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## Personality Pathology and Momentary Stress Processes

Colin E. Vize<sup>1</sup>, Aleksandra Kaurin<sup>2</sup>, Aidan G. C. Wright<sup>1</sup>

<sup>1</sup>Department of Psychology, University of Pittsburgh

<sup>2</sup>University of Wuppertal, Germany

### Abstract

The expression of personality pathology differs between people and within a person in day-to-day life. Personality pathology may reflect, in part, dysregulation in basic behavioral processes. Thus, a useful approach for studying maladaptive trait expression comes from literature on stress and daily hassles, which provide dynamic accounts for the relations between individual differences and maladaptive dysregulation. This study sought to integrate maladaptive traits and dynamic stress processes to further dynamic models of personality pathology. In a combined clinical/community sample ( $N=297$ ) oversampled for interpersonal problems, we used ecological momentary assessment (observation  $N=19,968$ ) to investigate how maladaptive traits moderated the processes of stress generation, stress reactivity, and affective spillover/inertia. Tests of our preregistered hypotheses provided a mix of supportive and null findings for stress processes identified in past research, and mixed support for the moderating role of personality. The results provide insights into the relations between everyday stressors and personality pathology.

### Keywords

Daily hassles; maladaptive traits; ecological momentary assessment; personality processes

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There has been notable progress in the dimensional (vs. categorical) assessment and conceptualization of maladaptive personality traits (Widiger et al., 2019). However, dimensional trait models remain descriptive and more work is needed to explain *how* maladaptive traits bring about pathological behaviors and outcomes. Descriptive research has demonstrated that the structure of maladaptive personality traits can be organized hierarchically into broad domains underlain by more specific facets, mirroring the structure of general personality traits (Costa & McCrae, 1992; Krueger & Markon, 2014). For example, the Alternative Model of Personality Disorders (AMPD) in DSM-5 (American Psychiatric Association, 2011) organizes maladaptive traits into five domains: Negative Affectivity (the tendency to experience a broad range of negative emotions), Detachment (the tendency towards restricted affective experiences and interpersonal withdrawal), Antagonism (tendency to be at odds with and exploit others, disregarding their needs and

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Correspondence concerning this article should be addressed to Colin E. Vize, Department of Psychology, University of Pittsburgh, 4307 Sennott Square, 210 S. Bouquet St., Pittsburgh, PA, 15260. cev18@pitt.edu.

<sup>5</sup>Since all models were estimated using a Bayesian framework, CI refers to Bayesian credible intervals, as opposed to frequentist confidence intervals.

feelings), Disinhibition (tendency to favor immediate gratification leading to impulsive behaviors), and Psychoticism (tendency to exhibit odd, eccentric, or unusual beliefs and behaviors). Each domain in the AMPD is underlain by more specific facets (e.g., callousness and manipulateness are both facets of Antagonism). The newly introduced diagnostic model of personality disorders in the World Health Organization's International Classification of Diseases 11<sup>th</sup> Revision (ICD-11) possesses a similar five-factor structure, though Antagonism is represented by the Dissocial domain, and the opposite pole of Disinhibition is represented by the Anankastia domain (Kim et al., 2021). These dimensional (vs. categorical) conceptualizations of maladaptive personality in both the DSM-5 and ICD-11 highlight the ongoing seismic shift in personality disorder conceptualization and represent important improvements over the categorical approach to personality disorders (Widiger & Trull, 2007).

These improvements notwithstanding, research has also emphasized that the problems associated with these traits is brought about by dynamic, contextualized processes (Hopwood et al., 2022). Process-based accounts of personality, whether applied to general or maladaptive personality traits, seek to move beyond description and towards explanation by shifting the focus of personality research to intra-individual processes that unfold in transaction with the environment (Baumert et al., 2017; Wright et al., 2023). Such processes can shed light on the "production mechanisms" of more stable personality traits (Fleeson, 2017). Indeed, though often described in terms of pervasiveness and relative stability, it is understood that personality and its pathology are not consistently expressed across time and circumstances. Emerging empirical studies of behavior in daily life (e.g., Edershile & Wright, 2021; Hepp et al., 2016; Mneimne et al., 2015; Ringwald et al., 2023a; Wright & Simms, 2016) suggest that the expression of personality pathology is quite variable. For instance, Wright and Simms (2016) had participants with a range of personality disorder diagnoses complete daily diary assessments over the course of 100 days, reporting on their daily personality disorder features. The results showed considerable variability in personality disorder features across days. Furthermore, participants differed from one another in average levels of daily personality disorder features. Also, Ringwald et al (2023a) found that the shared variance among maladaptive personality traits was strongly associated with the shared variance among indices of variability in social perception, behavior, and emotions in daily life assessed with ecological momentary assessment (EMA). This suggests that the expression of personality pathology may be partly conceptualized as relatively persistent, ineffective responses to the challenges of daily life (e.g., extreme shifts in emotional and behavioral reactions from one moment to the next, selecting into potentially hostile, or less supportive social contexts, evoking negative responses from others, such as hostility). This conceptualization provides the opportunity to further personality disorder research by borrowing from research on stress processes, many of which describe differences in how individuals respond to the challenges of daily life. In the present study, we seek to advance personality disorder research by 1) using a comprehensive inventory of maladaptive traits consistent with recent advances in the assessment of personality pathology; 2) evaluating three stress processes as valuable candidate processes for understanding the expression and maintenance of maladaptive traits; and 3) examining how maladaptive traits and candidate

stress processes relate to one another using EMA methods and a community sample enriched for personality pathology.

## Personality Pathology and Stress Processes

The empirical literature on stress processes provides several general frameworks for understanding processes linked to the expression and maintenance of maladaptive traits. These broadly include *stress generation*, *stress reactivity*, and *affective inertia*<sup>1</sup> (Kaurin et al., 2021; Eberhart & Hammen, 2009; Suls, 2001). Stress generation refers to the way individuals engage with and interact with their environments that may increase (or decrease) the occurrence of stressful events. Stress reactivity describes the affective response to stress events, where individuals may differ in their affective responses to stressful events. Last, affective inertia describes the tendency for negative affect to linger over time following a stressful event, reflecting difficulties in effective stress management. Within each of these processes the relation between individuals and stress is conceptualized reciprocally, emphasizing that people influence their environment just as environmental events influence individuals' behavior (Carson, 1991; Lazarus & Folkman, 1984). Process-based accounts of personality (Baumert et al., 2017), which seek to move beyond description of between-person traits and towards dynamic, intra-individual processes, mesh well with these stress processes.

Clinical descriptions of maladaptive personality have emphasized dynamic, within-person processes that overlap considerably with processes that contribute to stress (Linehan, 1993; Beck et al., 2004; Wright & Kaurin, 2020). For example, the types of situations individuals with elevated levels of maladaptive traits pursue and the way they engage with the world may engender hostile reactions or other forms of interpersonal conflict (i.e., stress generation; Powers et al., 2013). Many symptoms of personality pathology can be conceptualized as an increased reactivity to stress (e.g., a strong negative affective response to interpersonal rejection in borderline personality disorder; Hopwood et al., 2013). Prolonged experiences of negative affect after a stress event (i.e., affective inertia) have been seen as fundamental to various forms of personality pathology including borderline and antisocial personality disorders (Hawes et al., 2016; Mneimne et al., 2015). Analogously, interventions aimed at decreasing the negative impacts of personality pathology emphasize the identification and modification of appraisal processes that contribute to stress generation, stress reactivity, and affective inertia (Beck et al., 2004; Linehan, 1993).

## The Interpersonal Context, Personality Traits, and Stress

Clinical accounts of maladaptive personality traits as well as stress processes both emphasize the importance of the interpersonal context (e.g., Hopwood et al., 2013), which is understood to involve two or more people and the other(s) can be either proximally or mentally represented (Hopwood, 2018). Interpersonal stress, which is stress arising in the interpersonal context, has been the primary focus of stress generation research due to its

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<sup>1</sup>Note that affective inertia has become the more widely used term of late, but in the past the same concept and its operationalization have been termed mood spillover (e.g., Marco & Suls, 1993; Suls & Martin, 2005).

dependent nature (i.e., the stressful interpersonal event is partly due to the individual's own behavior) and relevance to psychopathology (Eberhart & Hammen, 2009). Most notably, interpersonal stress has been linked to the onset and maintenance of depression (e.g., Liu & Alloy, 2010; Hammen, 2006), but has also been connected to a wider range of psychopathology despite differing interpersonal styles across disorders (e.g., Girard et al., 2017).

Past work on the aforementioned stress processes and personality pathology has tended to focus on personality disorder categories, particularly borderline personality disorder, given its strong empirical and conceptual ties to heightened stress reactivity (e.g., Bourvis et al., 2017; Cackowski et al., 2014; Carr et al., 2013; Pagano et al., 2004; Slagt et al., 2015). Other work has focused on the transdiagnostic assessment of maladaptive traits (e.g., Sharpe et al., 2020; Sperry et al., 2018) which offers a variety of improvements relative to categorical classification approaches (Widiger & Simonsen, 2005; Widiger & Trull, 2007), even though these studies sought to examine relatively narrow portions of the maladaptive trait space. Overall, results have consistently shown that the presence of a personality disorder diagnosis or elevated levels of maladaptive personality traits are associated with less effective stress responses, as well as experiencing a higher number of stressful life events over longer timescales (e.g., Denissen et al., 2019; Liu & Alloy, 2010; Roberts et al., 2007). Nonetheless, there has been less research seeking to integrate research on stress processes with research on maladaptive personality traits at fine-grained time scales.

The value of this integration lies in the ability to identify general processes that unfold over relatively short intervals and are relevant to the expression and maintenance of personality pathology. This integration effort assumes that individuals with maladaptive personality traits experience similar intrapersonal processes in response to stress (e.g., an increase in negative affect in response to perceived stressor). However, establishing how stress processes may be more pronounced for those with maladaptive personality traits (e.g., the increase in negative affect in response to a perceived stressor is much stronger in individuals with maladaptive traits) is important, because it can help illuminate ways maladaptive personality is expressed and maintained in daily life.

Past work in this area has typically focused on the process of stress generation using daily diary studies. For example, trait hostility assessed in the morning was positively related to daily dependent stress (Sahl et al., 2009), and similar results were found when focusing on avoidant personality disorder symptoms (Cummings et al., 2013). Additionally, when examining the Negative Emotionality factor from the Multidimensional Personality Questionnaire (Tellegen, 1982), Hankin (2010) found that individuals with higher Negative Emotionality scores at baseline were at higher risk for experiencing and maintaining depressive symptoms, due in part to these individuals generating stress in their day-to-day lives. In an EMA-based study examining the relation between depressive symptoms and interpersonal stress generation, Sears and colleagues (2018) found interpersonal stress both preceded and followed emotional distress, highlighting the dynamic nature of stress in daily life.

These more recent studies join an earlier literature that investigated similar processes to those we do here (i.e., stress generation, stress reactivity, affective inertia). However, this literature has primarily focused on neuroticism, finding that the general tendency to experience negative emotions amplifies each of the stress processes (see Suls & Martin, 2005 for a review). More recent meta-analytic evidence supports neuroticism's relative importance to the frequency of reported daily hassles—the average effect size for neuroticism and frequency of daily hassles was largest ( $r = .24$ ) compared to the other FFM domains ( $r$  range =  $-.10$  to  $.02$ ; Luo et al., 2022).<sup>2</sup> These past studies provided important data on stress and personality, yet merging stress and personality processes is difficult due in part to methodological challenges in the assessment of stress and a lack of comprehensive assessment of maladaptive traits in past research.

## Challenges for the Dynamic Assessment of Stress

Conceptually, the term “stress” encompasses two components: stress exposure and stress response (Harkness & Monroe, 2016). Stress exposure refers to an internal or environmental event that poses a challenge to the individual. Stress response refers to the reaction to the stress exposure, and is determined by psychological, behavioral, and neurobiological processes. These terms, however, are not entirely independent—the dynamic interplay of stress exposure and stress response over time contributes to the experience and maintenance of stress in one's life (Monroe, 2008). These stress components are relevant for each type of stress event category that has been outlined in the literature, which include life events, chronic stressors, and daily hassles (Wright et al., 2020). Stressful life events typically have a clear beginning point in time and would generally be expected to bring about some degree of stress response. In other words, stressful life events are considered relatively strong situational events that are likely to affect people in similar ways. Chronic stressors are long-term in nature, but also may vary in their severity (e.g., long-term illness, persistent relationship problems). Daily hassles describe day-to-day annoyances that give rise to mild levels of frustration and stress (e.g., getting stuck in traffic).<sup>3</sup> Though daily hassles have been the subject of empirical research for some time (e.g., Lazarus, 1984), their assessment has changed significantly with recent technological advances. These advances have allowed for daily hassles to be studied in day-to-day life at fine-grained time scales, and passively in some cases, with little to no burden on individuals (Mohr et al., 2017). Regardless of which stress category is being studied, it is important to disentangle stress exposure and stress response—conflation of exposure and response can make it impossible to know whether an illness outcome (e.g., depressive episode) was a product of the event, the response to the event, or their interplay (Harkness & Monroe, 2016).

Disentangling the stress event from the stress response is particularly challenging in experience sampling designs when assessments are administered multiple times a day. Typically, participants' self-reports are the only assessment of stress involved in EMA

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<sup>2</sup>A similar pattern was found for the frequency of interpersonal stressors, though the magnitude of the meta-analytic effect size for Agreeableness ( $r = -.21$ ) was more comparable to the effect size found for Neuroticism ( $r = .23$ ).

<sup>3</sup>Like the distinction between stress exposure and response, the boundaries between these types of stressors can become blurred. A life event stressor can become a chronic stressor (e.g., the diagnosis of a chronic illness followed by the medical care for the illness over time), and a daily hassle may also be a part of a more long-term chronic stressor (e.g., administering daily insulin shots).

designs. To circumvent this issue, past approaches using daily diary designs incorporated semi-structured phone calls focused on the most stressful event of the day, allowing coders to evaluate objective characteristics of the stressor as well as subjective appraisals of the event (e.g., Almeida et al., 2002; Charles et al., 2013). Though such semi-structured interviews provide important contextual information surrounding participants' reports of stress, it is not feasible for EMA designs to incorporate these approaches when focusing on multiple daily hassles within any given day due to excessive participant burden. So, while intensive repeated measure designs that provide important benefits not provided by other approaches—namely, the ability to explore more fine-grained temporal dynamics surrounding stress experiences in participants' natural settings of their daily lives—these approaches sacrifice the benefits of interview-informed assessments of stress which can help delineate objective and subjective features of a stress event. The present study sought to leverage the unique strengths of EMA designs to study individual differences in personality pathology in terms of dynamic, within-persons processes in daily life while also taking steps to limit the conflation of stress exposure and response.

## Current Study

To examine relations among maladaptive traits and dynamic stress processes, and in turn advance process models of personality pathology, we focused explicitly on daily hassles and three temporally distinguishable stress processes: stress generation, stress reactivity, and affective inertia. We aimed to parse variability in each of the processes that may be accounted for by maladaptive personality traits while controlling for conceptually relevant stable and time-varying covariates. More specifically, the ability of EMA to capture and statistically model the dynamic interplay of people and their environments is ideal for research on stress and personality traits in terms of assessing environmental triggers (e.g., stressors) and responses to those triggers (e.g., stress reactivity) in naturalistic settings. Daily hassles represent the most common form of stress that individuals experience and thus provide opportunities to investigate how maladaptive personality traits relate to the ubiquitous challenges of daily life, as opposed to more major stressors.

The present study sought to build upon and extend past work in several ways. The prior studies in this area, despite their notable strengths, have often relied on modest sample sizes and incorporated narrow operationalizations of personality pathology (Kaurin et al., 2023). We addressed these limitations by recruiting a larger community sample ( $N=297$ ) stratified for a range of personality pathology, balanced on sex and treatment seeking status. We also employed a comprehensive, contemporary inventory of personality pathology that allowed us to probe both zero-order and unique effects across maladaptive trait domains that allow results to be incorporated into the growing evidence base for dimensional models of personality pathology (e.g., the AMPD). Examining zero-order and unique effects across the maladaptive trait domains can be particularly useful in establishing whether maladaptive trait domains are differentially important to stress processes in daily life. For example, significant positive relations between each maladaptive trait domain and daily stress processes that remain similar in magnitude after controlling for domain overlap would suggest that the relations could not be attributed to the shared variance across traits. On the other hand, if significant positive relations are substantially reduced for most domains after



accounting for domain overlap, it would suggest that the unique variance in those domains does not account for the relation between the domains and stress processes.

This study had two primary aims with several preregistered hypotheses associated with each aim. Figure 1 graphically depicts our conceptualization of stress processes, primary aims, and hypotheses.

### **Aim 1.**

We first examined whether individual differences (i.e., between-person differences) in maladaptive traits positively relate to average stress experiences and average momentary negative affect in daily life, and whether stressful events account for (at least in part) the association between maladaptive personality traits and average momentary negative affect. We had three primary hypotheses related to Aim 1:

*Hypothesis 1a:* Maladaptive personality traits, measured at baseline, will be associated with higher average levels of momentary negative affect. Each of the five maladaptive traits will have a significant, positive relation with average levels of momentary negative affect, with average momentary negative affect representing aggregated negative affect reported during random EMA assessments.

*Hypothesis 1b:* Maladaptive personality traits, measured at baseline, will be positively related to stressful events reported in daily life. Specifically, we hypothesize that each of the five maladaptive traits will be significantly positively related to the average number of stress events reported over the course of the EMA protocol.

*Hypothesis 1c:* The association between maladaptive personality traits and average negative affect (assessed by aggregating negative affect reports from each EMA assessment) will be partly accounted for by stressful events. In other words, we hypothesize that the relation between each maladaptive trait and average negative affect will be accounted for by stress events, such that there will be a significant positive relation between maladaptive traits and the average number of stress events, and the average number of stress events will be significantly positively related to average negative affect. The indirect effect (i.e., the product of these two links), will be significant and positive.

Building upon the links identified in Aim 1, Aim 2 was focused on within-person stress processes:

### **Aim 2.**

Evaluate whether within-person experiences of negative affect are related to within-person stress processes, and whether these processes are moderated by maladaptive personality traits. Prior to testing the primary aim of whether maladaptive personality traits moderated within-person stress processes, we estimated an unconditional model (i.e., without moderation by traits) testing the average effect (i.e., fixed effect) and individual differences in the effect (i.e., random effects) of three within-person processes: *affective inertia*, the tendency for an individual to persist or get stuck in a negative emotional state (momentary

affect deviations at  $t-1$  to be related to one's negative affect at time  $t$ ); momentary *stress generation*, the tendency for negative affect at one time point ( $t-1$ ) to relate to stressors reported at the next assessment (time  $t$ ); and *stress reactivity*, the association between a stressor and negative affect at a given momentary assessment. Significant, positive fixed effects for these within-person pathways would be suggestive of a maladaptive feedback loop, or vicious cycle, whereby negative affect at  $t-1$  increased the risk of experiencing a stressor at time  $t$ , which then amplified negative affect (i.e., an indirect effect). Independent of a significant indirect effect, significant random effects would provide evidence that individuals differ in the strength of these paths, and we sought to test whether maladaptive personality traits could partly account for such differences.

We had three primary hypotheses in relation to Aim 2:

*Hypothesis 2a:* Individuals who report elevated levels of maladaptive personality traits will have stronger affective inertia paths. Thus, we hypothesize that each maladaptive trait will significantly enhance within-person links between past negative affect ( $t-1$ ) and current negative affect ( $t$ ) (i.e., a positive cross-level moderation effect for each trait).

*Hypothesis 2b:* Individuals who report elevated levels of maladaptive personality traits will have a stronger stress generation link. We specifically hypothesize that each maladaptive trait will significantly enhance the within-person link between past negative affect ( $t-1$ ) and the occurrence of a stressful event at time  $t$ .

*Hypothesis 2c:* The stress reactivity path will be amplified by maladaptive traits assessed at baseline—we hypothesize that maladaptive traits will significantly enhance the within-person link between the occurrence of a stressful event and current negative affect.

*Hypothesis 2d:* Last, the within-person link between past negative affect ( $t-1$ ) and current negative affect ( $t$ ) will be partially accounted for by the generation of stress events (i.e., an indirect effect). Specifically, past negative affect ( $t-1$ ) will be related to subsequent stress at time  $t$ , and stress at time  $t$  will positively relate to momentary negative affect at time  $t$ . This mediational test is designed to examine whether the within-person processes of stress generation and stress reactivity can partially account for how momentary negative affect persists over time (i.e., the within-person process of affective inertia). We hypothesize that the mediational effect will be significant and positive.

## Secondary Analyses.

As previously noted, the interpersonal context figures prominently in research on both stress processes and maladaptive traits. Regarding the former, interpersonal stress has been particularly important to research on stress generation, since the way individuals interact with others may produce conflict or other forms of stress (Eberhart & Hammen, 2009). Concerning the latter, theoretical work on maladaptive personality traits has consistently highlighted that the pathology associated with maladaptive traits manifests in the interpersonal context (Hopwood et al., 2013; Wright et al., 2012; Wilson et al.,



2017). In turn, interpersonal stress may pose a more difficult challenge to those with higher maladaptive traits. Therefore, we also preregistered secondary analyses to evaluate if stress processes were impacted by whether the reported stressor was primarily interpersonal or non-interpersonal.

## Methods

All study procedures were approved by the Institutional Review Board of the University of Pittsburgh (IRB Protocol #: 15120131). All data and code needed to reproduce our results are available at <https://osf.io/y4w36>. Our analytical approach was preregistered, and can be found at <https://osf.io/tf6pu/>. Importantly, our preregistration occurred after data collection and after observation of portions of the data—data from this sample had been analyzed in other published projects (Yan et al., 2022; Sperry et al., 2021; Vize et al., 2022). However, none of the publications examined relationships between stress and maladaptive traits and momentary negative affect. A full overview of these past studies and areas of overlap with the present study are detailed in the supplementary material.

## Sample

Between 2016 and 2018,  $N=311$  community members were recruited online through the University of Pittsburgh's Clinical Translational Science Institute's participant registry, which maintains a large repository of individuals in the Pittsburgh metropolitan area who have expressed interest in participating in research studies run through the University of Pittsburgh. These individuals also provide various information about themselves to aid researchers in targeted recruitment efforts (e.g., history of mental health treatment or diagnosis). Participants were also recruited using flyers posted throughout the Pittsburgh metropolitan area. 4.5% participants ( $n = 15$ ) were excluded for failing to complete a minimum of 10 surveys during the ambulatory assessment protocol.

In order to achieve the full range of personality pathology, individuals were pre-screened using items from the Inventory of Interpersonal Problems–Personality Disorder scales (IIP-PD; (Pilkonis et al., 1996), which assesses distress associated with interpersonal problems. The IIPPD was derived from the original 127 items of the Inventory of Interpersonal Problems (Horowitz et al., 1988). Past work has shown that three of the five subscales of the IIP-PD (interpersonal sensitivity, interpersonal ambivalence, aggression) maximally discriminate between those with and without personality disorder traits (Pilkonis et al., 1996; Morse & Pilkonis, 2007). These three subscales of the IIP-PD (18 items total) were used for screening participants, and items were rated from 0 (Not at All) to 4 (Extremely). In the present study, IIPPD total scores were used to screen participants in an approximately 1-1-1 representation of low ( $< 10$ ) moderate (11–16), and high (17+) levels of interpersonal difficulties. Reliability for IIPPD total scores was high ( $\alpha=.89$ ;  $\omega=.92$ ). The sample was also selected to balance biological sex, and balance individuals who had received recent mental health treatment (within the past year) with those who had not. The IIP-PD score groups were also balanced by sex and treatment status. At the time of study enrollment, participants were not receiving treatment for psychosis or a psychotic disorder, and this was the only exclusion criteria.

The final sample ( $n=297$ ) ranged in age from 18 to 40 ( $M=28$ ,  $SD=6.39$ ) and was 52.53% female ( $n=156$ ). The majority of participants identified as White (71.38%,  $n=212$ ). 13.47% identified as Black or African American ( $n=40$ ), 6.4% as Asian ( $n=19$ ), and 8.08% ( $n=24$ ) as multiracial or “Other”; two individuals declined to answer this item. 64.31% ( $n=191$ ) of the sample had a lifetime history of mental health treatment, 61.78% ( $n=118$ ) of which were currently receiving treatment at baseline. 60% of participants reported a family income of \$59,999 or lower. See Table S7 for detailed demographic information.

**Power Estimations.**—Sensitivity-based power analyses were conducted to assess what effect size we would be able to detect with .90 power or greater with our actual sample size of person  $N=296$  with an average number of observations of 67 per person. Monte Carlo simulations of simplified MSEMs estimating main effects, variance components, and cross-level interactions were conducted in Mplus (version 8.4; Muthen & Muthen, 1998–2019). Plausible values for secondary parameters were informed by prior research with similar variables (e.g., momentary affect variable  $ICCs = .50$ ). Results showed that sufficient power (power > .90) was achieved for between-person effects of  $\beta = .20$  or higher and within-person fixed effects that were very small  $\beta = .03$ .

## Procedure

Participants completed a three- to five-hour baseline laboratory session and an ambulatory assessment protocol. All participants received \$50 for the baseline session. Those who answered 90% or greater of the surveys during the ambulatory assessment period earned an additional \$110 (14-day ambulatory assessment) or \$160 (21-day ambulatory assessment). This amount was prorated by week for those who completed less than 90% of the surveys overall, with surveys completed in later weeks of the study valued higher in the prorated compensation model. Additionally, for each 100 participants, a drawing was conducted for an iPad Mini.

## Comprehensive Assessment of Traits Relevant to Personality Disorder (CAT-PD)

The Comprehensive Assessment of Traits Relevant to Personality Disorder-Static Form (CAT-PD-SF; Simms, 2013) was completed during the baseline assessment, and includes 216 items drawn from the larger CAT-PD project item pool (Simms et al., 2011). The CAT-PD project sought to develop a comprehensive model of maladaptive personality traits, using the Personality Psychopathology-5 model (PSY-5; Harkness et al., 2012) as the *a priori* guiding framework. The CAT-PD project followed a similar developmental trajectory compared to the AMPD in the DSM-5—the project started with the enumeration of lower order facets most relevant to personality pathology which were then psychometrically refined in community and patient samples.

The CAT-PD assesses 33 maladaptive personality traits with items rated on a five-point Likert scale (0 – Very Untrue of Me to 4 – Very True of Me). An overview of trait scale properties can be found in supplementary Table S2. Structural examinations of the CAT-PD have shown that the 33 trait scales can be organized into five broad factors: Negative Affectivity, Detachment, Disinhibition, Antagonism, and Psychoticism which largely overlap with other maladaptive personality models (e.g., the AMPD; Wright &

Simms, 2014; Ringwald et al., 2023b). These five domains served as our key between-person variables, with trait scales assigned to factors based on their primary loadings from the obliquely-rotated five factor solution reported in Wright and Simms (2014).

### Ambulatory Assessment

Ambulatory assessments typically began the day after baseline assessment. The length of the assessment period was initially set at 21 days ( $n=37$ ) but was later shortened to 14 days ( $n=260$ ) to reduce participant burden. Surveys were administered through the MetricWire (MetricWire, Inc., 2019) smartphone application and participants were prompted to answer surveys through push notifications.

Surveys were delivered on a pseudo-random schedule, and participants received six surveys per day during an approximately twelve-hour time window that corresponded to their typical waking hours. Blocked random intervals were set so that a minimum of 90 minutes passed between surveys and participants were given 20 minutes to initiate a response. A total of 20,379 responses to random prompts were collected over the course of the study with a mean number of 68.62 ( $SD = 20.94$ ) surveys completed per participant. This translates to an approximate compliance rate of 76.8% for the randomly administered prompts.

**Positive and Negative Affect Schedule (PANAS).**—At each assessment, participants rated the degree to which they currently felt negative emotions (i.e., ashamed, nervous, sad, and angry) derived from the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). Items read “How [ADJECTIVE] do you feel right now?”, and ratings were made on a slider scale from 0 (“Not at All”) to 100 (“Extremely”) for each adjective. The original PANAS assesses positive and negative affect with 10 items each, and our use of an abbreviated set of items was designed to reduce the overall length of the EMA survey during the randomly administered prompts, while also providing broad coverage of the negative affect domain (sadness, anxiety, and anger) and self-conscious emotion of shame given its relevance for personality pathology.

**Stressful Events.**—Participants were asked if anything “stressful”, “unpleasant”, or “pleasant” had occurred since the last assessment. We focused on the stressful and unpleasant events for the present project. For stressful events, participants were instructed to consider whether they themselves felt stressed when the event occurred, not whether they or another person would typically feel stressed in the same situation. If participants indicated a stressful event occurred they were prompted to answer questions about the event, including when the event occurred, and if any interpersonal interaction was involved. Participants who indicated that their most stressful event was an “argument/disagreement/conflict” were asked to further describe the type(s) of argument or conflict: “general disagreement”, “work related”, “financial issues”, “miscommunication”, “value difference”, “family issues,” or “other”. Participants were also asked to indicate who they argued with: “romantic partner/spouse”, “family member”, “friend/acquaintance”, “boss/teacher”, “employee/student”, “coworker”, “roommate”, “someone else I know”, or “someone I’ve not met before.” However, our preregistered secondary analyses focused on a broad

categorization of interpersonal stress, as opposed to more specific types (e.g., a financial stressor involving a romantic partner).

Participants who indicated that they had not experienced a stressful event since the last assessment were asked if any of the following had occurred since the last assessment: “argument, disagreement, conflict”, “social disappointment/let down”, “difficulties involving work or school”, “difficulties at home”, “health issue or accident”, “negative event that happened to others”, or “other unpleasant event.” These selections were written to closely mirror the content of the stressful events, but were presented in this manner to differentiate situation characteristics from the perception of stress. The approach of assessing both unpleasant and stressful events was designed to differentiate situation characteristics from the perception of stress and limit conflation of stress exposure with stress response.

The options for type of event provided were “argument/disagreement/conflict” ( $N=676$ ), “social disappointment/let down” ( $N=320$ ), “work/school related event” ( $N=1,282$ ), “home related event” ( $N=506$ ), “health issue or accident” ( $N=511$ ), “event that happened to others” ( $N=203$ ), and “other” ( $N=1,118$ ). Because participants could select more than one type of stressful event, they were asked to select the most stressful event as the focus for further questions.

## Data Analysis

As preregistered, we used multi-level structural equation modelling (MSEM; Sadikaj et al., 2021) to accommodate the hierarchical structure of intensive longitudinal data resulting from recurrent assessments of stressors and affect within participants. MSEM allows the overall variability in individuals’ responses to be divided into between- and within-person variance components. Between-person variance reflects individual differences in average responses and is akin to coefficients derived from dispositional or trait measures. Within-person *variance* reflects moment-to-moment fluctuations from an individual’s average level. Within-person *associations* reflect the extent to which two variables tend to covary over time. The average association among two within-person variables (i.e., average levels of affective inertia, stress generation, and stress reactivity) is represented by the fixed effects. The random effects represent individual differences in the strength of these associations. In our models, we estimated all within-person regression paths as random slopes, which tests whether individuals differ in the strength of their within-person associations. To illustrate, for some individuals, the link between experiencing a stressor and negative affect may be positive and strong, but for others it may be weaker or even negatively related. Thus, estimating random slopes further allows us to test whether the strength of association varies as a function of individual differences in between-person variables, such as the CAT-PD traits (i.e., cross-level interaction).

Figure 1 provides an overview of all tested models. Aim 1 models examined whether maladaptive traits were associated with individual differences in negative affect, contributed to the generation of stress in daily life, and whether the association between maladaptive personality traits and stressful events would account for the association between these traits and negative affect. To this end, all models estimated random intercepts for the binary

(i.e., stress was coded as 1 if a stressor was reported and 0 if a stressor was not reported) and continuous (i.e., negative affect) outcomes, which were regressed onto each of the maladaptive trait predictors. The random intercept of negative affect was regressed on the random intercept of stressors. Furthermore, we tested the shared and unique contribution of CAT-PD traits in the prediction of stressors and negative affect by entering all traits simultaneously into the model.

In testing our Aim 2 hypotheses,<sup>4</sup> we first established the validity of our momentary models of stress generation, reactivity and inertia, by running a set of *unconditional* models. By unconditional, we mean that the within-person paths were not moderated by the CAT-PD traits. In the unconditional models, stressor ratings were regressed on negative affect at  $t-1$  (generation), and current negative affect was regressed on stressor ratings (reactivity) or negative affect at  $t-1$  (inertia; an autoregressive effect). In MPlus, dichotomous mediators are treated as latent response variables in the estimation of mediation effects. As described above, for within-person regressions, we estimated random slopes, modeling individual differences in the strength of their within-person associations. After testing unconditional models, we next introduced individual maladaptive CAT-PD traits as predictors of each of the random effects of the within-person paths as a test of the cross-level interactions outlined in *Hypotheses 2a-2c* (right column of Figure 1). In a final step, we reran the same models while adjusting for the overlap among maladaptive traits to examine the unique effects of the CAT-PD domains.

In a secondary set of analyses, we further evaluated if stress processes manifested differentially depending on whether the stressor or unpleasant event was primarily interpersonal or non-interpersonal based on Aim 1 models. In brief, if participants reported a stressful event had occurred and categorized it as an argument/disagreement/conflict, they were asked “Which specific type(s) of argument, disagreement, or conflict did you experience?” and selected from a variety of options (e.g., general disagreement, value difference). Across the categorizations, numerous descriptions could defensibly be considered either interpersonal or non-interpersonal. To ensure that our results are not dependent on subjective groupings, we conducted a multiverse analysis (Steege et al., 2016) and tested different plausible ways to group stressful events into interpersonal vs. non-interpersonal stressful events. Additional detail on how events were categorized as interpersonal vs. non-interpersonal is described in the supplementary section and outlined in Tables S2 and S3.

In all models, we included within-person random effects for time of day and weekend to control for their influence in the tests of primary hypotheses. In accordance with previous analyses based on similar datasets (e.g., Sadikaj et al., 2013), we used age and sex as covariates at the between-person level, and a continuous time measure as well as day of week at the within-person level in all analyses. Time and lagged negative affect were person-mean centered, while CAT-PD traits were left in their original scale.

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<sup>4</sup>We note that in the preregistered version of the syntax for our Aim 2 models, negative affect at  $t-1$  was incorrectly included at the between-person level and therefore has been removed for all analyses reported in this article.

All analyses were conducted using Bayesian estimation in Mplus (version 8.4; Muthen & Muthen, 1998–2019). In MPlus, Bayesian estimation is accomplished using Markov Chain Monte Carlo (MCMC) methods, and diffuse priors were used for all model parameters (Muthén, 2010). Though the number of parameters across our models varied, the default prior distributions were either normal (e.g., for regression parameters), inverse gamma (e.g., for variance parameters), or inverse Wishart (e.g., for covariance parameters). The output files available on OSF for the project also provide specific prior specifications for each model parameter. MCMC methods were implemented using the Gibbs sampling algorithm (Gelfand, 2000), and potential scale reduction (PSR; Gelman & Rubin, 1992) was used as the parameter convergence criterion. Convergence is checked every 100 iterations by default in MPlus, and sampling is stopped when a low PSR (typically between 1.05 and 1.10) has been achieved for all model parameters. Across most models convergence was achieved after the first 200–300 iterations, but more complex models required many more iterations (e.g., our Aim 2 model with all CAT-PD domains included at level-2 converged after approximately 8,000 iterations).

## Results

### Descriptive Results

Table 1 provides descriptive information for primary study variables at the between- and within-person level. Over the EMA protocol, participants reported a stressor on 4,209 of 19,968 (21%) assessments. Between-person reliability for primary study variables ranged from  $\omega=.68-.93$ , and the within-person reliability for momentary negative affect was  $\omega=.66$ . The intraclass correlation for momentary negative affect ( $ICC=.58$ ) indicated that over half of the variance in momentary negative affect occurred at the between-person level. Within- and between-person correlations among primary study variables are presented in the supplementary materials (Table S2). Generally, the CAT-PD domains were moderately to strongly positively related with one another ( $r$  range  $=.30-.58$ ), but two exceptions were the relation between Antagonism and Detachment ( $r = -.06$ ) and Detachment and Psychoticism ( $r = .16$ ). The CAT-PD domains were also positively related with average momentary negative affect at the between-person level ( $r$  range  $=.12-.53$ ). At the within-person level, momentary negative affect and stress were positively related ( $r=.31$ ).

### Aim 1 Models

We first tested a set of hypotheses predicting that CAT-PD domains would be positively related to individual differences in negative affect (*H1a*) and reported stressors in daily life (*H1b*), and whether stressful events partially accounted for the association between maladaptive personality traits and negative affect (*H1c*).

Regarding *H1a*, when entered as sole predictors, we found that each CAT-PD domain was positively related to negative affect, providing support for *H1a* (see last column of Table 2). When reported stressors were included in the model, Detachment and Antagonism were no longer significantly related to negative affect (see first column in Table 2), while the direct path remained significant for the other three CAT-PD domains. When all CAT-PD domains were jointly entered in the model, only the positive unique relation between Negative



Affectivity and negative affect remained significant, while a negative unique relation for Antagonism emerged (see last column in lower part of Table 2) indicative of a suppression effect (Lynam, Hoyle, & Newman, 2006; Paulhus et al., 2004).

As hypothesized, all domains were positively associated with a higher number of reported stress events during random assessments (*H1b*; see second column of Table 2). When including all traits simultaneously in the model, only Negative Affectivity and Psychoticism were uniquely positively related to the number of reported stress events (see lower part of Table 2). The test of *H1c* showed that the relationship between maladaptive traits and negative affect in daily life was partially accounted for by stressful events (see last two columns of Table 2), but in the case of Detachment and Antagonism, these domains were no longer related to negative affect after accounting for their relation with reported stressors. Only for Negative Affectivity, however, was the unique indirect effect significant when including all other traits in the model.

## Aim 2 Models

Prior to testing hypotheses 2a-2c, we tested for the presence of the normative within-person processes of affective inertia, stress generation, and stress reactivity. We found a significant fixed effect for stress reactivity (i.e., a positive link between reports of momentary stressors and negative affect;  $\beta=.41$ , 95% CI<sup>5</sup>= .36; .43) as well as affective inertia ( $\beta=.31$ , 95% CI=.29; .32). In other words, participants reported higher levels of negative affect compared to their average following a stressful event, and past negative affect ( $t-1$ ) positively related to participants' level of negative affect at time  $t$ . However, past negative affect ( $t-1$ ) did not increase the chance of participants reporting a stressful event at time  $t$  (i.e., stress generation;  $\beta=.00$ , 95% CI= -.02; .03). As a result, we did not find that, on average, affective inertia could be partially accounted for by the joint effect of stress generation and stress reactivity. Random effects for all three paths, inertia, stress generation, and reactivity were significant. Based on the significant random effect findings from our unconditional models, we examined whether maladaptive traits moderated the strength of the within-person slopes (i.e., stress generation, stress reactivity, and affective inertia). Corresponding coefficients are displayed in Table 3.

Regarding *H2a* (maladaptive traits would amplify affective inertia), results showed that all 95% credible intervals included zero across the CAT-PD domains ( $\beta$  range= -.08 to .05). Thus, *H2a* was not supported. Similarly, *H2b* (maladaptive traits would amplify stress generation) was not supported for any trait ( $\beta$  range= -.03 to .01). *H2c* (maladaptive traits would amplify stress reactivity) was partially supported. Negative Affectivity ( $\beta=.35$ , 95% CI=.27; .43), Disinhibition ( $\beta=.19$ , 95% CI=.11; .26), and Antagonism ( $\beta=.16$ , 95% CI=.06; .23) all showed cross-level amplification of the stress reactivity process, but these effects were not observed for Detachment or Psychoticism.

Consistent with our preregistered plan, these analyses were repeated while including all CAT-PD domains simultaneously to examine any unique domain relations that emerged after adjusting for domain overlap. Results showed that only Negative Affectivity and Detachment were unique, significant moderators of within-person stress reactivity after adjusting for domain overlap. While the unique relation for Negative Affectivity was

essentially equivalent to the relation observed when it was the sole domain in the model ( $\beta = .36$ , 95% CI = .24; .47), the unique effect of Detachment showed evidence of suppression—after controlling for domain overlap, Detachment had a unique dampening effect ( $\beta = -.14$ , 95% CI =  $-.22$ ;  $-.04$ ) on stress reactivity at the within-person level.

### Interpersonal Versus Non-Interpersonal Stressors

Results from our secondary analyses, where stressors were categorized into interpersonal or non-interpersonal stressors, largely returned the same pattern of results for Aim 1 and Aim 2 models. Thus, there was no evidence that interpersonal stress played a distinguishing role in the pattern of relations observed in our primary analyses. Respective coefficients analogous to those reported for our primary preregistered analyses can be found in supplementary Tables S6 and S7. Accompanying code and outputs can be found at [https://osf.io/y4w36/?view\\_only=bf0e7b4005ab47b795bf813e5bb99432](https://osf.io/y4w36/?view_only=bf0e7b4005ab47b795bf813e5bb99432).

## Discussion

The results of the current preregistered study provided mixed support for our primary hypotheses. Regarding Aim 1 models, maladaptive personality traits were positively related to higher average levels of negative affect over the course of the EMA protocol, as well as a higher frequency of stressful events. Overall, the relation between maladaptive personality traits and average negative affect was either partially or fully accounted for by reported stress events. Results from the Aim 2 models provided support for the normative stress processes of stress reactivity (i.e., daily hassles lead to increases in momentary negative affect) and affective inertia (past negative affect was positively linked to future negative affect), but not stress generation. Aim 2 models also indicated the presence of individual differences in affective inertia, stress reactivity, and stress generation processes as shown by the significant random slopes estimates for each process. However, maladaptive traits only moderated effects for stress reactivity. Taken together, the results provide insights into both our understanding of maladaptive personality traits as well as the dynamic relations between stress and personality pathology.

### Between- and Within-Person Relations Among Maladaptive Traits, Negative Affect, and Stress

Aim 1 models showed that the relation between maladaptive traits and average momentary negative affect, a robust relation found in both cross-sectional and EMA studies (e.g., Tomko et al., 2015; Ringwald et al., 2021), was either partially or fully accounted for by the relation between maladaptive traits and average daily hassles. After accounting for the shared variance among CAT-PD traits, Negative Affectivity remained the only unique trait correlate of average momentary negative affect and average reported stressors, while a unique suppression effect emerged for Antagonism. Interestingly, the relations between the CAT-PD domains of Antagonism and Detachment and average momentary negative affect were fully accounted for by the inclusion of stressors in the models, while significant independent effects remained for the other domains. To further explore these patterns, Aim 2 analyses shifted the level of analysis to within-person processes that could shed further light

on the between-person relations among maladaptive personality traits, average daily hassles, and average momentary negative affect observed in the Aim 1 analyses.

More limited evidence was found for our Aim 2 hypotheses, which focused on whether maladaptive traits moderated the within-person processes of stress generation, stress reactivity, and affective inertia. Results provided support for the normative within-person processes of stress reactivity and affective inertia (i.e., fixed effects), but no support for momentary stress generation, where we expected that past negative affect would positively relate to daily hassles at the next assessment. However, there were significant individual differences for each of these within-person processes highlighting that individuals varied in the strength of these within-person stress processes. Nonetheless, maladaptive personality traits were not associated with this variability except in the case of stress reactivity.

Cross-level moderation of stress reactivity was observed for all domains except for Detachment. To make sense of the impact of maladaptive traits on the process of stress reactivity, it is useful to consider their respective effect sizes. The fixed effect observed for stress reactivity in the unconditional model with no maladaptive traits included was  $B=5.11$  ( $\beta=.42$ ), meaning that the difference in momentary negative affect when a stressor was reported (versus no stressor reported) was slightly higher than 5 points (with momentary negative affect assessed using a 0–100 scale). The moderation effects of the CAT-PD domains ranged from  $B=2.06$ – $3.03$  ( $\beta=.16$ – $.35$ ; Table 2) such that a one-point increase in a maladaptive trait was related to the impact of stress on negative affect increasing by about 40%–60%. While these effects are not large in an absolute sense considering the 0–100 scale of momentary negative affect, they are relatively substantial given the fixed effect observed in the unconditional model. In turn, these results highlight an important way that maladaptive personality traits may predispose individuals to heightened experiences of negative affect in their day-to-day life.

These results complement past work that has focused on broader personality disorder constructs and stress reactivity. Much of this research has focused on personality disorders related to Negative Emotionality, most notably borderline personality disorder (e.g., Glenn & Klonsky, 2009; Mneimne et al., 2015). Our results suggest that various maladaptive traits predispose individuals to be more reactive to stress, but reactivity was most pronounced for Negative Emotionality. The present results are also consistent with past research focused on transactional accounts of maladaptive personality traits. For example, when examining categorical personality disorder diagnoses, Daley and colleagues (1998) found that while personality disorders were unrelated to independent stress events (i.e., stress events that are outside of an individual's influence), they were prospectively linked to dependent stress events including romantic relationship dysfunction and chronic interpersonal stress. Importantly, the prospective relationship between Cluster A and B disorders and subsequent depressive symptoms was mediated by the positive relation between personality disorder and stress events (Daley et al., 1998). What the current results offer relative to this past research, in addition to an increase in sample size and a focus on empirically supported transdiagnostic dimensions, is that these transactional processes were also observed when stress events were operationalized as stressors that most people experience on a day-to-day basis (i.e., daily hassles). In turn, the results suggest that the transactional nature of stress

and personality pathology is pervasive, applying not only to more substantial life events, but also to events that may go unnoticed or are difficult to accurately measure if not explicitly assessed with EMA or daily diary methods (Wright et al., 2020).

Taken together, past research and the current results support the notion that personality pathology may be maintained by multiple stress processes, both distal and proximal. However, the data are consistent with various accounts of how stress may interact with personality traits to give rise to maladaptive functioning. For example, the impact of daily hassles on negative affect may be the avenue by which more distal stress events continue to affect well-being—following a significant stress event, individuals with elevations on maladaptive traits may have difficulty returning to homeostasis which is partially explained by daily hassles serving as frequent obstacles to homeostatic recovery. Recent work provides support for this account (Jayawickreme et al., 2023). Alternatively, the proximal processes involving daily hassles may constitute the building blocks of major life events. More impactful life events such as the end of a relationship or the loss of a job rarely occur suddenly, and instead are a product of accumulated negative events. Thus, the accumulation of daily hassles over time may conduce to more disruptive stress events. Importantly, these accounts are not mutually exclusive and may operate in tandem. Additional research is needed to disentangle how the mechanisms underlying the relation between maladaptive traits and daily hassles are independent of the mechanisms underlying the relation between maladaptive traits and more substantial stressful life events. It is likely that these processes are somewhat interdependent, but to what extent is a question for future research.

### **Shared and Unique Relations Between Maladaptive Traits and Stress Processes**

Aim 1 results showed that while all maladaptive traits were related to average momentary stress and average momentary negative affect, these relations were only present for Negative Affectivity after adjusting for overlap among the maladaptive traits. A similar pattern was found for the enhancement of within-person stress reactivity. Research examining general personality traits has tended to find a similar pattern (e.g., Luo et al., 2022) and suggest that the general tendency to experience negative affect is relatively more important than other trait-like tendencies when it comes the experience of stress and its affective consequences. The present results are important when considering the differential importance of maladaptive trait domains, at least as it pertains to negative affect and the daily stress processes examined in this study. The results suggest that the unique variance of maladaptive trait domains independent of negative affectivity is largely unimportant to stress reactivity, average momentary stress, and average momentary negative affect. In fact, in specific cases, the unique domain variance was negatively related to momentary negative affect (e.g., the relation between the unique variance of antagonism and average momentary negative affect). In turn, the results highlight the benefits of considering both zero-order and unique relations with study outcomes—because there is a moderate to strong positive manifold among maladaptive traits, careful consideration of both unique and shared trait variance and their respective relations with study outcomes can further our understanding of their differential importance to important functional outcomes.

However, the results observed for the unique variance of maladaptive traits should be interpreted with caution as the practice of partialing shared variance from moderately to highly correlated scales typically complicates interpretation of results (Lynam, Hoyle, & Newman, 2006). Future research can further explore hypotheses about the shared and unique contributions of maladaptive trait domains, and facet level analyses may be particularly informative. If general negative affectivity is most important to stress in daily life, one would expect facet scales that explicitly assess such content would drive the relation observed at the domain level. Using facet scales of Antagonism as an example, such a pattern would be reflected by differential relations for hostility- or anger-related facets compared to facets assessing manipulateness or dishonesty.

### Future Directions

The current study provided initial data highlighting how personality dysfunction may be maintained over time, but also highlights important avenues for future research. We focused on negative affect as the primary consequence of stress and maladaptive traits. However, there are various other consequences that can be explored. Some examples include interpersonal conflict or health outcomes that have been shown to relate to stress (e.g., sleep and fatigue; Åkerstedt et al., 2014). Alternatively, these outcomes could be explored as extended consequences of the relationship between stress and negative affect.

We explored the three stress processes of stress generation, stress reactivity, and affective inertia. We further posited that these processes would combine in a “vicious cycle”, that could help explain how negative affect is maintained over time. That is, we expected that affective inertia could be partially explained by past negative affect generating future stress, which in turn led to increases in negative affect. However, the lack of evidence for within-person stress generation suggests that alternative design approaches may be necessary to examine the ways negative affect generates daily hassles. An interesting direction for future EMA work would be to study different time lags to study how individuals may contribute to their experiences of stress. More specifically, shorter time frames (e.g., a 10–15 minute lag between negative affect and stress) seem most promising in order to better understanding the generation of daily hassles.

Relatedly, the three stress processes we focused on are not exhaustive. In their recent conceptual review of everyday stress, Smyth and colleagues (2022) discuss stress reactivity but also the processes of recovery (the return to resting state after an initial stress reaction) and pileup (defined as the accumulation of stressors over time or stress reaction-recovery cycles over time). While the process of stress recovery is related to affective inertia, they are not completely overlapping; recovery extends beyond the simple linkage between negative affect across assessment periods. Furthermore, stress recovery and its role within a vicious cycle was not considered in the present paper. Presumably, any vicious cycle would not continue indefinitely, and recovery would eventually take place. While these dynamic processes are complex, future work can explore their interplay using cutting-edge EMA designs that build on the present results (e.g., EMA designs that incorporate short, frequent assessments following a stressor). These additional dynamic processes may be outcomes where the unique variance of maladaptive trait domains other than negative affectivity may

be important, since there was little evidence found for such importance when considering stress reactivity.

Future work can further explore the role of interpersonal stress despite the lack of findings for the importance of interpersonal versus non-interpersonal stressors. Many accounts of personality pathology note the importance of interpersonal contexts regarding symptom expression (Wright et al., 2012), and past research has found support for the importance of interpersonal situations to personality pathology (Hepp et al., 2016; Sadikaj et al., 2013; Wright et al., 2017). Nonetheless, we found little evidence that daily hassles that were nominally interpersonal versus non-interpersonal had a discernible impact on either Aim 1 or Aim 2 model results, regardless of whether we used an inclusive or more stringent classification approach (see supplementary materials). Discrepancies in methodology between past work and our study may explain the differences in findings. Specifically, past work has tended to examine construct relevant interpersonal stress (e.g., disaffiliation and borderline personality, dominance and narcissism). Therefore, designs that are more sensitive in how interpersonal stress is assessed will be helpful to further investigate the theoretically-positing dynamics between stress and maladaptive personality traits.

### Limitations

There are several limitations to the present study. First, our statistical models focused on a select number of processes related to stress and maladaptive personality traits. These select processes are not an exhaustive account of the various mechanisms that explain how stress and personality traits may coalesce in daily life. Other work has employed alternative models that are also informative, and extend to relevant behavioral outcomes, whereas we focused on negative affect as the endpoint of our analyses. For example, Goldschmidt et al. (2014) examined similar mediation models using EMA data, but examined stress, negative affect, and bulimic behaviors. While they did not examine how personality traits related to stress, the relation between stress and bulimic behaviors was examined, as well as the mediating effect of negative affect. Thus, additional components could justifiably be added to the models employed in the current study, and future work may benefit from expanding our models to examine downstream behavioral consequences that follow the onset of negative affect. These may offer more tractable models for self-fulfilling processes, vicious cycles, and other potential maintenance mechanisms that would be high-value clinical intervention targets.

Second, the sample used in the current study was not diverse enough to examine daily hassles that are commonly experienced by members of minority groups (e.g., discrimination; Ong & Burrow, 2017). Thus, the inferences about personality traits and daily hassles are limited to more general daily hassles and do not necessarily extend to the types of daily hassles that are tied to one's identity, where this important qualitative difference may result in more notable negative consequences compared to daily hassles unrelated to one's identity. The multilevel approach used in the current study may nonetheless serve as a useful framework for future EMA-based assessment of microaggressions.



Third, we did not use any type of semi-structured interview to provide important contextual information about daily hassles and participants' appraisals of these hassles. To some, this may confine any inferences from the present study to daily events that participants perceived as stressful, as opposed to inferences about the impact of daily hassles more generally. This is likely to be a limitation of EMA approach to daily hassles, given the impracticality of fully vetting each reported hassle. Nonetheless, future EMA work on daily hassles could further improve on the current study design. For example, EMA protocols could be developed that gather fine-grained contextual information about a given hassle, and coders could review this information to delineate aspects of the hassle itself versus those that can be attributed to subjective appraisal. This would likely require that the entirety of the EMA protocol be focused on items assessing daily hassles and perceptions thereof, which may be at odds with the traditional approach of trying to assess multiple constructs in a single EMA study (e.g., affect, interpersonal behavior, personality pathology). Thoughtful consideration of how to incorporate such an approach while maintaining minimal participant burden would be a promising future direction for EMA work on daily hassles.

Fourth, our primary recruitment strategies involved an existing online participant registry and flyers/ads posted in a midsized urban city. However, these recruitment tools involve self-selection into the study and there is limited information about the individual characteristics that may have made some individuals more likely to participate compared to others who chose not to participate. These features of our recruitment strategy need to be considered when considering the generalizability of results.

Last, the EMA protocol required participants to complete surveys after a minimum of 90 minutes had passed. Though this is a typical approach in EMA research, little empirical evidence is available that outlines the time scales involved with daily hassles and their consequences. It will be important for future work to examine alternative lag times between assessments (e.g., < 90 minutes) to explore whether consequences of daily hassles may operate at shorter time scales as captured in the current study.

## Conclusion

Results from the present study focused on daily hassles and maladaptive traits mesh well with the existing literature on more major stress events and personality, highlighting that similar processes are at play when considering proximal or distal relations between stress and personality traits. However, we found that maladaptive traits were most relevant to the process of stress reactivity (as opposed to stress generation and affective inertia)—apart from Detachment, maladaptive traits enhanced the experience of negative affect following stress. The study has some notable strengths, including a relatively large EMA sample, a preregistered analytical strategy, and a focus on transdiagnostic traits as opposed to discrete disorder categories. Nonetheless, future work is needed to further investigate other behavioral outcomes related to stress and personality pathology, and potentially clarify the role of interpersonal stress as it pertains to stress and maladaptive trait dynamics.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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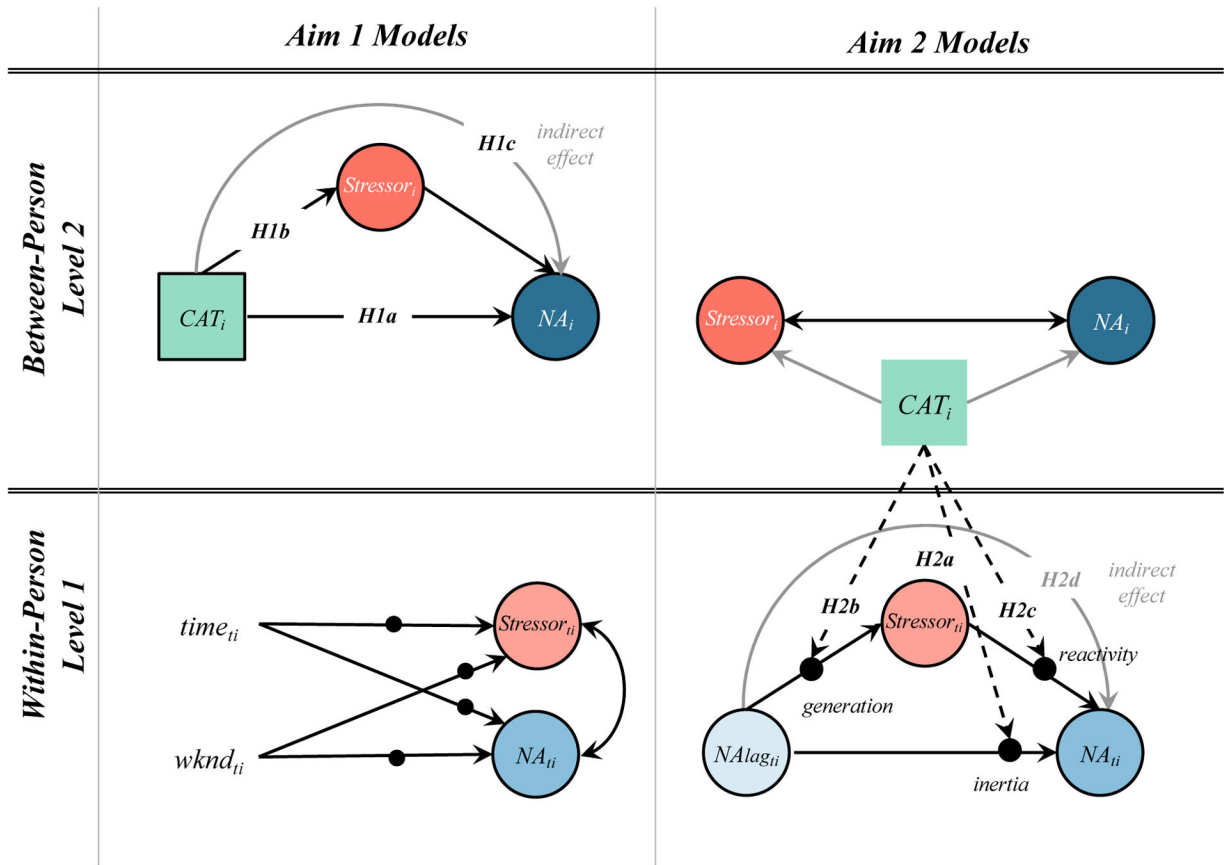
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**Figure 1.** Diagrams of Preregistered Analyses. Preregistered model groups used for all analyses including decomposition of observed momentary variables into between- (subscript  $i$ ) and within-person (subscript  $it$ ) variance. All models controlled for age and sex at the between-person level. Coefficients for covariates are not presented for parsimony. Single headed arrows indicate regression paths. Filled in dots represent random effects. Dashed arrows denote cross-level interactions (i.e., as an individual’s CAT-PD score changes, so does the strength of the respective within-person association), and grey arrows indicate effects of PD traits at the between-person level.



**Table 1**

Between- and Within-person Descriptives Statistics for Primary Variables

	Individuals (Level 2)				Observations (Level 1)					
	Mean	SD	$\omega$	N	Min.	Max.	Mean	SD	ICC	$\omega$
<b>Sample N=297</b>										
CAT-PD-NA	1.33	.66	.87	--	--	--	--	--	--	--
CAT-PD-ANT	0.67	.47	.85	--	--	--	--	--	--	--
CAT-PD-DIS	1.46	.54	.79	--	--	--	--	--	--	--
CAT-PD-DET	1.78	.66	.68	--	--	--	--	--	--	--
CAT-PD-PSY	0.90	.57	.76	--	--	--	--	--	--	--
Momentary Negative Affect	14.57	17.11	.93	19,968	0	100	14.67	17.17	.58	.66
Stressor	--	--	--	19,968	0	1	--	--	--	--

Note: CAT-PD=Comprehensive Evaluation of Traits Relevant to Personality Disorder; NA=Negative Affectivity; ANT=Antagonism; DIS=Disinhibition; DET=Detachment; PSY=Psychoticism; Stressor was a categorical variable and thus only certain descriptive statistics are available. However, the number of stressors reported across EMA assessments was 4,087 (versus 15,583 assessments where no stressor was reported).

Unstandardized and standardized estimates from six individual Aim 1 models showing associations between momentary general stressors, negative affect, and maladaptive personality.

**Table 2**

<i>CAT-PD Main Effects</i>										
Between-person	Negative Affect	$\beta$	Stressor	$\beta$	Stressor→NA	$\beta$	Indirect Effect	$\beta$	Total Effect	$\beta$
Negative Affectivity	<b>9.18 [7.04; 11.32]</b>	.47	.36 [.27; .46]	.40	3.09 [.53; 5.78]	.14	1.11 [.20; 2.16]	.07	10.30 [8.38; 12.19]	.62
Detachment	2.03 [-.22; 4.28]	.10	.17 [.08; .27]	.19	6.74 [4.17; 9.62]	.31	1.14 [.50; 2.07]	.06	3.21 [.91; 5.42]	.17
Disinhibition	<b>6.95 [4.23; 9.71]</b>	.28	.30 [.19; .42]	.27	5.45 [2.89; 8.24]	.25	1.60 [.77; 2.83]	.07	8.59 [5.98; 11.29]	.39
Antagonism	2.68 [-.66; 6.01]	.10	.21 [.05; .37]	.16	6.87 [4.30; 9.69]	.32	1.44 [.32; 2.81]	.05	4.16 [.82; 7.50]	.16
Psychoticism	<b>5.70 [2.82; 8.31]</b>	.25	.36 [.23; .48]	.33	5.44 [2.82; 8.31]	.25	1.91 [.87; 3.20]	.09	7.61 [4.98; 10.14]	.36
<i>CAT-PD Unique Effects</i>										
Between-person	Negative Affect	$\beta$	Stressor	$\beta$	Stressor→NA	$\beta$	Indirect Effect	$\beta$	Total Effect	$\beta$
Negative Affectivity	<b>10.12 [7.19; 13.00]</b>	.38	.25 [.11; .41]	.22			.66 [.03; 1.63]	-	10.81 [7.98; 13.67]	-
Detachment	-1.74 [-3.90; .44]	.07	.05 [-.06; .15]	.04			.10 [-.18; .55]	-	-1.61 [-3.77; .55]	-
Disinhibition	2.76 [-.20; 5.80]	.08	.06 [-.09; .20]	.05	<b>2.73 [1.14; 5.40]</b>	.13	.12 [-.29; .72]	-	2.91 [-.04; 5.89]	-
Antagonism	<b>-4.98 [-8.58; -1.33]</b>	.13	-.14 [-.33; .05]	-.06			-.33 [-1.21; .13]	-	<b>-5.35 [-9.02; -1.74]</b>	-
Psychoticism	.31 [-2.79; 3.49]	.01	.17 [.00; .33]	.10			.41 [-.04; 1.22]	-	.77 [-2.28; 3.95]	-

Note. N=296 (between), N= 19,968 (within); NA = Negative Affect;  $\beta$ =standardized regression coefficient; Main effects indicate the effects of CATPD domains without controlling for overlap among the domains; unique effects indicate the CAT-PD effects after controlling for overlap among the domains; Boldfaced values indicate that the 95% credible interval does not contain zero.

Unstandardized and standardized estimates from six individual Aim 2 MSEM models showing associations momentary stressors, negative affect and maladaptive personality.

**Table 3**

	Stress Generation	$\beta$	Stress Reactivity	$\beta$	Inertia	$\beta$
<i>CAT-PD Unique Effects</i>						
Negative Affectivity	.00 [-.01; .02]	.00	<b>3.03 [2.26; 3.64]</b>	<b>.35</b>	.01 [-.03; .07]	.03
Detachment	.00 [-.02; .01]	-.03	.11 [-.68; .84]	.01	-.04 [-.08; .01]	-.08
Disinhibition	.00 [-.02; .02]	.00	<b>2.11 [1.18; 3.07]</b>	<b>.19</b>	-.00 [-.06; .05]	-.01
Antagonism	.00 [-.02; .03]	.01	<b>2.06 [.81; 2.96]</b>	<b>.16</b>	.01 [-.06; .09]	.02
Psychoticism	.00 [-.02; .01]	-.01	<b>2.64 [1.78; 3.37]</b>	<b>.25</b>	.03 [-.03; .08]	.05
<i>CAT-PD Unique Effects</i>						
Negative Affectivity	.00 [-.02; .02]	.02	<b>3.11 [2.07; 4.10]</b>	<b>.36</b>	.03 [-.04; .09]	.06
Detachment	-.01 [-.02; .01]	-.04	<b>-1.22 [-1.98; -.35]</b>	<b>-.14</b>	-.05 [-.10; .01]	-.10
Disinhibition	.00 [-.02; .03]	.02	.42 [-.67; 1.52]	.04	-.01 [-.08; .05]	-.02
Antagonism	.00 [-.02; .03]	.01	-.88 [-2.06; .43]	-.07	-.03 [-.12; .05]	-.05
Psychoticism	-.01 [-.03; .02]	-.04	.82 [-.26; 1.88]	.08	.03 [-.04; .11]	.05

Note.  $N=296$  (between),  $N=19,968$  (within);  $\beta$ =standardized regression coefficient; Main effects indicate the effects of CAT-PD domains without controlling for overlap among the domains; unique effects indicate the CAT-PD effects after controlling for overlap among the domains; Boldfaced values are significant at  $p<.05$ ; values in brackets represent 95% credible intervals.