactivity that define this trait. It was also associated with variability in interpersonal behavior and perception, but these associations may be better understood as general personality processes as they were notably weakened after adjusting for the LPFS-SR.

Finally, no strong interpersonal pattern was found for Psychoticism except for more overall positive affect. Previous research has shown Psychoticism to be associated with elevated interpersonal distress (Wright et al., 2012), but our results suggest that this may be a function of severity (e.g., general pathology) rather than style. It is also possible that the eccentricity and perceptual and cognitive dysregulation specific to Psychoticism were not represented by the dimensions of behavior and perception measured in this study, or that the people in our samples did not experience the kinds of symptoms that are typical of a clinically psychotic presentation.

Results from this study begin to bridge the literature on variability in BPD with an empirically-based, dimensional framework of personality pathology. We found nearly all the associations between variability and specific traits were accounted for by a general factor, whereas different measures of general personality pathology were associated with variability in dominant behavior and affect. Interpreted alongside associations with average affect and behavior, these data imply patterns of engaging in more frequent hostile interactions with fluctuations between controlling and timid behaviors, and frequent or intense affective reactions.

It is adaptive to modulate relatively stable behavior patterns to fit a given situation or relationship to get one's needs met to have varying emotional responses. However, the clear associations with the LPFS-SR found in this study suggest that "too much" variability across interactions is reflective of generalized maladaptive dysregulation. Psychological and behavioral variability across situations aligns with processes of dysregulation and reactivity, as posited by clinical theories such as vacillating between striving for independence versus dependence, confused boundaries, and distorted thinking about the self and others (e.g., Kernberg, 1987; Lerner & St. Peter, 1984; Kohut, 1971). By linking general personality pathology with the kinds of interpersonal patterns that have been described clinically, these results lend novel support to the potential clinical utility of assessing general personality functioning as proposed by models such as the AMPD (Hopwood et al., 2018; Morey et al., 2014).

However, as noted, variability is only *consistent* with these processes, not a direct measure of them. Determining what is psychologically functional or dysfunctional is not simply a matter of quantitative differences in variability—functioning is defined in relation to one's environment. Having established the presence of within-person variability across interpersonal situations provides the foundation for more granular examination of these dynamics, and identification of more specific prompting events. For instance, looking at outcomes related to within versus between context variability (Geukes et al., 2017), measuring the covariation of interpersonal perception and behavior, the temporal sequencing of events and affect (Sadikaj et al., 2010), or the moderating effect of pathology on links between these elements (Wright et al., 2017) are possible ways to clarify the nature of this observed variability and empirically test ideas that have long informed clinical practice. Another fruitful approach is examining *within*-situation dynamics with observational measurement of behavior (e.g., Assaad et al., 2019).

A limitation to inferring clinical implications is that we did not use samples enriched for psychopathology. Despite this, 35% of the sample reported a lifetime history of mental health treatment. Furthermore, general personality functioning is conceived as a continuum from healthy to extreme impairment, and the LPFS-SR specifically was designed to assess this full spectrum in the AMPD. Maladaptive traits, similarly, are not exclusively clinical in nature and represent a range of severity. Most existing studies on momentary outcomes associated with personality pathology have relied on extreme group mean comparisons reflecting a categorical approach. To appropriately test models of dimensional personality pathology requires sampling an array of functioning levels (Fisher et al., 2020) like that found in community and student populations (Lenzenweger et al., 2007).

Regarding extrapolation to clinical contexts, it has been shown that results from unselected community samples produce comparable patterns to those in clinical samples, even if the mean levels of pathology differ (Stanton et al., 2020). That we found robust, replicable associations with varying levels of impairment represented in this sample arguably provides a stronger test of the model than using a sample with less variability. By not restricting the range of functioning, our study shows how severity might moderate the effects on interpersonal behavior, perception, and affect. We do not suggest this approach supplant research in clinical populations; rather, our study was designed to evaluate the conceptual model, not its clinical application directly, so the sample fit our purpose. To validate its use for diagnostic purposes, more research looking at treatment outcomes, prognoses, and feasibility in samples selected for severe personality pathology are needed.

Because our study involved secondary analysis of previously existing data, we were constrained by the limited criterion measures to evaluate the full breadth of dynamic features

associated with personality pathology. One possible reason noted previously for why there were fewer specific associations with traits like Disinhibition and Psychoticism is that they may be expressed in less distinctively interpersonal ways. Although there is a rich literature characterizing maladaptive personality processes with the interpersonal constructs used in this study, there are less interpersonally-focused AA measures available which could be used to achieve even greater discriminative validity. For instance, there are AA scales for impulsivity (e.g., Halverson et al., 2020), grandiosity and vulnerability (e.g., Edershile et al., 2019), five-factor model personality states (e.g., Ringwald et al., under review), and daily expression of personality disorders (Wright & Simms, 2016) that could further differentiate maladaptive trait manifestations and more thoroughly address the question of whether the general factor primarily reflects self and interpersonal dysfunction or if it is broader in nature. Additionally, our study focused on the general factor and broad trait domains, but investigating a wider range of processes in relation to lower-order traits within those domains could also help clarify specific styles of impairment.

Another consideration for interpreting our results are the effect sizes. By conventional rules of thumb, the effects are small – but effect sizes are only meaningful in relation to the method and construct at hand. As noted, the strength of associations in the non-clinical sample could be weaker than what would be found in a clinical sample. Our results are also cross-method associations (i.e., AA and cross-sectional data) which guards against shared method variance inflating the effect sizes, but also produces coefficients that appears smaller than those in studies comparing cross-sectionally measured personality pathology with other cross-sectional variables. Perhaps more compelling than the size of effects is their replicability, which was largely demonstrated in this study. In considering the constructs of interest, personality pathology is relatively enduring and pervasive (Morey & Hopwood, 2013), and the cumulative impact of maladaptive momentary

responses and perception repeated across many interactions a day over a lifetime could be quite consequential. Thus, in the context of personality processes, statistically "small" effects can translate into a large, real-world effects (Funder & Ozer, 2019).

More effective diagnosis and treatment, and more reliable research, require the precision of personality pathology models that reflect its natural structure. Evidence that general and specific domains provide incremental information about interpersonal patterns consistent with their expected clinical presentation lends support to the theoretical structure as well as the potential value of a two-step diagnostic assessment. One barrier to transitioning to dimensional models for clinical use and research is the possible loss of knowledge gained from research using categorical models. Our study addresses this concern by aiding interpretations of previous literature within a dimensional framework, suggesting momentary variability associated with BPD may be best understood as a feature of general personality pathology.

5.0 Appendix A: Tables & Figures

Table 1. Associations between personality pathology and momentary interpersonal variables

a. Zero-order associations

	Means						**Variability**					
Personality Pathology Meas.	Dom	Affil	Dom Other	Affil Other	NA	PA	Dom	Affil	Dom Other	Affil Other	NA	PA
LPFS-SR	**-.07 (-.14, -.02)**	**-.15 (-.21, -.09)**	-.05 (-.11, .01)	**-.14 (-.20, -.09)**	**.29 (.23, .35)**	**-.14 (-.21, -.09)**	**.14 (.09, .20)**	**.09 (.03, .14)**	**.16 (.10, .21)**	**.10 (.05, .16)**	**.08 (.02, .14)**	.05 (-.01, .12)
Antagonism	.05 (-.02, .11)	**-.13 (-.19, -.07)**	-.06 (-.13, .01)	**-.14 (-.21, -.08)**	**.20 (.14, .26)**	.04 (-.03, .10)	**.11 (.05, .17)**	.00 (-.06, .07)	**.11 (.05, .17)**	.01 (-.05, .07)	-.01 (-.07, .05)	-.05 (-.12, .01)
Detachment	-.05 (-.11, .02)	**-.17 (-.23, -.12)**	-.03 (-.10, .04)	**-.15 (-.21, -.09)**	**.16 (.10, .22)**	**-.23 (-.29, -.18)**	-.02 (-.08, .03)	-.02 (-.08, .04)	-.02 (-.08, .04)	-.03 (-.09, .03)	-.03 (-.08, .02)	**-.09 (-.15, -.02)**
Disinhibition	**-.06 (-.13, -.01)**	**-.11 (-.17, -.05)**	-.04 (-.11, .03)	**-.12 (-.19, -.06)**	**.24 (.18, .30)**	**-.06 (-.13, -.01)**	**.09 (.03, .14)**	.03 (-.02, .09)	**.11 (.05, .17)**	.03 (-.02, .09)	**.06 (.01, .12)**	-.01 (-.06, .07)
Negative Aff.	**-.11 (-.18, -.05)**	-.05 (-.11, .01)	-.01 (-.08, .05)	-.05 (-.13, .01)	**.29 (.23, .35)**	**-.08 (-.16, -.02)**	**.12 (.06, .18)**	**.09 (.03, .15)**	**.12 (.06, .18)**	**.09 (.03, .15)**	**.12 (.05, .18)**	**.10 (.03, .17)**
Psychoticism	-.03 (-.10, .03)	-.05 (-.11, .01)	-.02 (-.08, .04)	**-.07 (-.14, -.01)**	**.19 (.14, .25)**	.00 (-.06, .06)	**.06 (.01, .12)**	.01 (-.05, .07)	**.09 (.04, .15)**	.05 (-.01, .11)	.02 (-.03, .079)	-.01 (-.07, .05)

b. Shared and specific trait variance

Shared trait variance	**-.10 (-.19, -.01)**	**-.20 (-.29, -.11)**	-.06 (-.16, .03)	**-.21 (-.29, -.12)**	**.46 (.38, .53)**	**-.14 (-.23, -.05)**	**.15 (.05, .23)**	.04 (-.05, .13)	**.20 (.10, .28)**	.07 (-.02, .16)	**.10 (.01, .19)**	.00 (-.09, .10)
Antagonism	**.11**	**-.08**	-.06	**-.08**	**.11**	**.11**	**.10**	-.01	**.08**	-.01	-.02	-.03

	(.03, .18)	**(-.15, -.02)**	(-.13, .02)	**(-.17, -.02)**	**(.06, .18)**	**(.05, .18)**	**(.04, .18)**	(-.07, .05)	**(.02, .16)**	(-.08, .06)	(-.09, .05)	(-.11, .07)
Detachment	-.02 (-.09, .04)	**-.16 (-.22, -.10)**	-.01 (-.07, .05)	**-.13 (-.19, -.07)**	.03 (-.04, .09)	**-.28 (-.33, -.22)**	**-.09 (-.16, -.04)**	-.05 (-.12, .01)	**-.10 (-.12, .01)**	**-.07 (-.13, -.01)**	**-.06 (-.11, -.02)**	**-.11 (-.19, -.04)**
Disinhibition	-.05 (-.12, .03)	-.06 (-.14, .01)	-.03 (-.10, .05)	-.07 (-.14, .01)	**.08 (.01, .15)**	-.03 (-.10, .04)	.03 (-.05, .11)	.01 (-.07, .09)	.05 (-.03, .14)	-.02 (-.10, .06)	.03 (-.03, .11)	-.03 (-.11, .06)
Negative Aff	**-.10 (-.17, -.03)**	.04 (-.03, .11)	.01 (-.05, .09)	.04 (-.04, .12)	**.22 (.14, .29)**	-.03 (-.10, .05)	**.11 (.04, .18)**	**.12 (.05, .18)**	**.10 (.03, .17)**	**.09 (.01, .15)**	**.15 (.07, .22)**	**.17 (.08, .24)**
Psychoticism	.01 (-.07, .08)	.06 (-.01, .14)	.01 (-.07, .09)	.04 (-.04, .10)	.01 (-.07, .07)	**.10 (.03, .17)**	.01 (-.07, .08)	-.02 (-.09, .05)	.04 (-.03, .11)	.05 (-.01, .12)	-.01 (-.08, .05)	.00 (-.08, .08)

c. Traits adjusting for shared variance with all other traits and LPFS-SR

LPFS-SR	.06 (-.15, .03)	**-.08 (-.17, -.01)**	-.04 (-.12, .04)	.09 (-.14, .01)	**.16 (.08, .23)**	**-.10 (-.18, -.02)**	**.16 (.08, .23)**	.10 (-.04, .20)	.12 (-.02, .22)	.10 (-.05, .19)	.09 (-.01, .17)	**.12 (.02, .20)**
Antagonism	**.12 (.05, .18)**	-.06 (-.13, .00)	-.05 (-.12, .01)	**-.07 (-.14, -.01)**	**.07 (.01, .13)**	**.13 (.06, .20)**	.06 (-.01, .13)	-.02 (-.08, .04)	.05 (-.03, .11)	-.02 (-.09, .05)	-.04 (-.10, .02)	-.06 (-.14, .01)
Detachment	.00 (-.07, .06)	**-.13 (-.20, -.06)**	.00 (-.07, .08)	**-.10 (-.17, -.03)**	-.01 (-.08, .06)	**-.24 (-.30, -.19)**	**-.15 (-.22, -.08)**	-.07 (-.14, .01)	**-.12 (-.19, -.03)**	-.08 (-.15, .02)	**-.09 (-.15, -.03)**	**-.16 (-.24, .07)**
Disinhibition	-.03 (-.11, .04)	-.05 (-.12, .04)	.00 (-.08, .07)	**-.07 (-.14, .01)**	.06 (-.02, .14)	-.01 (-.08, .06)	-.01 (-.09, .07)	.00 (-.09, .11)	.03 (-.06, .13)	-.02 (-.11, .08)	.02 (-.05, .11)	-.06 (-.13, .03)
Negative Aff.	**-.09 (-.17, -.02)**	.06 (-.01, .14)	.02 (-.06, .09)	.06 (-.01, .13)	**.18 (.11, .25)**	-.01 (-.08, .06)	.08 (.00, .14)	.06 (-.05, .15)	.03 (-.07, .11)	.03 (-.08, .12)	**.12 (.03, .20)**	**.14 (.05, .21)**
Psychoticism	.01 (-.07, .08)	.07 (.00, .14)	.02 (-.06, .09)	.04 (-.04, .11)	.00 (-.08, .07)	**.11 (.03, .17)**	-.01 (-.08, .06)	-.02 (-.09, .06)	.04 (-.04, .11)	.03 (-.04, .12)	-.02 (-.09, .05)	-.01 (-.09, .06)

Note. Associations between measures of personality pathology and means and variability of AA measures. 95% credibility interval presented in parenthesis; bolded values indicate credibility interval does not contain zero. Dom = self dominant behavior; Affil = self affiliative behavior; Dom Other = perception of other's dominance; Affil Other = perception of other's affiliation; NA = negative affect; PA = positive affect; Table a-c: traits measured by Personality Inventory for DSM-5; Table d: LPFS-SR = Level of Personality Functioning Scale—Self-Report; Shared trait variance = latent variable estimated from shared variance between maladaptive traits, specific trait variance = adjusting for shared variance with all other traits.

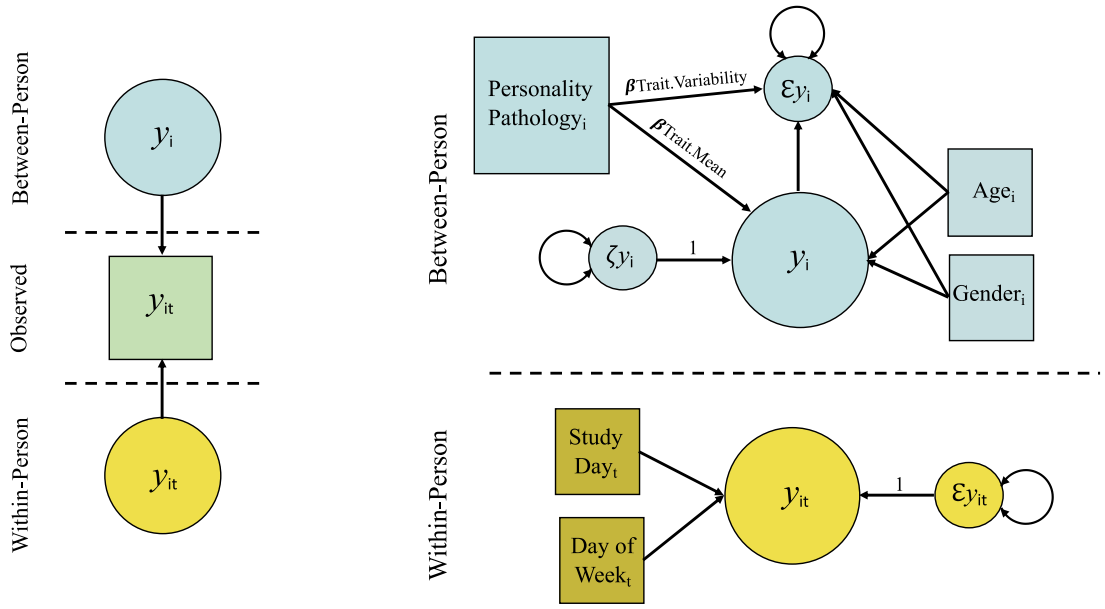

Figure 1. Multi-level structural equation model for associations between personality pathology and AA variables

Note. The left panel depicts the latent decomposition of observed variables into within-person (y_{it}) and between-person (y_i) variance for individual *i* during interaction *t*. The right panel shows the model used for all analyses. Single-headed arrows represent regression paths, double-headed arrows represent variances. Circles indicate latent variables and squares are observed variables. Note that the primary predictor in our models, personality pathology, is shown as an observed variable, but in some models it is estimated as a latent variable. $\boldsymbol{y}$ represents all outcome variables. The two labelled paths ($\boldsymbol{\beta}$Trait.Variability, $\boldsymbol{\beta}$Trait.Mean) indicate the associations of central interest. $\boldsymbol{\varepsilon y_{it}}$ represents heterogenous within-person variance, and $\boldsymbol{y_i}$ is the estimate of an individual's average. $\boldsymbol{\zeta y_i}$ represents variance in $\boldsymbol{y_i}$ not explained by personality pathology.

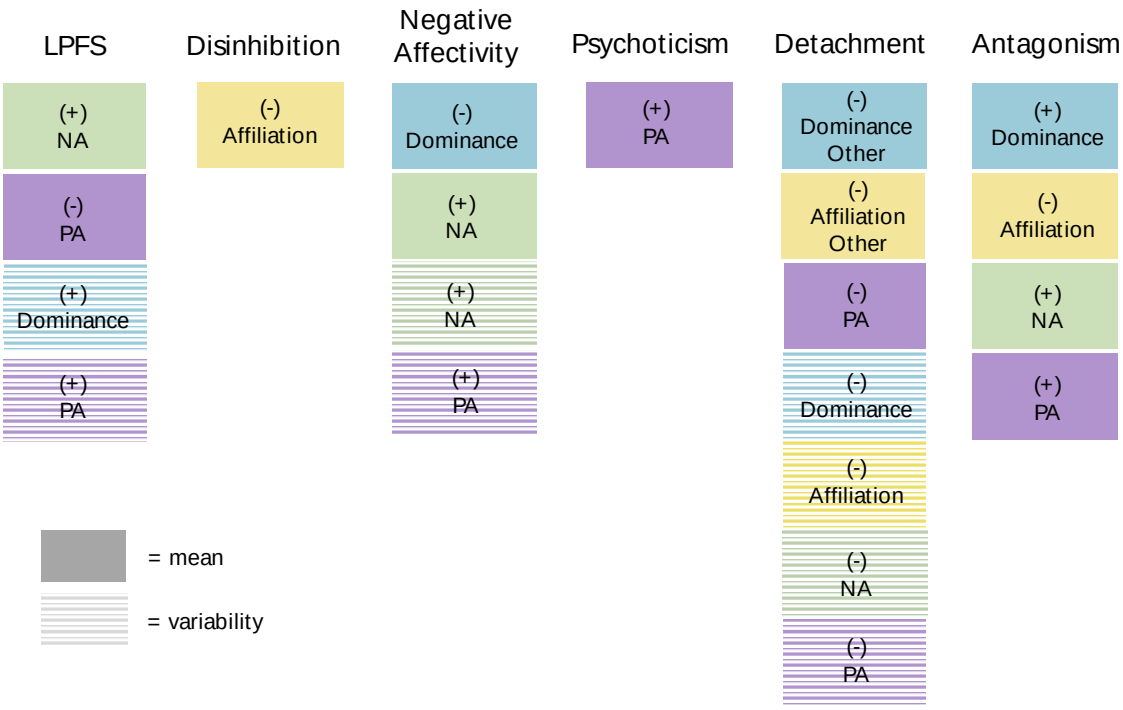

Figure 2. Associations between traits and LPFS-SR with interpersonal variables adjusting for shared variance

Note. Below each measure of personality pathology are rectangles representing AA variables associated with it. Associations are adjusting for shared variance between traits and the Level of Personality Functioning Scale—Self-Report (LPFS-SR). Dominance and Affiliation are ratings of one's own behavior; Dominance Other and Affiliation Other are ratings of interactant's behavior; NA = negative affect, PA = positive affect. Solid rectangles indicate associations with means, striped rectangles indicate associations with variability. (+)/(-) = positive/negative association.

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