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DO PSYCHOPATHIC TRAITS STATISTICALLY PROTECT AGAINST PTSD? A RETROSPECTIVE STUDY OF VIETNAM VETERANS

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Although psychopathy traits are traditionally associated with maladaptivity, certain traits may statistically buffer against risk for posttraumatic stress disorder (PTSD). Research suggests that psychopathy traits are differentially associated with PTSD, as boldness traits are negatively related to PTSD whereas disinhibition features are positively related. The authors sought to clarify the relations between psychopathy and PTSD in a large sample of Vietnam veterans (N = 2,598) and to examine the statistical interactions among (a) psychopathy traits and (b) combat exposure and psychopathy traits in predicting PTSD. Results indicate that psychopathy traits are differentially associated with PTSD in combat-exposed veterans, although the authors found little evidence that boldness was protective against PTSD. Nonetheless, meanness was significantly, albeit weakly, protective against PTSD in the presence of combat exposure. The authors consider the implications of these findings for future research, including the need to consider fearlessness as a heterogeneous construct, and they examine whether the findings generalize to PTSD in *DSM-5*.

Keywords: posttraumatic stress disorder, psychopathy, combat, personality, PTSD

Approximately 88% of adults in the United States have experienced a *DSM-5* Criterion A trauma at least once in their lifetime (American Psychiatric Association [APA], 2013), with reported traumatic events encompassing sexual assault and natural disaster, among others (M. W. Miller et al., 2013). Nevertheless, only 8.3%–16.6% of the population actually goes on to meet *DSM-5* criteria for a lifetime posttraumatic stress disorder (PTSD) diagnosis (Kilpatrick et al., 2013; M. W. Miller et al., 2013). PTSD is an often debilitating disorder characterized by such symptoms as intrusive memories, dissociative flashbacks, and marked alterations in cognition, arousal, and mood (APA, 2013). Such statistics demonstrate that the occurrence of ostensibly

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severe traumatic events is nearly ubiquitous in American society, whereas the emergence of PTSD symptomatology is considerably rarer. Thus, it is essential to identify and understand individual differences that predict risk and resilience for PTSD.

One potent risk factor for PTSD symptomatology is combat exposure. Although PTSD affects both civilian and military populations, the prevalence of *DSM-5* (APA, 2013) PTSD is elevated among victims of combat exposure compared with victims of most other Criterion A traumas (Kilpatrick et al., 2013). Personality traits may also be important correlates of risk and resilience in PTSD, because certain general personality traits are differentially associated with symptoms of PTSD. For example, traits such as sensation-seeking, neuroticism, introversion, and disinhibition are positively correlated with symptoms of PTSD (e.g., Jakšić, Brajković, Ivezić, Topić, & Jakovljević, 2012). In a sample of male veterans, Bramsen, Dirkzwager, and Van der Ploeg (2000) reported that trait paranoia and negative emotionality (a higher order dimension that is closely related to but somewhat broader than neuroticism) positively predicted PTSD, even after controlling for the number of stressful events experienced during deployment.

Still, trauma exposure is a theoretically and practically important variable to consider in the relations between personality and PTSD, and little research has considered the potential interactive effects of personality and trauma exposure in predicting PTSD. For instance, preliminary evidence indicates that neuroticism interacts with trauma severity such that the associations between trauma severity and PTSD increase as neuroticism increases (Guo, Xue, Shao, Long, & Cao, 2015). Given that combat exposure is a particularly salient risk factor for PTSD, more research on the statistical interactions between personality and combat exposure in predicting PTSD is warranted. Such investigations could elucidate which personality traits in the context of combat exposure are especially deleterious for or protective against PTSD.

PSYCHOPATHY: NATURE AND BOUNDARIES

Personality disorder traits, such as those of psychopathic personality (psychopathy), may be one particularly fruitful avenue to explore in this regard. Psychopathy, broadly construed, comprises a blend of interpersonal, affective, and behavioral features, including callousness, guiltlessness, egocentricity, recklessness, and deceitfulness (Hare, 1991/2003). Although most psychopathy measures yield total scores, which are presumed to serve as global indicators of psychopathic traits, factor analyses of widely used psychopathy measures, such as the Self-Report Psychopathy Scale-4 (SRP-4; Paulhus, Neumann, & Hare, 2015), indicate that psychopathy is a heterogeneous construct comprising at least two underlying subdimensions.

Although there is no single agreed-upon conceptualization of psychopathy, an influential descriptive framework for this condition is the triarchic model (Patrick, Fowles, & Krueger, 2009). According to this model, psychopathy consists of three phenotypic dimensions: Boldness, Disinhibition, and

Meanness. Boldness comprises interpersonal dominance, emotional stability, and venturesomeness (Patrick et al., 2009). In accordance with Lykken's (1995) fearlessness model, which posits that most, if not all, psychopathic features arise from low levels of dispositional fear, Boldness encompasses social and physical fearlessness (Drislane, Patrick, & Arsal, 2014). Nonetheless, the relevance of fearlessness to psychopathy is contested, as some authors have argued that boldness traits, which are potentially psychologically adaptive, are peripheral to the core features of psychopathy (e.g., J. D. Miller & Lynam, 2012).

Dovetailing with the fearlessness hypothesis, Meanness may represent a malignant manifestation of low fear. According to this hypothesis, low levels of trait fear in conjunction with detrimental environmental events, such as neglectful or abusive parenting giving rise to insecure attachment (Patrick et al., 2009), may predispose to high levels of Meanness. This dimension is associated with lack of empathy for others, guiltlessness, and exploitativeness (Stanley, Wygant, & Sellbom, 2013). Meanness encompasses actively aggressive traits and behaviors in addition to emotional detachment. The third and last dimension, Disinhibition, also comprises externalizing traits and behaviors, such as impaired affect regulation, distress intolerance, and irresponsibility (Patrick et al., 2009). Research suggests that Disinhibition reflects the nexus of negative emotionality and impulsivity (e.g., Krueger, Markon, Patrick, Benning, & Kramer, 2007).

Other conceptualizations of psychopathy parse the construct into four facets: interpersonal manipulation, antisociality, erratic lifestyle, and callous affect. Measures of psychopathy that assess these four facets, such as the SRP-4, tend to emphasize disinhibition and meanness features and largely underemphasize boldness traits, such as physical fearlessness and stress immunity. Nonetheless, the four facets of these psychopathy measures broadly correspond to the triarchic dimensions. Drislane et al. (2014) found that interpersonal manipulation and erratic lifestyle were moderately positively associated with Meanness, Disinhibition, and, to a lesser extent, Boldness. Callousness primarily mapped onto Meanness, although it was also positively associated with both Boldness and Disinhibition. Finally, antisociality was moderately positively associated with Disinhibition and Meanness and nonsignificantly associated with Boldness (see also J. D. Miller & Lynam, 2012).

ARE PSYCHOPATHIC INDIVIDUALS BUFFERED AGAINST THE IMPACT OF TRAUMA?

At first glance, it appears that certain psychopathy features, such as fearlessness, and PTSD are mutually exclusive or at least substantially negatively associated. For instance, in Hare's book, *Without Conscience* (1993), a psychopathic individual discussed his perception of one of his victim's expression of fear: "When I rob a bank, I notice the teller shakes or becomes tongue-tied…. She must have been pretty messed up inside, but I don't know why. If someone pointed a gun on me, I guess I'd be afraid" (pp. 53–54). This individual was not even certain that he would feel afraid when experiencing

what virtually everyone would consider a traumatic event. Some evidence indicates that global psychopathy is negligibly or negatively related to the intensity of an individual's reaction to trauma (Pham, 2012), and at least some symptoms of PTSD (Sellbom, 2015; Willemsen, De Ganck, & Verhaeghe, 2012).

Nevertheless, the associations between psychopathy and PTSD become much more complex when considering the heterogeneity of psychopathy. Much of the literature has assessed the relations between the four facets of psychopathy and PTSD using measures such as the SRP-4. Most of these studies suggest that antisociality and erratic lifestyle facets are moderately positively associated with PTSD (Anestis, Green, Arnau, & Anestis, 2017; Anestis, Harrop, Green, & Anestis, 2017; Blonigen, Sullivan, Hicks, & Patrick, 2010). The literature is somewhat mixed, however, regarding the correlates of other facets of psychopathy. Some studies indicate that interpersonal manipulation and callousness are negligibly associated with PTSD (Anestis, Harrop, et al., 2017; Blonigen et al., 2010), whereas others indicate that these traits are negatively associated (Willemsen et al., 2012). Making matters more complicated, still other studies suggest that interpersonal manipulation and callousness are positively associated with PTSD (Anestis, Green, et al., 2017).

As discussed earlier, the four facets of psychopathy can be broadly mapped onto the triarchic dimensions; nonetheless, as is evident from the differing number of dimensions in the two models (four versus three), this mapping is far from perfect. In addition, certain features of Boldness, such as physical fearlessness and leadership-orientation, are not comprehensively covered in the four-facet model of psychopathy. Thus, although research examining the relations between the four facets of psychopathy and PTSD is informative, the extent to which the results of such studies translate into the triarchic dimensions remains unclear. Previous studies have examined the associations between the subdimensions of the Psychopathic Personality Inventory–Revised (PPI-R; Lilienfeld & Widows, 2005), which is a measure of psychopathy that is closely aligned with the triarchic model, and PTSD. The PPI-R comprises two largely orthogonal higher order factors, Fearless Dominance and Self-Centered Impulsivity, which conceptually align largely with Boldness and Disinhibition, respectively.[1]

The PPI-R subscale Coldheartedness is conceptually aligned with Meanness, but the two differ in their emphasis on passive emotional detachment versus active antagonism, respectively. Evidence suggests that Fearless Dominance and Self-Centered Impulsivity diverge in their associations with PTSD, with the former relating negatively to PTSD and the latter relating positively (Sellbom, 2015).

1. We say "largely" because there is not a perfect isomorphism between the two psychopathy measures. Certain subdimensions of Self-Centered Impulsivity, for instance, such as Machiavellian Egocentricity, are also partly linked to Meanness (e.g., Sellbom & Phillips, 2013).

PRESENT STUDY

With these considerations in mind, we retrospectively examined the relations between the triarchic dimensions of psychopathy, on the one hand, and combat exposure and PTSD, on the other, in Vietnam veterans. To replicate and extend existing literature, we analyzed the statistical interactions between combat exposure and psychopathic traits in predicting PTSD. We derived our hypotheses for Boldness and Disinhibition from data on the associations between their PPI-R counterparts, Fearless Dominance and Self-Centered Impulsivity, respectively, and PTSD (Sellbom, 2015). We predicted that Boldness would be moderately negatively associated with PTSD, whereas Disinhibition would be moderately positively associated with PTSD. Given the mixed literature regarding certain traits relevant to Meanness, such as callousness and interpersonal manipulation, our hypotheses regarding Meanness were exploratory.

Holowka et al. (2012) found that Disconstraint, a personality construct that comprises aspects of impulsivity and sensation-seeking (Harkness & McNulty, 1994), was positively associated with combat exposure. Thus, we posited that Disinhibition and Boldness would exhibit moderate positive associations with combat exposure, given their content coverage of impulsivity and physical fearlessness, respectively. Our hypotheses regarding the relations between Meanness and combat exposure were again exploratory.

In the present study, we use the terms *protective* and *potentiate* in a statistical sense only, given that this is a retrospective rather than prospective study. We hypothesized that Boldness would statistically protect against PTSD in the presence of combat exposure, such that the relation between combat exposure and PTSD would decrease as levels of Boldness traits increase. This hypothesis aligns with Boldness's linkage to personality traits, such as stress immunity and physical fearlessness, that are ostensibly tied to emotional resilience (Patrick et al., 2009). In addition, because PTSD is traditionally conceptualized as a disorder of fear or, alternatively, a lack of fear inhibition (see Jovanovic & Ressler, 2010, for a review), fearlessness traits may be a particularly potent protective factor against PTSD. In contrast, we predicted that Disinhibition would statistically potentiate the association between combat exposure and PTSD.

Preliminary research also suggests that callousness and interpersonal manipulation may statistically protect against PTSD in the presence of trauma (Anestis, Harrop, et al., 2017; Willemsen et al., 2012). Nonetheless, given that these facets of psychopathy overlap at least modestly with all of the triarchic dimensions, it is not clear how such results generalize to individual dimensions of the triarchic model. Thus, our hypotheses regarding the statistical interaction between Meanness and combat exposure were exploratory. In subsidiary analyses, we examined whether Boldness would statistically protect against PTSD in the presence of Meanness and Disinhibition, given preliminary evidence that Fearless Dominance protects against PTSD in the presence of Self-Centered Impulsivity (Sellbom, 2015). In addition, we examined the potential protective or potentiating effects of Meanness in the presence of Disinhibition in predicting PTSD.

METHOD

PARTICIPANTS

Participants were drawn from the Vietnam Experience Study (VES; U.S. Centers for Disease Control and Prevention, 1989). The VES collected 4.9 million U.S. Army records between 1965 and 1971 to investigate health outcomes in a cohort of veterans who had served in Vietnam. From this initial population of records, the VES randomly sampled 48,513 records to satisfy six criteria: (1) male veteran, (2) military occupation other than duty soldier or trainee, (3) single term of enlistment, (4) minimum of 16 weeks of active service time, (5) pay grade from E-1 to E-5 at discharge from military, and (6) entry into the military for the first time between January 1, 1965, and December 31, 1971. The subsample that fulfilled all six criteria comprised 15,288 veterans. Participants completed medical and psychological evaluations for a 1-week period in 1985 to 1986, including the measures used in this study. In the analyses reported here, we examined a subset of the 15,288 veterans who were combat-exposed (N = 2,598; M_{age} = 19.78, SD = 1.65). The majority of the combat-exposed sample were drafted (62%), honorably discharged (98.2%), high-school educated (81.3%), White (88.5%), and married (81.8%).

MEASURES

PTSD Symptomatology. PTSD symptomatology was assessed using the PTSD module of a modified version of the Diagnostic Interview Schedule III-A (DIS-III-A), which is a standardized and extensively validated psychiatric interview (see U.S. Centers for Disease Control and Prevention, 1989, for details on the DIS-III-A modifications). The DIS-III-A was originally developed to assess the prevalence of psychiatric diagnoses in large epidemiological studies conducted by the National Institute of Mental Health (NIMH). This measure includes nine dichotomous symptom probes for PTSD, which were summed to compute a total PTSD symptom score according to *DSM-III* criteria (APA, 1980). The average number of PTSD symptoms reported in this sample was 1.95 (SD = 2.52).

Combat Exposure. Frequency of combat exposure was assessed using the Combat Exposure Index (CEI; U.S. Centers for Disease Control and Prevention, 1989), a 12-item self-report index of combat experiences (α = .95). Items (e.g., unit patrol was ambushed) were rated on a 0 (*never*) to 4 (*very often*) scale. Higher scores on the CEI reflect more combat exposure. A score of 0 on the CEI indicates that an individual experienced no combat exposure. Thus, we limited our analyses to include only veterans who reported experiencing at least some combat-related trauma (i.e., scores greater than 0) because we were interested in combat-related PTSD. The average frequency of combat exposures reported in this sample was 15.99 (SD = 10.78; see Supplement Figure S2).

Psychopathy. Psychopathy was assessed using the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1940, 1942). The

MMPI is a 566-item self-report measure of personality and psychopathology that yields scores on 10 clinical scales and numerous other supplementary subscales. Sellbom and colleagues (2016) developed triarchic psychopathy scales for the MMPI-2-RF (Ben-Porath & Tellegen, 2008). They reported that these scales exhibited robust convergent validity with other theoretically relevant indices, including an array of self-report psychopathy measures, global narcissism (Boldness $r = .63$), and antisocial behaviors (Meanness and Disinhibition *r*s ranged from .35 to .59). The MMPI-2-RF triarchic total score exhibited moderate to large positive correlations with all of the examined dimensions of each psychopathy measure across samples (*r*s ranged from .20 [PPI-R Disinhibition, correctional sample] to .76 [Triarchic Psychopathy Measure (TriPM) total, undergraduate sample]). In addition, each of the MMPI-2-RF triarchic dimensions demonstrated primary associations with their TriPM counterparts (e.g., MMPI-2-RF Boldness was most closely associated with TriPM Boldness); these correlations were large and positive across samples (*r*s ranged from .57 [MMPI-2-RF Meanness with TriPM Meanness, correctional sample] to .79 [MMPI-2-RF Boldness with TriPM Boldness, correctional sample]). Kutchen et al. (2017) provided further validity evidence for the MMPI-2-RF triarchic scales in correctional and undergraduate samples. They observed a moderate but well-replicated pattern of associations with the PCL-R, as well as large associations with conceptually relevant scales from the TriPM, PPI-R, and measures of various maladaptive personality traits.

To extract the MMPI-2-RF scales from the MMPI, we converted the triarchic psychopathy MMPI-2-RF items to the MMPI-2 (Butcher et al., 2001) using Appendix E of the MMPI-2-RF *Manual for Administration, Scoring, and Interpretation* (Ben-Porath & Tellegen, 2008). We then converted the MMPI-2 items to the MMPI using Appendix H of the MMPI-2 *Manual for Administration, Scoring, and Interpretation* (Butcher et al., 2001). After completing these conversions (Supplement Tables S3–S5), 88% of the original Boldness items (18 total), 100% of the original Disinhibition items (13 total), and 85% of the original Meanness items remained (22 total); thus, the MMPI-derived scales were nearly identical to the MMPI-2-RF–derived scales. The reported internal consistencies, although modest, are well within the range of those from other studies using the MMPI-2-RF triarchic scales (see Sellbom et al., 2016). In addition, scales derived from empirically constructed tests, such as the MMPI, tend to exhibit lower internal consistencies compared with scales developed using other test construction methods given that they prioritize correlations with external criteria (Helmes & Reddon, 1993).

Although there are minor differences among versions of the MMPI, research indicates that MMPI scores can be used to generate MMPI-2-RF items without a significant decrement in psychometric functioning across the vast majority of clinical scales across populations (Tarescavage, Corey, & Ben-Porath, 2016). The MMPI and MMPI-2 versions were designed to maintain continuity between older and newer versions of the inventory, and as a result the different versions of the MMPI are broadly psychometrically comparable (Ben-Porath & Butcher, 1989). We computed Boldness ($\alpha = .67$), Disinhibi-

tion (α = .67), and Meanness (α = .78). There is evidence for criterion-related validity of the MMPI scales, as Boldness was moderately negatively associated with Welsh Anxiety (A), whereas Disinhibition and Meanness were moderately positively associated; these correlations are consistent with theoretical expectation.

Covariates. All analyses were statistically adjusted for the following demographic characteristics that were potential confounds: age of entry into the military, education level, relationship status, race, military rank, and form of enlistment (e.g., drafted).[2] The relations among study variables are presented in Table 1 and Supplement Table S1.

In exploratory analyses, we adjusted for MMPI Welsh A (Welsh, 1965), which is a marker of negative emotionality, to examine whether statistical interactions remained significant even after controlling for negative emotionality (α = .93). We conducted this analysis given that negative emotionality is a pervasive dimension that cuts across most self-reported measures of distress-related psychopathology (Tellegen, 1985) and therefore can operate as an overlooked "lurking variable" (Joiner, 1981) in studies of psychopathology. Studies indicate that Meanness and Disinhibition are moderately positively associated with negative emotionality, whereas Boldness is negatively associated (e.g., Latzman et al., 2018). In addition, research on the PPI factors indicates that most of the variance in the associations between psychopathy traits and PTSD was accounted for by negative emotionality (Sellbom, 2015). Thus, we examined whether psychopathy traits statistically protected against or potentiated risk for PTSD above and beyond their shared variance with negative emotionality.[3] This analysis bears on the specificity of our interactional findings to triarchic dimensions per se as opposed to global psychological distress.

RESULTS

PSYCHOPATHY'S RELATIONSHIP WITH COMBAT EXPOSURE

We analyzed the relations between combat exposure and psychopathy, controlling for study covariates (but see Table 1 for the zero-order correlations among all study variables). Given the large size of the sample, we focus our exposition of the results on effect size rather than statistical significance. Disinhibition was positively related to combat exposure ($r_{partial}$ = .10), although the magnitude of this relation was small using Cohen's (1988) suggested metrics. Contrary to prediction, there was no significant association between

2. In subsidiary analyses, we excluded 180 participants with elevated scores on the L- and K-scales (> 70) and the F-scale (> 100) of the MMPI, because elevated scores on these scales may indicate invalid responding (e.g., socially desirable response patterns). Excluding these participants did not significantly alter the effect size or the statistical significance of the results. Given the decidedly mixed evidence for the utility of excluding protocols on the basis of elevated validity scales (e.g., Bagby, Rogers, Buis, & Kalemba, 1994), we retained all participants for our analyses to maximize statistical power.

3. There were two items on both the Welsh A and Boldness scales. In all analyses involving both Welsh A and Boldness, we removed the two overlapping items from the Welsh A scale to avoid criterion contamination.

TABLE 1. Intercorrelations Among All Study Variables

	Mean (*SD*)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15[a]
1. Entry Type	.39 (.49)	—	**–.30**	**–.10**	–.02	–.01	.00	.04*	.01	.04	.01	–.06	.05*	.02	**.09**	.03
2. Age of Entry	19.78 (1.65)	—	—	**–.14**	*.07*	.03	**–.08**	**.26**	.03	.01	**–.09**	**–.09**	*.06*	**–.08**	**–.19**	**–.08**
3. Rank in Military	.10 (.31)	—	—	—	**.15**	.01	**.14**	**–.11**	.04*	**.09**	**.15**	.05*	–.03	**.13**	**.23**	.05*
4. Black vs. White	.12 (.32)	—	—	—	—	**–.09**	–.01	*–.06*	.07	**.11**	*.05*	.05*	**.14**	**.13**	.03	–.00
5. Other Race vs. White	.06 (.24)	—	—	—	—	—	.01	–.02	.03	.03	**.07**	.02	.04*	**.07**	.00	.04*
6. Completed Education < High School	.13 (.34)	—	—	—	—	—	—	**–.19**	–.01	.04	**.15**	*.06*	**–.11**	**.10**	**.19**	.04*
7. Completed Education > High School	.19 (.39)	—	—	—	—	—	—	—	.04	*–.06*	**–.17**	*–.06*	**.13**	**–.15**	**–.15**	–.03
8. Single vs. Married	.09 (.28)	—	—	—	—	—	—	—	—	*–.15*	*.06*	–.01	–.04*	.02	.03	–.01
9. Divorced/Separated/Widowed vs. Married	.18 (.39)	—	—	—	—	—	—	—	—	—	**.11**	*.06*	.01	**.07**	**.13**	*.06*
10. Welsh A	12.38 (9.28)	—	—	—	—	—	—	—	—	—	—	**.14**	**–.51**	**.56**	**.36**	**.21**
11. Combat Exposure	15.99 (10.78)	—	—	—	—	—	—	—	—	—	—	—	.03	**.17**	**.13**	**.55**
12. Boldness	10.11 (3.15)	—	—	—	—	—	—	—	—	—	—	—	—	*–.07*	*–.06*	–.03
13. Meanness	10.02 (4.12)	—	—	—	—	—	—	—	—	—	—	—	—	—	**.42**	**.18**
14. Disinhibition	4.28 (2.49)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	**.18**
15. PTSD Symptom Count[a]	1.95 (2.52)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Note. Bolded values are $p < .001$, italicized are $p < .01$, and * represents $p < .05$. [a]denotes Spearman rho coefficients to account for the substantial skew in PTSD symptoms. The zero-order correlations between PTSD symptoms and study variables are available from the first author upon request.

Boldness and combat exposure ($r_{partial}$ = .04). In addition, Meanness was significantly positively associated with combat exposure ($r_{partial}$ = .15), although the magnitude of the association was again small.

To examine the relative contribution of each psychopathy dimension to the prediction of combat exposure, a multiple regression analysis was conducted in which all three psychopathy dimensions were entered simultaneously into the same step when statistically predicting combat exposure (Supplement Table S2). All three psychopathy dimensions were significant positive predictors of combat exposure when controlling for the shared variance among them, and the magnitudes of these associations were generally small to medium (*b*s ranged from .15 to .37). The variance accounted for in combat experience (3.4%) was at best modest.

PSYCHOPATHY'S RELATIONSHIP WITH PTSD

Most individuals in the sample endorsed few PTSD symptoms, resulting in significant positive skew and overdispersion, meaning that the variance exceeded the mean (Supplement Figure S1). Hence to test for overdispersion in the distribution of PTSD symptoms, we used the AER package (Kleiber & Zeileis, 2008) in R, which uses a maximum-likelihood method to test the null hypothesis of equidispersion against the alternative hypothesis of overdispersion. There was significant overdispersion for PTSD, as the dispersion estimates were statistically significantly greater than 1 (estimates ranged from 2.63 to 3.23, *p*s < .001) and the heterogeneity estimates were significantly greater than 0 (estimates ranged from .48 to 1.44, *p*s < .001).

Thus, we analyzed the relations between psychopathy dimensions and PTSD using negative binomial regression with the MASS package (Venables & Ripley, 2002) in R. The regression coefficients represent the multiplicative change in the expected value of PTSD associated with every one-unit change in the independent variable. To facilitate interpretation, we also report the incidence rate ratios (IRR), calculated using the exponentiated regression coefficients, and the 95% confidence intervals (Table 2).

To identify the negative binomial regression models yielding the best fit, we conducted log-likelihood ratio tests.[4] First, we tested the models that included the demographic covariates against the models without the covariates. The majority of the models with demographic covariates included did not provide a statistically significant improvement in fit compared with the models without covariates (χ^2s ranged from 10.63 to 27.58). Second, we tested the models that included combat exposure against the models without combat exposure. All of the log-likelihood ratio tests indicated that including combat exposure in the model provided a statistically significant improvement in fit compared with the models without combat exposure (χ^2s ranged from 550.58 to 599.59). Third and finally, we tested the models that included combat exposure against the models that included the demographic covariates and combat exposure. All of the log-likelihood ratio tests indicated that including the covariates and combat exposure in the model provided a statis-

4. The log-likelihood fit statistics are available from the first author upon request.

TABLE 2. Relations Between Combat Exposure and Psychopathy Dimensions and PTSD Symptoms

	b	exp(*b*)	IRR	Std. Error	95% CI
A. Main effects					
Boldness	*–.03*	.97	2.7%	.004	[–.04, –.01]
Meanness	**.04**	1.04	3.6%	.01	[.02, .05]
Disinhibition	**.06**	1.06	6.4%	.01	[.04, .09]
Combat exposure	**.07**	1.08	7.8%	.06	[.07, .08]
B. Relative contribution of the psychopathy dimensions					
Boldness	–.02*	.98	2.1%	.01	[–.04, –.01]
Meanness	*.02*	1.03	2.5%	.01	[.01, .04]
Disinhibition	**.05**	1.05	4.6%	.01	[.02, .07]
C. Psychopathy traits' interactions with combat exposure					
Boldness-by-combat exposure	.0003	1.0003	.03%	.001	[–.001, .002]
Meanness-by-combat exposure	*–.002*	.998	.20%	.001	[–.003, –.0002]
Disinhibition-by-combat exposure	–.001	.999	.10%	.001	[–.003, .001]
D. Interactions among the psychopathy dimensions					
Boldness-by-Meanness	–.004	.996	.40%	.003	[–.01, .001]
Boldness-by-Disinhibition	.003	1.003	.30%	.004	[–.01, .01]
Disinhibition-by-Meanness	–.004	.996	.40%	.004	[–.001, .002]

Note. IRR = incidence rate ratio. Bolded values are $p < .001$, italicized are $p < .01$, and * represents $p < .05$. In Model A, each of the psychopathy dimensions and combat exposure were examined independently. In Model B, all of the triarchic psychopathy dimensions were entered simultaneously. In Model C, the main effects of psychopathy and combat exposure were entered into the first step of the regression and the interaction term was entered into the second step. In Model D, the main effects of psychopathy traits were entered into the first step of the regression and the interaction term was entered into the second step.

tically significant improvement in fit compared with the models without the covariates (χ^2s ranged from 564.02 to 603.00). Thus, all of the psychopathy models included the demographic covariates and combat exposure (Table 2).

Combat exposure was positively related to PTSD symptoms (b = 0.07), and every one-unit increase in combat exposure was associated with a 7.8% increase in PTSD symptoms (Table 2). Boldness exhibited negative relations to PTSD symptoms (b = –0.02) whereas Disinhibition was positively associated (b = 0.06). Meanness was also positively associated with PTSD symptoms (b = 0.04). Thus, all of the psychopathy dimensions were significantly associated with PTSD even after controlling for combat exposure and the demographic covariates, albeit these relations were generally small in magnitude. Every one-unit increase in Boldness was associated with a 2.7% decrease in PTSD symptoms. In contrast, every one-unit increase in Disinhibition was associated with a 6.4% increase in PTSD symptoms, and Meanness was associated with a 3.6% increase. When all of the psychopathy dimensions were included in the model, every one-unit increase in Boldness was associated with a 2.1% decrease in PTSD symptoms; Disinhibition was associated with a 4.6% increase; and Meanness was associated with a 2.5% increase. This model provided a better fit than the univariate models (χ^2s ranged from 515.62 to 532.47).

STATISTICAL INTERACTIONS BETWEEN COMBAT EXPOSURE AND PSYCHOPATHY DIMENSIONS

We analyzed the statistical interactions between combat exposure and the triarchic psychopathy dimensions in predicting PTSD, again using negative binomial regression (Table 2). All variables were mean-centered, and the statistical significance of the interaction term was examined after controlling for the main effects of combat exposure and the psychopathy dimensions. Contrary to our hypothesis, Boldness did not protect against PTSD in the presence of combat exposure, and the interaction model did not provide a significant improvement in fit compared with the model that included the main effects of combat exposure and Boldness ($\chi^2 = 0.14$).[5] Also, in contrast with our hypothesis, Disinhibition did not potentiate the association between combat exposure and PTSD, and the interaction model did not provide a significant improvement in fit compared with the model that included the main effects of combat exposure and Disinhibition ($\chi^2 = 0.77$). Controlling for the MMPI Welsh Anxiety Scale did not alter the significance of the Disinhibition-by-combat or Boldness-by-combat interaction terms.

In contrast, although unpredicted, Meanness protected against PTSD in the presence of combat exposure. As Meanness increased, the relations between combat exposure and PTSD decreased. Nonetheless, the interaction term contributed to a mere 0.2% decrease in likelihood in PTSD symptoms. The interaction model provided a statistically significant improvement in fit compared with the model that included the main effects of combat exposure and Meanness, although the chi-square statistic was small ($\chi^2 = 5.38$).[6] This interaction remained statistically significant after controlling for the MMPI Welsh Anxiety scale, suggesting that negative emotionality alone is not driving the interaction effect. To probe this interaction further, we conducted a simple slopes test of the negative binomial regression model with the Johnson-Neyman technique using the "jtools" package in R (Long, 2018). The conditional effect of Meanness on PTSD, although modest in magnitude, was statistically significant across the entire range of Meanness in this sample (Supplement Figure S3).

POTENTIAL INTERACTIVE EFFECTS OF THE TRIARCHIC DIMENSIONS

We analyzed the statistical interactions between Boldness, on the one hand, and Disinhibition and Meanness, on the other, using negative binomial regression (Table 2). All variables were again mean-centered, and the statistical

5. In addition to potential slope differences, we investigated potential intercept differences in the relations between combat exposure and PTSD at high and low levels of Boldness. The 95% confidence intervals of the intercept values overlapped, indicating that the intercept values did not differ significantly. This finding suggests that Boldness does not exert a protective effect against PTSD symptoms in the presence of combat exposure.

6. We explored the potential nonlinear relations between combat exposure and PTSD. The Meanness-by-combat-squared interaction term was not statistically significant, although the inclusion of combat-squared in the model resulted in a statistically significant improvement in fit compared with the model without combat-squared.

significance of the interaction term was examined after controlling for the main effects of the psychopathy dimensions. Boldness was not protective against PTSD in the presence of Disinhibition or Meanness.[7] The interaction models did not provide a significant improvement in fit compared with the models that included the main effects of the psychopathy dimensions (χ^2s were 0.59 and 2.34). We also examined the statistical interaction between Disinhibition and Meanness in predicting PTSD. This interaction term was again not statistically significant, and the model did not provide a significant improvement in fit compared with the model that included the main effects of Disinhibition and Meanness ($\chi^2 = 1.63$).

DISCUSSION

Taken together, our results indicate that psychopathic personality traits are differentially associated with PTSD in combat-exposed populations. Even after controlling for the effects of combat exposure, which predicted close to a 10% increase in PTSD symptoms, psychopathic traits in aggregate still predicted PTSD. Boldness was negatively related to PTSD symptoms, corroborating findings from research on the relations between the PPI factors and PTSD (Sellbom, 2015). Studies that examined the relations between the four facets of psychopathy and PTSD have yielded mixed results regarding the associations between boldness traits and PTSD; the present findings, in conjunction with research using the PPI-R, suggest that using psychopathy measures that are more comprehensive in their coverage of fearlessness and leadership-oriented traits may clarify the associations between boldness features and PTSD.

In contrast to our hypotheses, however, Boldness was not statistically protective against PTSD in the presence of either combat exposure, on the one hand, or of Disinhibition or Meanness, on the other. These results are inconsistent with research that the Fearless Dominance domain was statistically protective against PTSD in the presence of Self-Centered Impulsivity (Sellbom, 2015). Although Fearless Dominance and Boldness overlap conceptually and empirically, Fearless Dominance is more extensive than Boldness in its content coverage of fearlessness traits. In this regard, it is possible that fearlessness traits in particular, which are captured in depth by one of the three subdimensions of PPI-R Fearless Dominance, are statistically protective against PTSD in the presence of disinhibition traits. Nonetheless, the role of fearlessness in psychopathy is controversial, because the potentially adaptive correlates of fearlessness are viewed by some authors as peripheral to psychopathy (e.g., J. D. Miller & Lynam, 2012). In addition, some research raises the possibility that psychopathic individuals do not possess global fear deficits; meta-analytic evidence suggests that psychopathic individuals may

7. In addition to potential slope differences, we investigated potential intercept differences in the relations between Disinhibition and Meanness, on the one hand, and PTSD, on the other, at high and low levels of Boldness. The 95% confidence intervals of the intercept values overlapped, indicating that the intercept values did not differ significantly. This finding suggests that Boldness does not exert a protective effect against PTSD symptoms in the presence of Disinhibition or Meanness.

be moderately impaired in automatic threat detection but largely normal in their subjective experience of fear (e.g., Hoppenbrouwers, Bulten, & Brazil, 2016). Future research is needed to clarify whether certain aspects of fearlessness, such as impaired threat detection, might statistically protect against PTSD in the presence of other psychopathic traits.

Unlike Boldness, Disinhibition and Meanness were positively related to PTSD. Each dimension remained a significant predictor of PTSD even after controllling for the shared variance among the three dimensions. The model that included all psychopathy dimensions as predictors of PTSD provided the best fit, perhaps suggesting that the shared variance among the psychopathy dimensions best predicts PTSD compared with the dimensions in isolation.

Out of the six interaction models we examined, only one was significant: Meanness was statistically protective against PTSD in the presence of combat exposure. Nevertheless, the interaction term predicted a small decrease in PTSD symptoms (<1%), raising questions regarding its practical significance. It is worth noting, however, that the interaction remained significant even after controlling for negative emotionality. These results are largely consistent with research that callousness and interpersonal manipulation buffer against PTSD in the presence of combat exposure (Anestis, Harrop, et al., 2017). Meanness is linked, at least theortetically, to emotional detachment and low social affiliation. Although these traits often lead to maladaptive outcomes, they may confer resilience to some forms of combat-related trauma, especially those that involve serious harm to others. Nonetheless, the implications of this interaction term remain unclear, and replication efforts are warranted to corroborate its robustness and meaning.

This study was characterized by a number of strengths that distinguish it from existing studies, including our examination of statistical interactions among personality traits and combat exposure in predicting PTSD and the large sample size of Vietnam veterans. Nonetheless, this study was also characterized by several limitations that warrant consideration in future research. First, psychopathy was assessed exclusively using self-report, rendering our findings partly susceptible to monomethod bias. This limitation notwithstanding, our results demonstrate significant differentiation across psychopathy dimensions, suggesting the presence of substantive covariance rising above method covariance. In addition, because we derived the triarchic scales from the MMPI, our analyses bear on the associations between the triarchic *constructs* and PTSD rather than on the associations between the original triarchic *scales* and PTSD. Nevertheless, the MMPI-2-RF–derived triarchic scales, from which we extracted the MMPI scales, were strongly associated with the TriPM in previous research (Kutchen et al., 2017; Sellbom et al., 2016).

In addition, our study comprised male participants only. Studies have yet to examine gender differences in the relations among combat exposure, psychopathic traits, and PTSD. Most studies have relied on male veterans, perhaps due at least in part to the long-standing ban on females entering the military. Females now, however, comprise approximately 15.5% of active duty military, and they represent the fastest growing cohort in veteran communities (Department of Veterans Affairs, 2017). Although the overall

veteran population is decreasing by approximately 1.5% per year, the female veteran population is increasing by approximately 1% per year (Department of Veterans Affairs, 2017). Given these statistics, it is essential that future studies examine risk factors for and protective factors against combat-related PTSD in women.

On balance, no studies have examined the relations among combat exposure, psychopathic traits, and *DSM-5* PTSD symptoms. It is unclear whether our findings, in addition to those from existing literature, will generalize to modern clinical conceptualizations of PTSD, because there are now four symptom clusters (as opposed to three in prior editions) with revised diagnostic criteria, including expanded coverage of avoidance symptoms and self-destructive behaviors (Friedman, 2013). Although Criterion A was revised in *DSM-5* regarding which events and how many are requisite for a PTSD diagnosis (Friedman, 2013), combat exposure is still classified as a Criterion A trauma, thus cutting across versions of the *DSM*.

Because all reports were completed retrospectively after the Vietnam War, it is not possible to generate formal conclusions regarding temporal precedence, let alone causality, in the relations between psychopathy and PTSD in combat-exposed individuals. Thus, our analyses bear only on the circumscribed, but theoretically important, question of whether psychopathic traits statistically protect against or confer risk for PTSD. Despite this limitation, research suggests that symptoms of PTSD are often relatively stable across an individual's life span and can persist 20 years after the original trauma (Solomon & Mikulincer, 2006). In addition, one study indicated that combat-related PTSD symptoms were more consistent across a 20-year time span than either depression or anxiety symptoms (Ginzburg, Ein-Dor, & Solomon, 2010).

Regarding psychopathy, it is unclear whether the subjects' self-reports of their personality traits reflected their predeployment personality features, their postdeployment personality features, or a combination of the two. It is possible that certain predeployment personality traits were changed by combat. For instance, one study examined triarchic psychopathy traits in two groups of military patrol teams, with one group having worked for just 1 year and the other group having worked for 2 years (Kjærgaard, Leon, Venables, & Fink, 2013). The researchers found that mean levels of Boldness were high in both groups, whereas mean levels of Disinhibition were higher in the second-year group in comparison with the first-year group. This study suggests that individuals high on Boldness may self-select into risk-laden occupations, with Disinhibition potentially increasing after working in such an environment.

Nonetheless, research suggests that combat exposure does not significantly alter predeployment personality, as one study found that the relative stability of predeployment traits following deployment was not statistically different between non-combat-exposed and combat-exposed veterans (Schnurr, Rosenberg, & Friedman, 1993). Furthermore, precombat personality significantly predicted postcombat PTSD even after controlling for combat exposure (e.g., Bramsen et al., 2000; Koffel et al., 2016). Taken together, literature suggests that moderately stable predeployment traits significantly

predict future PTSD. It is likely that our findings largely reflect the subjects' predeployment traits, although future research is warranted to clarify the temporal precedence of personality in the relations between psychopathy and PTSD.

In sum, our findings highlight the importance of treating psychopathy as a heterogeneous construct, given the differential pattern of associations between boldness and disinhibition traits, on the one hand, and PTSD, on the other. Our results also provide preliminary and novel evidence that meanness traits may exert a protective effect against PTSD in the presence of combat-related trauma. Nonetheless, given the small magnitude of this interaction, its clinical significance is unclear. If our findings can be independently replicated, we would encourage investigators to explore the potential implication of our results for identifying moderators and mediators of PTSD treatment response.

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SUPPLEMENTAL MATERIALS

FIGURE S1. Distribution of PTSD symptoms.

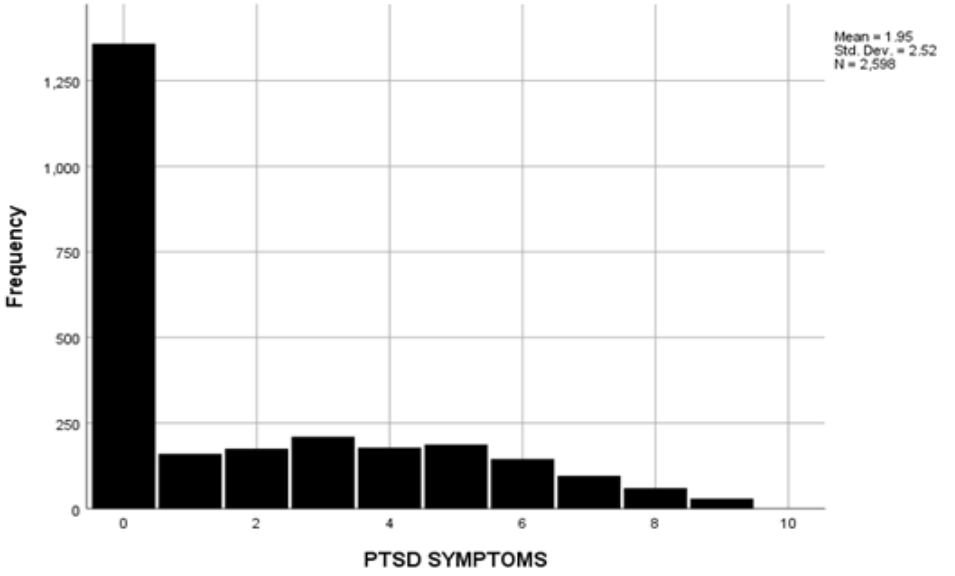
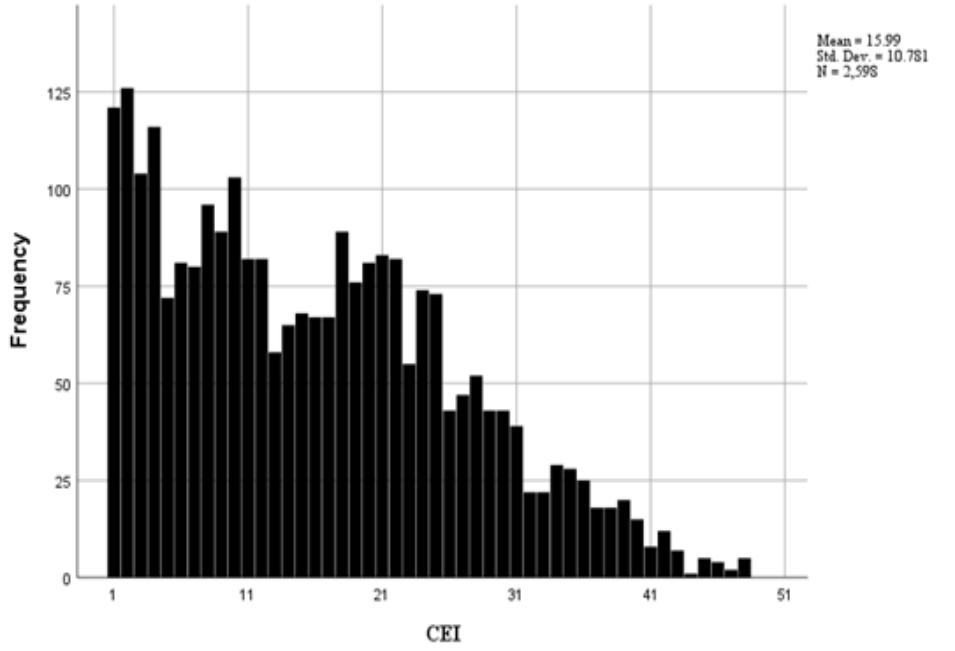
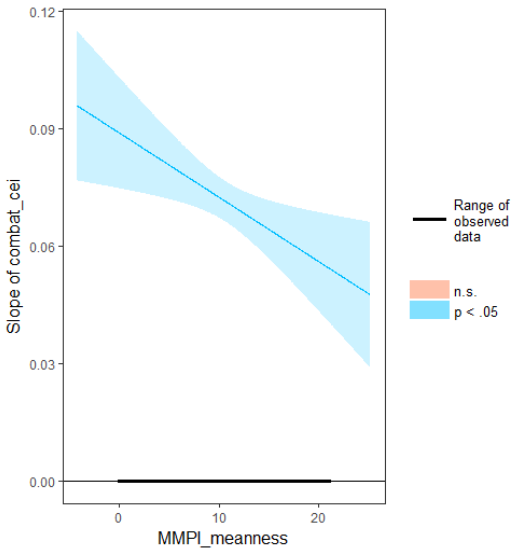


FIGURE S2. Distribution of Combat Exposure Index (CEI) Scores



Note. The data were slightly skewed to the right (skewness = .51) and slightly platykurtic (kurtosis = –.52).

FIGURE S3. Johnson-Neyman regions of significance test for the Combat-by-Meanness interaction.



Note. When MMPI Meanness is outside of the interval [35.32, 184.28], the slope of combat exposure is statistically significant at the $p < .05$ level.

TABLE S1. Relations Between Demographic Covariates and PTSD Symptoms

	b	exp(*b*)	IRR (%)	Std. Error	*p*	95% CI
Entry Type	.04	1.04	4.1	.07	.62	[−.11, .18]
Age of Entry	−.06	.94	5.8	.02	.006**	[−.10, −.02]
Rank in Military	.12	1.13	12.7	.11	.26	[−.09, .35]
Black vs. White	.03	1.03	3.0	.11	.77	[−.17, .24]
Other Race vs. White	.26	1.30	29.7	.13	.06	[−.01, .54]
Completed Education < High School	.15	1.16	16.2	.10	.14	[−.04, .34]
Completed Education > High School	−.03	.97	3.0	.09	.78	[−.20, .15]
Single vs. Married	.03	1.03	3.0	.12	.82	[−.20, .27]
Divorced/Separated/Widowed vs. Married	.18	1.20	19.7	.09	.04*	[.01, .35]

Note. IRR = incidence rate ratio. *$p < .05$. **$p < .01$.

TABLE S2. Relative Contribution of the Psychopathy Dimensions to Combat Exposure

	b	β	Std. Error	*p*	95% CI
Boldness	.15	.04	.07	.03*	[.02, .28]
Meanness	.37	.14	.06	< .001***	[.26, .48]
Disinhibition	.30	.07	.09	.001**	[.12, .48]

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

TABLE S3. MMPI-2-RF to MMPI Item Conversions for the Boldness Scale

	MMPI-2-RF items	MMPI-2 items	MMPI items
1.	109	359	450
2.	114 (R)	185 (R)	201 (R)
3.	147	365	502
4.	182	239	264
5.	226	417	434
6.	234	496	NA
7.	239	350	415
8.	244	345	400
9.	246	318	257
10.	249 (R)	275 (R)	304 (R)
11.	24	70	82
12.	276	481	NA
13.	302	521	NA
14.	322 (R)	127 (R)	138 (R)*
15.	37	63	79
16.	42	133	144
17.	48 (R)	73 (R)	86 (R)
18.	64	61	73
19.	73	223	242
20.	91 (R)	289 (R)	321 (R)*
21.	94	360	479

Note. NA = items on the MMPI-2-RF that were not on the MMPI; (R) = reverse-coded items; *items that overlapped with the Welsh A scale and were excluded from the Welsh A scale in analyses involving both the Welsh A and Boldness scales.

TABLE S4. MMPI-2-RF to MMPI Item Conversions for the Disinhibition Scale

	MMPI-2-RF items	MMPI-2 items	MMPI items
1.	131	169	181
2.	156	362	481
3.	190 (R)	266 (R)	294 (R)
4.	205	412	419
5.	21	35	38, 311[a]
6.	212 (R)	314 (R)	347 (R)
7.	218	240	205
8.	221 (R)	126 (R)	113 (R)
9.	223	84	56
10.	253	431	471
11.	45	41	45
12.	66	105	118
13.	96	202	224

Note. (R) = reverse-coded items; [a] repeated items that were averaged.

TABLE S5. MMPI-2-RF to MMPI Item Conversions for the Meanness Scale

MMPI-2-RF items	MMPI-2 items	MMPI items
1. 104	452	520
2. 142	254	280
3. 143	212	233
4. 148	201	223
5. 185	286	319
6. 213	352	436
7. 255	270	218
8. 256	346	406
9. 292	393	386
10. 300	477	NA
11. 305	406	410
12. 316	414	426
13. 321	537	NA
14. 327	423	447
15. 329	548	NA
16. 36	58	71
17. 39	50	59
18. 55	81	93
19. 84	134	145
20. 87	104	117
21. 97	153	165
22. 99	110	124
23. 26	27	28
24. 41	323	355
25. 231	324	269
26. 236	381	NA

Note. NA = items on the MMPI-2-RF that were not on the MMPI.