

DSM-5 personality traits discriminate between posttraumatic stress disorder and control groups

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Abstract The relevance of personality traits to the study of psychopathology has long been recognized, particularly in terms of understanding patterns of comorbidity. In fact, a multidimensional personality trait model reflecting five higher-order personality dimensions—negative affect, detachment, antagonism, disinhibition, and psychoticism—is included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and represented in the Personality Inventory for DSM-5 (PID-5). However, evaluation of these dimensions and underlying personality facets within clinical samples has been limited. In the present study, we utilized the PID-5 to evaluate the personality profile elevation and composition of 150 control veterans and 35 veterans diagnosed with posttraumatic stress disorder (PTSD). Results indicated that veterans with PTSD

endorsed significantly more personality pathology than control veterans, with scores on detachment and psychoticism domains most clearly discriminating between the two groups. When personality domain scores were considered as parts of each subject's personality profile, a slightly different picture emerged. Specifically, the PTSD composition was primarily characterized by detachment and negative affect, followed by disinhibition, psychoticism, and antagonism in that order of relative importance. The profile of the control group was significantly different, mostly accounted for differences in antagonism and psychoticism. Using these complementary analytic strategies, the findings demonstrate the relevance of personality pathology to PTSD, highlight internalizing features of PTSD, and pave the way for future research aimed at evaluating the role of shared maladaptive personality traits in underlying the comorbidity of PTSD and related disorders.

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Introduction

The relevance of personality traits to the study of psychopathology has long been recognized. Research has demonstrated that shared personality traits account for the high comorbidity among disorders and that individual differences in personality traits underlie variations in psychopathology (Clark et al. 1994; Harkness et al. 1995; Kotov et al. 2010; Krueger et al. 2001; Malouff et al. 2005; Widiger and Simonsen 2005). Consequently, several personality-based models highlighting the dimensional nature of psychopathology have been proposed. Recently, the DSM-5 (APA 2013) included an empirically derived model of personality that permits dimensional assessment of pathological traits

via the Personality Inventory for the DSM-5 (PID-5; Krueger et al. 2011). The model characterizes personality along five higher-order dimensions—negative affect, detachment, antagonism, disinhibition, and psychoticism. It has been argued that these five dimensions represent a meaningful organizational framework for all psychological disorders (Wright et al. 2012). However, evaluation of this model within clinical samples has been limited (for exceptions, see Quilty et al. 2013 and Watson et al. 2013). The primary aim of the present study is to extend research on the PID-5 to the study of posttraumatic stress disorder (PTSD).

Prior research has applied personality trait models toward understanding the heterogeneity of posttraumatic responses and explaining the co-occurrence of PTSD with other disorders. For instance, Miller and colleagues have identified and replicated at least two personality-based subtypes of PTSD (Miller 2003, 2004; Miller and Resick 2007; Miller et al. 2003, 2004, 2008; Wolf et al. 2010, 2012). The internalizing subtype is characterized primarily by high negative emotionality in addition to low positive emotionality and is highly comorbid with depression, panic, schizoid, and avoidant features. In contrast, the externalizing subtype of PTSD is characterized primarily by lack of constraint and is highly comorbid with substance use disorders, antisocial personality disorder, and borderline personality disorder. Parallel studies using factor analysis to examine the relationship of PTSD to the internalizing and externalizing dimensions of psychopathology have generally found that PTSD loads primarily on the internalizing factor (Cox et al. 2002; Kessler et al. 2005; Miller et al. 2008; Slade and Watson 2006) and, more specifically, on the distress subfactor of the internalizing dimension (Cox et al. 2002; Miller et al. 2008; Slade and Watson 2006), emphasizing its association with major depression. Taken together, these studies highlight the heterogeneity of posttraumatic stress presentations, emphasize internalizing aspects of the diagnosis, and underscore the applicability of personality-based models to PTSD.

To our knowledge, no previous studies have evaluated the DSM-5 personality dimensions in individuals with PTSD; however, research using the Personality Psychopathology-Five (PSY-5) scales (Harkness et al. 1995), which is conceptually (Krueger et al. 2011) and empirically (Anderson et al. 2013) similar to the DSM-5 constructs, has demonstrated positive associations between PTSD and each of the PSY-5 domains (Forbes et al. 2010; Miller et al. 2004; Sellbom and Bagby 2009). Although the PSY-5 and PID-5 represent similar domains, the PID-5 is unique in that it permits derivation not only of the five higher-order domain scores but also of 25 underlying personality facets which can be used to further characterize the personality profile of PTSD. Overall, prior research demonstrates that all five of the personality domains defined by the PID-5 are

likely relevant to PTSD and merit further investigation both at the domain and at the facet level.

In the present study, we sought to evaluate the personality profile of veterans with PTSD and veteran controls using the PID-5. Specifically, we were interested in evaluating group differences on the PID-5 facets and higher-order domains, determining which of the PID-5 higher-order domains discriminated between PTSD and control participants, and evaluating the composition of the PID-5 domains across groups. Although prior research identifying personality-based subtypes of PTSD is compelling, there is no consensus on a definitive number of subtypes. Moreover, subtyping participants in the present study was precluded by the modest number of individuals with PTSD. Consequently, the PTSD group in the present study was considered in its entirety. Although we did not have a priori hypotheses about group differences on specific facets given the relatively limited prior research on the PID-5 facets in clinical samples, we expected the PTSD group to generally score higher than the control group across facets. Regarding the PID-5 domains, we expected the PTSD group to score higher than controls on each of the PID-5 domains, consistent with prior research using the PSY-5. Finally, consistent with factor analytic studies demonstrating the primary association of PTSD with the distress subfactor of the internalizing dimension and descriptive features of PTSD, we expected detachment (which is hierarchically associated with the internalizing dimension) to discriminate between groups and to account for a substantial proportion of the composition of the PTSD PID-5 profile.

Materials and methods

Participants

A total of 185 US veterans ($n = 150$ controls; $n = 35$ PTSD) participated in this study. In the control group (mean age \pm SD: 59.91 ± 13.06 years), there were 141 men and 9 women; in the PTSD group (mean age \pm SD: 51.42 ± 13.74 years), there were 30 men and 5 women. Veterans without mental health concerns and those with a primary PTSD diagnosis according to the medical chart were identified for recruitment. Veterans with active substance use disorders or a history of psychosis, bipolar disorder, or traumatic brain injury were excluded from recruitment. The study protocol was approved by the institutional review board at the Minneapolis VA Medical Center and was performed in accordance with the ethical standards outlined in the Declaration of Helsinki. All subjects provided written informed consent prior to participating in the study.

Diagnostic measures

PTSD was assessed using the Clinician-Administered PTSD Scale for *DSM-IV* (CAPS; Blake et al. 1995). The CAPS provides a continuous measure of symptom severity; to categorize participants in regard to PTSD status, CAPS symptom scores were converted to dichotomous scores using the SCID Symptom Calibration method (SXCAL, Weathers et al. 1999). The SXCAL scoring rule minimizes false positives and false negatives and is the preferred scoring method for the CAPS when differential diagnosis is the goal (Weathers et al. 1999). When diagnosing PTSD in the present study, emotional responses other than intense fear, helplessness, or horror were accepted for Criterion A2, consistent with DSM-5 (APA 2013) and the mounting research demonstrating wide-ranging reactions to trauma (Adler et al. 2008; Breslau and Kessler 2001; Brewin et al. 2000). Lifetime history of non-PTSD Axis I diagnoses was evaluated with the SCID (First et al. 2002) using DSM-IV-TR criteria (APA 2000). None of the individuals included in the present analyses met criteria for any current Axis I diagnosis other than PTSD.

The Personality Inventory for DSM-5 (PID-5; Krueger et al. 2011) is a 220-item questionnaire used to measure maladaptive personality traits as characterized in the DSM-5. Responses are selected from a four-point scale ranging from 0 ('very false or often false') to 3 ('very true or often true'). The items represent 25 empirically derived facets that load onto 5 higher-order personality domains: negative affect, detachment, antagonism, disinhibition, and psychoticism. The domain scales were calculated according to the most recent guidelines (see <http://www.psychiatry.org/practice/dsm/dsm5/online-assessment-measures#Personality>). Specifically, each domain represents the average of the three most indicative facet scales as follows: negative affect reflects emotional lability, anxiousness, and separation insecurity; detachment reflects withdrawal, anhedonia, and intimacy avoidance; antagonism reflects manipulativeness, deceitfulness, and grandiosity; disinhibition reflects irresponsibility, impulsivity, and distractibility; and psychoticism reflects unusual beliefs and experiences, eccentricity, and perceptual dysregulation. Internal consistency of the facets (median = .87; range .79–.95) and domains (median = .94; range .89–.96) was generally good to excellent with the exception of the grandiosity facet, which was acceptable (.74).

Statistical analyses

To evaluate group differences on the PID-5 facets, domains, and domain total score, analyses of covariance (ANCOVAs) were performed. A linear discriminant classification analysis (Fisher 1936) was performed to evaluate

the ability of the PID-5 domains to classify individuals into the PTSD and control groups and to identify the primary domains related to accurate classification. The aforementioned analyses were performed using the IBM SPSS statistical package (version 21). Finally, the composition of the PID-5 domains in the control and PTSD groups was examined using the Compositional Data Analysis (CODA) software package (Aitchison 1986). Age and sex were used as covariates as described below.

Results

Multivariate analyses of PID-5 domains

In this analysis, group differences in all five PID-5 domains simultaneously were assessed by a multivariate ANCOVA. The group factor had a highly significant effect ($p < 10^{-6}$, Hotelling's Trace). Gender also had a significant effect ($p = 0.00012$), whereas age had a marginal one ($p = 0.0503$).

Univariate analyses of PID-5 facets and domains

Group differences on the PID-5 facets and domains were assessed with univariate ANCOVAs where each PID-5 facet or domain was the dependent variable, group was a fixed factor, and age and gender were covariates. Since 31 univariate ANCOVAs were completed (25 facets, 5 domains, and total domain score), an adjusted threshold for statistical significance of the group factor was set at .0016 (.05/31). Most of the PID-5 facets and all five PID-5 domain scales as well as the PID total score were significantly higher in the PTSD group than the control group (see Table 1 and Fig. 1).

Discriminant classification analysis on PID-5 domains

Beyond group differences, the classification of individual subjects to one of the two groups based on the PID-5 domains was evaluated using a linear discriminant analysis. We carried out two such analyses. First, we used all 5 PID-5 domain scores as inputs for discrimination, with equal group priors. This yielded an overall correct classification rate of 87.7 % (88 % for controls and 86.5 % for PTSD); a leave-one-out cross-validation analysis yielded an overall classification rate of 85.0 % (87.3 % for controls and 75.7 % for PTSD). In a second analysis, we used a stepwise discriminant analysis to identify those measures that were more important for classification. This analysis retained detachment and psychoticism as the two variables in the final model. The overall correct classification rate was 85.6 % (86.7 and 81.1 % for controls and

Table 1 PID-5 descriptive statistics and results of univariate ANCOVA

| PID-5 scales | Control (<i>N</i> = 150) | | PTSD (<i>N</i> = 35) | | <i>p</i> value of <i>F</i> statistic | | |
|---------------------------------|---------------------------|-------|-----------------------|-------|--------------------------------------|-------------------|-------------------|
| | Mean | SEM | Mean | SEM | Group | Gender | Age |
| Facets | | | | | | | |
| Anhedonia | 0.631 | 0.040 | 1.692 | 0.164 | <10 ⁻⁶ | 0.41 | 0.51 |
| Anxiousness | 0.706 | 0.049 | 1.568 | 0.103 | <10 ⁻⁶ | 0.02 | 0.10 |
| Attention Seeking | 0.682 | 0.051 | 0.638 | 0.103 | 0.96 | 0.77 | 0.29 |
| Callousness | 0.282 | 0.024 | 0.819 | 0.108 | <10 ⁻⁶ | <10 ⁻⁴ | <10 ⁻⁵ |
| Deceitfulness | 0.328 | 0.032 | 0.649 | 0.109 | 0.003 | 0.07 | 0.14 |
| Depressivity | 0.294 | 0.034 | 1.051 | 0.109 | <10 ⁻⁶ | 0.16 | 0.31 |
| Distractibility | 0.691 | 0.049 | 1.544 | 0.082 | <10 ⁻⁶ | 0.82 | 0.07 |
| Eccentricity | 0.482 | 0.049 | 1.544 | 0.083 | <10 ⁻⁶ | 0.84 | 0.02 |
| Emotional Lability | 0.610 | 0.046 | 1.354 | 0.106 | <10 ⁻⁶ | 0.11 | 0.94 |
| Grandiosity | 0.600 | 0.039 | 0.678 | 0.087 | 0.42 | 0.12 | 0.43 |
| Hostility | 0.698 | 0.039 | 1.463 | 0.116 | <10 ⁻⁶ | 0.05 | 0.001 |
| Impulsivity | 0.569 | 0.044 | 1.343 | 0.127 | <10 ⁻⁶ | 0.49 | 0.02 |
| Intimacy Avoidance | 0.384 | 0.042 | 1.047 | 0.118 | <10 ⁻⁶ | 0.51 | 0.45 |
| Irresponsibility | 0.272 | 0.029 | 0.742 | 0.085 | <10 ⁻⁶ | 0.06 | 0.006 |
| Manipulativeness | 0.707 | 0.045 | 0.960 | 0.119 | 0.02 | 0.02 | 0.32 |
| Perceptual Dysregulation | 0.256 | 0.026 | 0.914 | 0.083 | <10 ⁻⁶ | 0.16 | 0.07 |
| Perseveration | 0.625 | 0.039 | 1.397 | 0.102 | <10 ⁻⁶ | 0.62 | 0.52 |
| Restricted Affectivity | 0.979 | 0.047 | 1.533 | 0.099 | <10 ⁻⁶ | 0.12 | 0.05 |
| Rigid Perfectionism | 0.825 | 0.046 | 1.396 | 0.118 | <10 ⁻⁶ | 0.92 | 0.46 |
| Risk Taking | 1.164 | 0.036 | 1.507 | 0.131 | 0.004 | 0.03 | 0.001 |
| Separation Insecurity | 0.490 | 0.033 | 1.018 | 0.138 | <10 ⁻⁶ | 0.05 | 0.17 |
| Submissiveness | 1.225 | 0.050 | 1.357 | 0.136 | 0.25 | 0.05 | 0.18 |
| Suspiciousness | 0.679 | 0.038 | 1.410 | 0.113 | <10 ⁻⁶ | 0.57 | <10 ⁻⁶ |
| Unusual Beliefs and Experiences | 0.348 | 0.036 | 0.768 | 0.095 | <10 ⁻⁶ | 0.35 | 0.37 |
| Withdrawal | 0.758 | 0.049 | 1.894 | 0.102 | <10 ⁻⁶ | 0.77 | 0.43 |
| Domains | | | | | | | |
| Negative Affect | 0.602 | 0.035 | 1.313 | 0.084 | <10 ⁻⁶ | 0.01 | 0.85 |
| Detachment | 0.591 | 0.035 | 1.544 | 0.099 | <10 ⁻⁶ | 0.46 | 0.75 |
| Antagonism | 0.560 | 0.033 | 0.762 | 0.090 | 0.018 | 0.02 | 0.20 |
| Disinhibition | 0.511 | 0.035 | 1.210 | 0.083 | <10 ⁻⁶ | 0.34 | 0.01 |
| Psychoticism | 0.362 | 0.029 | 1.004 | 0.083 | <10 ⁻⁶ | 0.47 | 0.05 |
| PID total domain score | 2.626 | 0.130 | 5.833 | 0.308 | <10 ⁻⁶ | 0.90 | 0.010 |

PTSD, respectively); in the leave-one-out cross-validation analysis, correct classification rates were identical to those above.

Profile composition analysis of PID-5 domains

In this analysis, the PID-5 domain scores were regarded as parts of each subject's personality profile. Hence, they were re-expressed as fractions (or percentages) of the total profile (see Fig. 2). The resulting profile composition was analyzed using multivariate statistics suitable for compositional data (Aitchison 1986). Specifically, we compared the profile compositions between the control and PTSD groups,

with age and gender as covariates. We found that the profile compositions were significantly different between groups ($p = 0.00001$, CODA log-ratio analysis). Figure 2 plots the compositions as pies where the area of the pie is scaled proportionally to the total PID-5 score. The total PID-5 score (i.e., area of the pie) was more than 2× higher in the PTSD versus the control group (mean ± SEM: 5.83 ± 0.30 vs. 2.63 ± 0.13 , $p < 0.000001$, t test; range .19–9.40 out of possible maximum score of 15). With respect to the profile shape, the PTSD group showed a reduction in antagonism, an increase in psychoticism, detachment and disinhibition (in that order of magnitude), and practically no change in negative affect. Univariate analyses of the

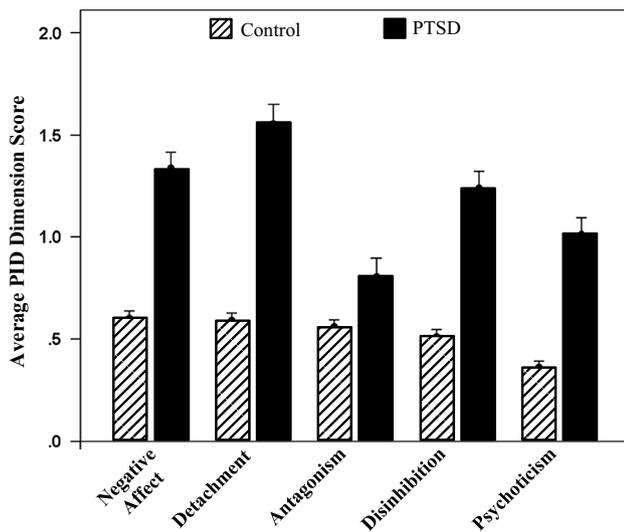


Fig. 1 Average score on PID-5 domains for control group and PTSD group

domain percentage scores showed that only antagonism ($p = .001$) and psychoticism ($p = .034$) were significantly different across groups (detachment: $p = 0.11$, disinhibition: $p = 0.36$, negative affect: $p = 0.94$).

Discussion

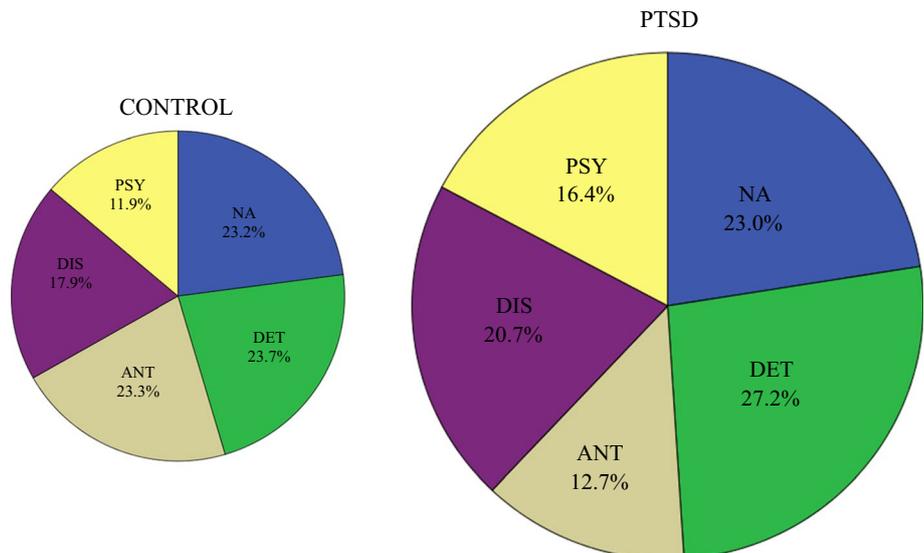
In the present study, we sought to evaluate the PID-5 in relation to PTSD, thereby extending the small but growing body of research on the DSM-5 maladaptive personality traits to psychiatric samples. The results indicate that PTSD and control veterans are quite distinct at the level of

maladaptive personality trait facets and domains, and highlight the relevance of particular PID-5 personality domains to the study of PTSD.

Nearly all of the 25 PID-5 facet scores were significantly higher in the PTSD group than in the control group, clearly demonstrating that personality pathology is characteristic of PTSD. The only facets that did not significantly differ across groups (taking the adjusted alpha level into consideration) were Attention Seeking, Deceitfulness, Grandiosity, and Manipulativeness (antagonism), Risk Taking (disinhibition), and Submissiveness (negative affectivity). Five of those six facets (all but Submissiveness) are hierarchically related to externalizing psychopathology (Wright et al. 2012), suggesting that the externalizing features, and particularly those reflecting the antagonism domain, are relatively limited in this sample of veterans with PTSD. In contrast, nearly all of the facets underlying the internalizing dimension were significantly greater in the PTSD group, emphasizing the relative presence of those features of this sample. Indeed, analyses at the domain level further suggest that, in this sample of veterans, PTSD is largely characterized by internalizing characteristics.

In parallel to previous research using the PSY-5 and in line with expectations, each of the PID-5 domains was elevated in the PTSD group relative to veteran controls, providing support for the validity of the PID-5; in addition, further analyses demonstrated that some domains were more clearly relevant to PTSD than others. For example, in our stepwise discriminant analysis, detachment and psychoticism were the two domains that yielded >80 % correct classification of participants to the control and psychopathology groups. Although all five PID domains effected an excellent classification, it is remarkable that detachment and psychoticism were the only two necessary

Fig. 2 PID-5 domain score profile composition of control and PTSD groups



and sufficient domains for a >80 % correct classification, even in the leave-one-out validation. The importance of these domains was not unexpected. Specifically, the detachment domain, which is characterized by withdrawal from interpersonal interactions and limited hedonic capacity, dovetails with previous studies highlighting associations between PTSD and depression (Cox et al. 2002; Miller et al. 2008; Slade and Watson 2006), another disorder characterized by similar features. And the contribution of the psychoticism domain in distinguishing between, and correctly classifying, PTSD and controls is in accord with the findings of prior studies that have highlighted the frequency of psychotic symptoms among individuals with PTSD (Braakman et al. 2009; Sareen et al. 2005), as well as previous research linking PSY-5 psychoticism to PTSD (Forbes et al. 2010; Miller et al. 2004). Finally, the influence of the detachment and psychoticism domains was also apparent in the profile analysis where the relative proportion of these domains was greatest in the PTSD group compared to controls.

Although scores on the remaining personality domains did not discriminate between PTSD and control groups in the present sample, their contributions to the profile analysis merit comment. First, the relative proportion of negative affect was roughly equivalent in both groups, which highlights instead the contributions of the other domains (particularly detachment and psychoticism as indicated above) in defining healthy versus pathological functioning in the present sample. Regarding the other personality domains, the relative proportion of disinhibition in the PTSD group was larger than the control group; conversely, the relative proportion of antagonism was smaller in the PTSD group than the control group. While the former is not surprising given a large literature documenting disinhibited behaviors including problematic substance use, interpersonal violence, risk taking, and self-destructive behaviors among veterans with PTSD (Kelley et al. 2012; Sacks et al. 2008; Strom et al. 2012; Teten 2010), the reduced proportion of antagonism in the PTSD group compared to controls was unexpected. That is not to say the control group was more antagonistic—in fact, scores on the antagonism domain were higher in the PTSD group relative to the control group. Rather, the other maladaptive personality domains simply accounted for a greater proportion of the psychopathology characterizing veterans with PTSD. Specifically, the PTSD profile in this sample appears to be primarily characterized by detachment and negative affect (internalizing personality traits) followed by disinhibition (externalizing), psychoticism, and lastly, antagonism (externalizing). This composition is consistent with factor analytic studies emphasizing the internalizing aspects of PTSD and with research demonstrating heterogeneity of PTSD presentations.

A major strength of the present paper is the use of several complementary data analytic strategies to essentially define PTSD in terms of maladaptive personality traits. While informative, a focus on group differences in score elevation alone would have overlooked the richness of information afforded by the subsequent analyses. For instance, it is likely that several disorders will exhibit elevations across all five maladaptive trait domains relative to healthy comparison groups, but the relative contribution of those domains, or composition, may differ tremendously across groups. That is, psychological disorders may be distinguished from one another based on their shape, or composition, rather than elevation on maladaptive personality domains. Conversely, it is possible that the composition of some forms of psychopathology may be quite similar to the personality profile observed in controls (i.e., a relatively equal proportion of internalizing and externalizing features coupled with low psychoticism), but could be distinguished from controls based on the elevation on the domain scores. Indeed, Skinner (1978) demonstrated that point regarding the MMPI. Thus, a comprehensive analytic approach similar to the one utilized here would be beneficial for future studies aimed at characterizing psychopathology according to the PID-5.

As one of the first studies to evaluate the DSM-5 personality traits in a psychiatric sample, the present study contributes to a growing literature supporting the validity of the model and helps bolster the contention that the DSM-5 traits may represent a meaningful organizational framework not only for personality disorders but for psychopathology in general. However, the findings must be considered in the context of several limitations. First, the clinical sample reflected in this study was composed of veterans with ‘pure’ PTSD. Given the high co-occurrence of PTSD and other disorders, the PTSD sample here may not be representative of individuals with PTSD in general. Particularly, externalizing personality traits reflected in the current sample may be restricted compared to the general population of veterans with PTSD due to exclusion of veterans with substance use disorders in the current study. Nearly 25 % of veterans with PTSD meet criteria for co-occurring substance use disorders (Petrakis et al. 2011); therefore, a significant number of veterans with likely externalizing features were excluded from the present study. Future studies that include more individuals with externalizing subtypes of PTSD will be important for comparing their personality composition relative to the current primarily internalizing sample. Finally, findings regarding veteran control participants may not extend to non-veteran controls. That is, by the very nature of their involvement in the military and/or certain military experiences (e.g., combat), personality traits of veteran controls may differ from general population controls. Despite these limitations, the

current study represents an important contribution to the literature regarding the applicability of the PID-5 framework to the study of PTSD, specifically, and to psychopathology, in general. Results from the present study begin to clarify the nature of pathological personality features that are now part of DSM-5 in individuals with PTSD and pave the way for future research aimed at understanding the role of these features in underlying the comorbidity of PTSD and related disorders.

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Conflict of interest The authors declare that they have no conflicts of interest.

Informed consent The study protocol was approved by the institutional review board at the Minneapolis VA Medical Center and was performed in accordance with the ethical standards outlined in the Declaration of Helsinki. All subjects provided written informed consent prior to participating in the study.

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