Evaluating the Structure of Psychopathic Personality Traits: A Meta-Analysis of the
Psychopathic Personality Inventory

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Abstract

Which core traits exemplify psychopathic personality disorder is a hotly debated question within psychology, particularly regarding the role of ostensibly adaptive traits such as stress immunity, social potency, and fearlessness. Much of the research on the inter-relationships among putatively adaptive and more maladaptive traits of psychopathy has focused on the factor structure of the Psychopathic Personality Inventory (PPI) and its revision, the Psychopathic Personality Inventory – Revised (PPI-R). These instruments include content scales that have coalesced to form 2 higher-order factors in some (but not all) prior studies: Fearless Dominance and Self-Centered Impulsivity. Given the inconsistencies in prior research, we performed a meta-analytic factor analysis of the 8 content scales from these instruments (total $N > 18,000$) and found general support for these 2 dimensions in community samples. The structure among offender samples (e.g., prisoners, forensic patients) supported a three-factor model in which the Fearlessness content scale uniquely loaded onto Self-centered Impulsivity (rather than Fearless Dominance). There were also indications that the Stress Immunity content scale had different relations to the other PPI scales in offender versus community samples. We discuss the theoretical and diagnostic implications of these differing factor structures for the field of psychopathy research.

Key words: Psychopathy; Meta-analysis; Psychopathic Personality Inventory; Psychopathic Personality Inventory – Revised; Factor analysis.

Public significance statement: The present meta-analysis suggests that the properties of a prominent measure of psychopathic personality disorder differ across offender and nonoffender samples. These differences were particularly pronounced for arguably adaptive traits, such as those related to an ability to recover quickly in stressful situations.

Evaluating the Structure of Psychopathic Personality Traits: A Meta-Analysis

Psychopathy is characterized by a range of personality traits, such as callousness, impulsivity, and dominance (Cleckley, 1941; Hare, 2003; Patrick, Fowles, & Krueger, 2009; Skeem, Polaschek, Patrick, & Lilienfeld, 2011). Despite some consensus about certain key features (e.g., callousness), there remains considerable controversy about what other characteristics are most central to the disorder. For example, the centrality of antisocial behavior in the conceptualization of psychopathy is a hotly contested issue (Skeem & Cooke, 2010; cf. Hare & Neumann, 2010). Similarly, several researchers have debated the validity of including ostensibly adaptive traits (e.g., “boldness”) in the conceptualization of psychopathy (Lilienfeld et al., 2012; Lynam & Miller, 2012; Marcus, Fulton, & Edens, 2013; Miller & Lynam, 2012; Sellbom, Cooke, & Hart, 2015). For instance, the fifth edition of the *Diagnostic and Statistical Manual (DSM-5)* (American Psychiatric Association, 2013) Section III description of Antisocial Personality Disorder (APD) now includes a specifier for psychopathy that includes traits such as high attention-seeking, low withdrawal, and low anxiousness, which seem similar to the concept of boldness. As expected, the inclusion of this specifier to the APD diagnosis has generated controversy (Crego & Widiger, 2014; Few, Lynam, Maples, MacKillop, & Miller, 2015).

The DSM notwithstanding, researchers and clinicians frequently rely on the interview and file-based Psychopathy Checklist-Revised (PCL-R; Hare, 1991/2003) to operationalize psychopathic traits. However, several self-report measures have been the focus of considerable research as well. Some of these instruments assess traits that are not fully captured by the PCL-R (Poythress et al., 2010) but nonetheless have considerable empirical support for their construct validity (e.g., Gardner, Boccaccini, Bitting, & Edens, 2015; Ray et al., 2013).

One of the most widely researched self-report measures is the Psychopathic Personality

Inventory (PPI; Lilienfeld & Andrews, 1996) and its revision, the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005). The PPI is a comprehensive self-report measure of psychopathic personality traits initially developed for use with noncriminal populations. Lilienfeld and Andrews (1996) drew from the theoretical literature on psychopathy to develop a provisional item pool that captured a wide array of constructs thought to be associated with psychopathy. A final set of eight content scales was developed through an iterative process of exploratory test construction and refinement following procedures outlined by Loevinger (1957). The original PPI scales consisted of Machiavellian Egocentricity, Impulsive Nonconformity, Blame Externalization, Carefree Nonplanfulness, Fearlessness, Stress Immunity, Social Potency, and Coldheartedness (see Table 1 for descriptions).

Although the PPI was not designed with a particular higher order structure in mind, an influential investigation of its structure (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003) identified a three-factor solution using data from a large community sample (see Table 2). The Impulsive Nonconformity, Blame Externalization, Machiavellian Egocentricity, and Carefree Nonplanfulness scales characterized the first factor, which was eventually labeled Self-centered Impulsivity,¹ whereas the Stress Immunity, Social Potency, and Fearlessness content scales characterized the second factor, which they labeled Fearless Dominance. Benning and colleagues (2003) then imposed a two-factor structure and found a solution that largely mirrored the first two factors of the original solution with Coldheartedness not loading appreciably on either factor. At present, Coldheartedness is usually considered to be a separate dimension assessed by the PPI/PPI-R (Benning, Patrick, Salekin, & Leistico, 2005; Berg, Hecht, Latzman, & Lilienfeld,

¹ Although Benning et al. initially referred to this factor as Impulsive Antisociality, the label was changed with the release of the PPI-R to Self-Centered Impulsivity because none of the items measures overt criminal activities (Lilienfeld & Widows, 2005). For the purposes of this article, we will use the updated label Self-centered Impulsivity.

2015).

This two-factor structure of the PPI/PPI-R is generally consistent with theoretical models linking psychopathic traits to the functioning of different neurobiological systems. Specifically, Patrick and Bernat (2009) argued that psychopathy can be understood as a combination of trait fearlessness and externalizing vulnerability. Psychopathic individuals are thought to have a reduced ability to detect threats (high levels of Fearless Dominance) and impaired executive functioning (high levels of Self-Centered Impulsivity). More generally, the concept of “fearless dominance” has been influential in the development of the triarchic model (Patrick, Fowles, & Krueger, 2009), which posits three relatively distinct constructs (boldness, meanness, and disinhibition) that encapsulate the primary features of psychopathy.

Replication of Benning and Colleagues’ (2003) Factor Structure

Subsequent research has attempted to replicate Benning and colleagues’ (2003) factor structure for the PPI. Notably, Lilienfeld and Widows (2005) conducted identical analyses with their community and college sample for the PPI-R manual and found evidence for the same solution. Likewise, several studies have generally replicated this solution in non-offender samples, particularly among college students (Benning, et al., 2005; Witt, Donnellan, & Blonigen, 2009; Witt, Donnellan, Blonigen, Krueger, & Conger, 2009). Research also supports this factor structure in a combined offender and undergraduate sample (Ross, Benning, Patrick, Thompson, & Thurstone 2009) and some offender samples (Edens & McDermott, 2010; Patrick, Edens, Poythress, Lilienfeld, & Benning, 2006).

It is important to note, however, that there are failures to replicate the factor solution of Benning et al. (2003). For example, Neumann, Malterer, and Newman (2008) used a large sample of incarcerated men ($N = 1,224$) and could not confirm this model using either

exploratory factor analysis (EFA) or confirmatory factor analysis (CFA) techniques. Instead, they suggested an alternative structure, with one factor including only Stress Immunity and Social Potency and another including the Fearlessness, Machiavellian Egocentricity, Impulsive Nonconformity, and Blame Externalization content scales. Notably, Fearlessness was fairly distinct from the Stress Immunity/Social Potency factor (loading = .16). A third factor distinct from Benning et al. also emerged in these analyses, which was composed of the Coldheartedness and Carefree Nonplanfulness content scales (see Table 2).

The alternative three-factor model identified by Neumann et al. (2008) has emerged in other samples as well. For example, Lilienfeld and Widows (2005) reported a similar pattern of factor loadings in their offender sample for the PPI-R. Smith, Edens, and Vaughn (2011) also identified different factor structures across different types of samples when examining the PPI-short form. Specifically, the Benning et al. (2003) factor structure was evident in an undergraduate sample, whereas the Neumann et al. factor structure was replicated in foster youth and juvenile offender samples. Additionally, other studies have suggested that the Fearlessness content scale tends to cross-load on the Self-centered Impulsivity factor (e.g., Benning et al., 2005). Benning et al. argued that Fearlessness may cross-load because some of its items tapping boredom proneness, which aligns more closely with Self-centered Impulsivity, as well as items measuring thrill-seeking, which aligns more closely with Fearless Dominance (for a similar argument, see Edens & McDermott, 2010). Altogether, these results suggest that the type of sample might be associated with the resulting factor structure of the PPI and PPI-R.

Even in studies supportive of the Benning et al. (2003) factor structure, there have been some inconsistencies in the degree of association between Fearless Dominance and Self-centered Impulsivity. Overall, research suggests the two factors are typically unrelated in offender

samples, but modestly correlated within non-offender samples (Uzieblo, Verschuere, & Crombez, 2007), with some notable exceptions (see Patrick et al., 2006). A meta-analysis of 37 studies (Marcus et al., 2013) reported essentially no association between Fearless Dominance and Self-centered Impulsivity in offender samples ($r = .03, p = .36$), whereas there was a stronger (albeit relatively modest) association in non-offender samples ($r = .16, p < .001$). This result is also consistent with the possibility that the type of sample under investigation might influence the psychometric properties of the PPI and PPI-R.

The question of the underlying structure of psychopathy is an important theoretical *and* practical issue for the field to resolve. As noted earlier, there are theoretical reasons to expect that certain patterns of covariation would be likely on an instrument such as the PPI/PPI-R as reflections of underlying neurobiological processes (Patrick & Bernat, 2009; Patrick, Fowles, & Krueger, 2009). At a more applied level, the *DSM-5* (American Psychiatric Association, 2013) included an alternative model of personality disorders in Section III that was proposed to replace what many believe to be an outdated and unscientific approach to personality diagnoses represented in the fourth edition (Zachar, Krueger, & Kendler, 2016). Antisocial personality in this dimensional model is represented primarily by aspects of Antagonism (e.g., hostility, deceitfulness) and Disinhibition (e.g., risk-taking, impulsivity), which in many regards are similar to the traits encapsulated by the Self-centered Impulsivity dimension of the PPI/PPI-R (e.g., Machiavellian Egocentricity, Impulsive Nonconformity). As noted earlier, this proposed model includes a psychopathy “specifier” for APD that incorporates traits highly similar to those reflected in the Fearless Dominance factor of the PPI/PPI-R, including Social Potency and Stress Immunity. Thus, research investigating the interrelationships among these psychopathic traits may be informative for future iterations of the personality disorder section of the most widely

used diagnostic nomenclature in the field.

The Current Meta-Analysis

One potential explanation for the debates concerning the higher order factor structure of the PPI and PPI-R is that sample type moderates the factor structure of these instruments. Indeed, the majority of studies providing support for Benning and colleagues' (2003) solution have been conducted on college or community samples, whereas the Neumann et al. (2008) solution was based on a combination of three prisoner samples (see Table 2 for both factor solutions). Accordingly, the goal of the current study was to use meta-analytic techniques to evaluate the structure of the PPI and PPI-R, and to formally test whether sample (offender versus community) is related to differences in the factor structure because of systematic differences in the underlying correlation matrices across these two populations. A secondary goal was to evaluate the correlation between higher-order factors, given hints that this correlation differs by sample type as well.

Method

Study Identification

We used multiple strategies to identify unique studies² that contained data on the PPI or PPI-R. These techniques updated an earlier database first assembled by Witt, Donnellan, Blonigen, and Patrick (2011). The current meta-analysis uses group-level data from previously published and unpublished works and did not involve recruiting human subjects. As a result, institutional review board approval was not necessary. First, we conducted a PsycINFO search (concluded in January 2015) with the key terms “psychopathic personality inventory” and “psychopathic personality inventory revised”. If articles did not include necessary information

² We ruled out redundant data via contact with authors and the method section of articles.

for data analysis (i.e., demographic information and correlation matrices, means, and standard deviations for content scales), we then contacted the corresponding authors. In case the corresponding author could not be reached, we emailed another author on the paper to obtain the coefficients. Additionally, in June and August of 2015, we contacted members from the Scientific Study of Psychopathic Personality (SSSP) using this organization's listserv. In both instances, we asked for both published and unpublished data concerning the structure of the PPI/PPI-R. Specifically, we asked researchers for correlation matrices, means, and standard deviations for the content scales and some basic study characteristics (nature of sample, sample size, gender ratio) for each study. This search resulted in 32 samples and 11,158 respondents for PPI analyses and 29 samples and 7,544 respondents for PPI-R analyses. Analyses of PPI data included 22 community samples ($N = 6,661$ participants; e.g., undergraduates, community members) and 10 offender samples ($N = 4,497$ participants). The majority of offender samples consisted of general population prison inmates, whereas others were, for example, waiting for trial or receiving court-mandated treatment. One very small ($N = 18$) PPI-R sample (of the 29 total) had to be excluded (Gheyntchi, 2008), due to non-positive definite matrix identified during the analyses. Thus, the PPI-R analyses were based on 22 community samples ($N = 7,018$) and 6 offender samples ($N = 508$). Specific characteristics of the studies (e.g., percent male) are reported in Table 3 (PPI) and Table 4 (PPI-R).

Overview of Data Analyses

Each of the 32 PPI samples and 28 PPI-R samples contained a full correlation matrix for the respective 8 content scales. Thus, within a given sample, participants contributed data to the full correlation matrix. Traditional univariate meta-analytic techniques are inappropriate for this type of data, because they ignore the dependency in correlations within a given sample. Meta-

analytic structural equation modeling (MASEM; Cheung & Chan, 2005; Jak, 2015) uses a multivariate approach that takes this dependency into account. In a MASEM, correlation matrices from each of the samples are pooled into a single synthesized correlation matrix weighting by sample size using the stage one procedure of Cheung and Chan (2005)'s two stage structural equation modeling technique (see Jak, 2015, pp. 19-21). We formally tested whether the synthetic matrices from the community samples were statistically different from offender samples using subgroup analyses, separately for the PPI and PPI-R sample.³ All code used for our analyses are available on the OSF page for this project: <https://osf.io/vyw67/>

We then subjected these meta-analytically derived correlation matrices to an (EFA) using *Mplus* Version 7.11. We conducted analyses using the overall matrices as well as separate matrices for community and offender samples. We used EFA rather than CFA, given that self-report measures of personality often fail to fit well when subjected to the strict assumptions of CFA (Hopwood & Donnellan, 2010). Moreover, we wanted to be flexible in evaluating the structure of the PPI/PPI-R, and Neumann et al. (2008) had previously reported difficulties using CFA with particular models for the structure of the PPI. We report varimax rotations to be consistent with much of the previous work that has factor analyzed the PPI/PPI-R content scales to identify higher-order dimensions. However, because we were interested in investigating the extent to which the higher-order factors might differentially correlate with each other across sample type (see Marcus et al., 2013), we also evaluated promax rotations. Unlike orthogonal rotations, oblique rotations allow for overlap between factors.⁴

³ The current analysis employed a fixed effects strategy, because a random effects solution did not converge in the PPI offender subsample. This is a common occurrence when the number of samples is small (Jak, 2015), and it is recommended that authors revert to fixed effects techniques in such cases.

⁴ Some methodologically-oriented authors often favor the oblique geomin rotation (e.g., Browne, 2001). Results using this approach were similar to other oblique rotations (e.g., promax, oblimin) except that, for the PPI offender sample EFA, Coldheartedness cross-loaded onto factors B and C >.95. Further details concerning these analyses are available from the first author.

We focused on loadings $\geq .30$, following Neumann et al. (2008; see, e.g., their Table 4). We also conducted analyses with and without the Coldheartedness scale following Benning et al. (2003). We specifically examined two- (Benning et al., 2003) and three- factor (Benning et al., 2003; Neumann et al., 2008) structures using the entire sample for both the PPI and the PPI-R. We also tried to estimate four and five factor solutions given concerns about underfactoring (see e.g., Fabrigar, Wegener, MacCallum, & Strahan, 1999). Models with four factors would not converge when omitting the Coldheartedness scale. Models with four factors would converge when using the 8 scales. However, the solutions were neither easily interpretable nor consistent with prior studies. We computed Tucker's congruence coefficients (see Lorenzo-Seva and ten Berge, 2006) to help quantify judgments about the similarity of factor solutions. Following Lorenzo-Seva and ten Berge (2006, p. 61), we considered congruence coefficients higher than .95 as indicating "good" similarity.

Results

Meta-Analysis of Correlation Matrices

Similar results were obtained using the *metasem* package in R (Cheung, 2015a) and Mplus (Muthén & Muthén, 1998-2015; see Cheung, 2015b); we present the results from Mplus here (see Table 5). MASEM models in Mplus are conducted using multiple group analysis (each sample is a separate group). First, the correlations between the eight content scales of the PPI or PPI-R are fixed to equivalence across all samples. These correlations constitute the synthesized correlation matrix. Then, the equivalency restriction is relaxed such that subgroups (in this case, community vs. offender samples) are allowed to have different correlations (i.e., two pooled correlation matrices, one for each subgroup, are created). These two models are nested and chi-square distributed with 28 degrees of freedom. The significance test for the nested model

comparison reveals whether the subgroups explain meaningful variation in the correlation matrices, at an omnibus level.

PPI. A nested model that specified two subgroups (community and offender) fit the data better than a model that assumed all samples came from a common group, $\Delta\chi^2(28) = 675.49, p < .001$ (see Table 5 for model fit statistics). The three synthesized correlation matrices are provided in supplemental online materials (i.e., overall, just community samples, and just forensic samples). To help isolate discrepant correlations, we compared each entry in the correlation matrices across offender and community samples and highlighted differences above $|.10|$. We then focused on consistencies with the PPI-R. We believed this approach was preferable to a series of statistical tests which might yield inflated rates of Type I errors given the sheer number of comparisons. The correlations between Stress Immunity and the other PPI scales demonstrated differences across sample type for five correlations ($r_s = .12 - .26$).

PPI-R. A nested model that specified two subgroups fit the data better than a model that assumed all samples came from a common group, $\Delta\chi^2(28) = 170.59, p < .001$. As with the PPI, the synthesized correlation matrices for the PPI-R are provided in the online supplemental materials. We also compared entries in the different matrices for offender and community samples and highlighted differences above $|.10|$ in the supplemental materials. As noted, correlations involving the Stress Immunity scale had the largest and most consistent patterns of differences across sample type.

Exploratory Factor Analyses

PPI. We first subjected the overall PPI correlation matrix to an exploratory factor analysis (using varimax rotation). The first four eigenvalues calculated by Mplus were 2.58, 1.81, 1.24, and .71, respectively, suggesting that a three-factor solution was appropriate. The

pattern and structure coefficients from these analyses are reported in supplemental materials.

Given that our MASEM subgroup analyses indicated significant differences across community and offender samples (see Table 5), the overall results are less informative than EFA results separated by subgroup. Accordingly, we conducted separate analyses on the community and offender matrices (see Table 6). The first four eigenvalues for the community matrix calculated by Mplus were 2.61, 1.81, 1.19, and .69, whereas the first four values for the offender matrix were 2.67, 1.73, 1.31, and .75. Both sets of results suggested a three-factor model.

The structure for the community subsample generally approximated the solution reported by Benning et al. (2003), with a few relatively minor exceptions. A Fearless Dominance factor (B) clearly emerged that also had a modest cross-loading (.36) for the Impulsive Nonconformity content scale. A Self-centered Impulsivity factor (A) emerged consistent with the results of Benning et al., except that the Fearlessness content scale cross-loaded onto this dimension (.44).⁵ Coldheartedness formed its own factor (C), consistent with several earlier investigations among community samples. We computed congruence coefficients between this solution and the coefficients for the Benning et al. (2003) solution reported in Table 1. They were .99, .97, and .98 for factors A, B, and C, respectively. The congruence coefficients with the Neumann et al. (2008) solution were .95, .80, and .74 for factors A, B, C, respectively. Thus, we concluded that the PPI community results showed good congruence with the Benning et al. (2003) PPI results.

The EFA results for the offender samples diverged from the community samples, especially for factor B. Congruence coefficients were .96, .80, and .97 for factors A, B, and C, respectively when considering community and offender samples. The first offender factor (A) was generally consistent with a Self-Centered Impulsivity dimension, except that the

⁵ The Fearlessness scale showed some evidence of cross-loading onto the Self-centered Impulsivity factor in the original Benning et al. (2003) EFA as well (.35).

Fearlessness content scale also loaded preferentially on this dimension (.64). For offender samples, the first factor (A) included Impulsive Nonconformity, Blame Externalization, Machiavellian Egocentricity, and Carefree Nonplanfulness in addition to Fearlessness. In contrast, the community sample had a negative loading for Stress Immunity (-.31). The second factor (B) was somewhat consistent with a Fearless Dominance higher order dimension, in that it was comprised of both the Stress Immunity and Social Potency content scales whereas Fearlessness had a more modest loading (.24). There were also, however, negative loadings for Blame Externalization and Carefree Nonplanfulness on this dimension. The third factor (C) was primarily represented by Coldheartedness, but also included a modest loading for Carefree Nonplanfulness (.35), which notably cross-loaded across all three factors (though negatively so for factor B). The congruence coefficients for the offender samples with the Neumann et al. (2008) solution were .99, .99, and .88 for factors A, B, C, respectively. The congruence coefficients for the offender samples with the Benning et al. (2003) solution were .95, .92, and .96 for factors A, B, C, respectively.

Next, we repeated these analyses using promax rather than varimax rotations (see Table 7). As can be seen, a similar pattern of loadings emerged for these solutions when compared to the varimax results for both community and offender samples. Congruence coefficients were 1.0, .99, and 1.0 for factors A, B, and C, respectively for community samples. Congruence coefficients were .99, 1.0, and 1.0 for factors A, B, and C, respectively for offender samples. The inter-correlations among the three factors identified in the community subsample were small (all r s < .13). For the offender subsample, there was a relatively modest negative association between factors A and B ($r = -.17$) compared to a small positive correlation in the community sample ($r = .10$). There was a positive association between factors B and C in the community

sample (.12) whereas this coefficient was negative and trivial ($r = -.05$) for the offender samples.

PPI-R. Similar to the PPI, we first conducted EFAs for the overall sample and report results in the online supplemental tables. Eigenvalues for the overall sample were 2.61, 1.65, 1.17, and .76. Given the MASEM results, we conducted separate EFAs with varimax rotation on the PPI-R community and offender matrices. The first four eigenvalues for the community matrix were 2.62, 1.63, 1.16, and .77. The first four for the offender matrix was 2.73, 1.72, 1.32, and .66. The results from these analyses are reported in Table 8. The structure for the community samples seemed consistent with Benning et al. (2003). However, given differences between the PPI and PPI-R, we did not compute congruence coefficients. A Fearless Dominance factor (B) emerged that also contained a cross-loading (.42) for the Impulsive Nonconformity content scale. A Self-centered Impulsivity factor (A) emerged, with the Fearlessness content scale modestly cross-loading onto this dimension (.37). Coldheartedness again formed its own factor (C).

As with the PPI, the results (see Table 8) for the PPI-R offender matrix approximated solutions reported by Lilienfeld and Widows (2005) and Neumann et al. (2008). The first factor (A) was consistent with a Self-Centered Impulsivity dimension (i.e., loadings of Impulsive Nonconformity, Blame Externalization, Machiavellian Egocentricity, Carefree Nonplanfulness), except that again the Fearlessness content scale loaded preferentially on this dimension (.59) and not on either of the other two factors. The second factor (B) again was somewhat consistent with a Fearless Dominance dimension, in that it was comprised of both Stress Immunity and Social Influence⁶ but Fearlessness had a more modest loading (.27). Negative loadings were again noted for Blame Externalization and Carefree Nonplanfulness on this dimension. The third factor (C) was again primarily represented by Coldheartedness, but included a modest loading for Carefree

⁶ In the PPI-R, the Social Potency content scale was renamed Social Influence.

Nonplanfulness (.47). The Carefree Nonplanfulness content scale has cross-loadings across all three factors (negatively so for factor B) as was the case for the analyses for the PPI.

Congruence coefficients between the community and offender samples were .95, .77, and .96 for the three respective factors.

Finally, we repeated analyses using a promax rotation (Table 9). A similar pattern of results emerged in relation to the varimax rotations (congruence coefficients for the community samples were .99, 1.0, and 1.0 for factors A, B, and C, respectively; congruence coefficients for the offender samples were .99, 1.0, and .99 for Factors A, B, and C, respectively). The correlations among the three factors for the community sample ranged from trivial to relatively modest and positive (r s from .02 to .17). For the offender sample, there was a modest negative association ($r = -.15$) between factors A and B, similar to what was reported for the PPI among offender samples in Table 7.

Discussion

Psychopathy is one of the most widely researched personality disorders, and there continues to be controversies concerning how best to conceptualize its core features. Although the PPI/PPI-R is only one way of assessing various personality traits thought to be important to this disorder, it is an informative instrument to consider given the diversity of core traits represented in its eight content scales. Moreover, the higher-order dimensions associated with the PPI/PPI-R seem to have been influential in the development of the DSM-5 Section III personality disorder model (American Psychiatric Association, 2013), given the inclusion of a psychopathy specifier for APD that consists of traits very much aligned with the Fearless Dominance dimension—even specifically referring to these as “social potency” and “stress immunity” (p. 765). Additionally, the components of this psychopathy specifier, when

operationalized using the Personality Inventory for *DSM-5* (PID-5), appear to converge with Fearless Dominance (Lilienfeld et al., 2016). Thus, although our study focused only on the higher-order structure of one instrument (and its revision), it is a model that potentially bears implications for the much broader conceptualization of “psychopathy” as it will likely be operationalized in future research and in future versions of the *DSM*. Our study also has significant implications for the Triarchic Model (Patrick et al., 2009) given the overlap between Boldness and Fearless Dominance.

One of the most noteworthy results is that the higher-order structure of both the PPI and PPI-R differed in meaningful ways across community and offender samples. In the community samples, a structure relatively consistent with the widely researched Benning et al. (2003) model emerged for both inventories with expected loadings for Fearless Dominance among the Social Potency, Stress Immunity, and Fearlessness content scales. That said, the Fearlessness content scale cross-loaded on a factor that otherwise strongly mirrored the Self-Centered Impulsivity dimension initially identified by Benning et al. The content of the Fearlessness scale includes aspects of thrill-seeking and item-level analyses (Benning et al., 2005; Edens & McDermott, 2010) have suggested that this diversity of content may help to explain this cross-loading with both higher-order dimensions. In terms of the lone remaining content scale, Coldheartedness emerged as an isolated dimension, which is generally consistent with the results of numerous community studies in the literature based on these instruments.

Within the PPI and PPI-R offender samples, however, the Fearlessness content scale failed to strongly load on the Fearless Dominance higher order dimension, which consisted only of Stress Immunity and Social Potency—as well as negative loadings for Blame Externalization and Carefree Nonplanfulness. Fearlessness was more strongly associated with the Self-Centered

Impulsivity factor. This result is not entirely consistent with what might be predicted from a Triarchic model perspective (Patrick et al., 2009); however, this finding is theoretically interesting and somewhat consistent with the DSM-5 Section III trait model for APD. This observed structure largely reflects the sorts of traits that make up Self-Centered Impulsivity, which some might consider more “central to psychopathy” (Miller & Lynam, 2012, p. 316), but it may also represent a dimension more reflective of the externalizing spectrum more generically rather than psychopathy per se (Lilienfeld et al., 2012).

To better understand the source of the discrepancies in factor solutions, we examined differences between offender and community samples in how the content scales were correlated with each other. The Stress Immunity scale showed the most consistent and substantial differences across sample type for both the PPI and PPI-R. In general, this scale was more negatively correlated with scales assessing externalizing related content in offender samples than community samples. For example, the PPI Stress Immunity scale is moderately negatively correlated with Carefree Nonplanfulness in the offender samples matrix ($r = -.38$) but is less strongly correlated in the community samples matrix ($r = -.14$; complete tables are in the supplemental materials). Smith et al. (2011) also found that Stress Immunity was negatively correlated with narcissistic and callous unemotional attributes in juvenile delinquents, suggesting that attribute may be a protective factor against psychopathology and externalizing problems in offenders. It is an open question as to whether sample type moderates associations between this scale and criterion-related variables. In addition, future research should test whether the Stress Immunity scale exhibits measurement equivalence across the two sample types in item-based analyses. For example, prior work has used item response theory methods to test for Differential Item Functioning across sample type (forensic psychiatric vs. criminal offender: Bolt, Hare,

Vitale, & Newman, 2004). Unfortunately, item-based analyses were beyond the scope of this report given that we did not have access to item-level data from all of the constituent studies.

The finding of a third factor among offenders on the PPI and PPI-R—mostly represented by Coldheartedness but also involving Carefree Nonplanfulness—is generally consistent with other factor-analytic work *not* included in this meta-analysis. Using the short-form of the PPI, Smith et al. (2011) reported a similar effect among adolescent samples, with Coldheartedness and Carefree Nonplanfulness forming a distinct factor among delinquent but not community groups. Smith et al. speculated that this factor, which one might refer to as “Coldhearted Nonplanfulness,” reflects a pronounced “live in the moment” mind-set more characteristic of individuals who have been incarcerated. Smith et al. also suggested that greater covariation may occur between these personality traits among offenders because of situational factors related to incarceration.

The current results have implications both for clinical and research settings. Much of the published research conducted on the PPI and PPI-R research thus far has investigated the original higher-order model identified by Benning and colleagues (2003). The size of our aggregated PPI and PPI-R samples and the consistency of our findings across rotation methods make it difficult to argue that the original Benning et al. model is the most appropriate one for offender samples. It might be most appropriate to compute higher order composite scale scores differently depending on the sample type or to compute scores using both approaches to evaluate differences in the correlates of each dimension. Future work investigating the nomological network of competing model-based composite scores will provide further direction on whether it is appropriate and meaningful to calculate composite scores based on the sample type. If no interpretive differences emerge then retaining the original Benning and colleagues factor

structure may be most appropriate.

More broadly, we think it is valuable to test whether sample type moderates associations between scales that derive from distinct factor structures and external correlates. This issue is relevant given that meta-analytic work thus far has identified some heterogeneity in findings when sample type is considered (Miller & Lynam, 2012). That said, Smith et al. (2011) reported relatively few differences between Self-Centered Impulsivity and Self-Centered Impulsivity plus the Fearlessness content scale in terms of external correlates, suggesting the inclusion of this content scale onto this dimension may not make a substantive difference in relation to its nomological net. Removing the Fearlessness content scale from Fearless Dominance, however, resulted in substantive differences in relations with criterion measures. Similarly, the combination of Coldheartedness and Carefree Nonplanfulness produced a quite distinct pattern of external correlates relative to either content scale in isolation.

Future work is needed to understand *why* the structure of psychopathic personality may differ across sample types. Indeed, these results raise a more general question concerning the nature of the differing factor structures across these samples—are they in fact ‘genuine’ differences in the structure of psychopathic *personality* traits, or do these differences in covariation patterns reflect some more situationally-driven response pattern resulting from the effects of having been involved in the criminal justice system? For example, certain expressions of fearlessness (e.g., boredom proneness) may lead to antisocial behaviors and traits considered essential to Self-Centered Impulsivity. Alternatively, perhaps interactions with the legal system, including incarceration, may lead to a decreased sensitivity to threatening stimuli (or perhaps an increased tendency to deny self-reported fearfulness in threatening contexts such as incarceration in order to appear ‘tough’). A greater understanding of the etiology of these potential differences

has substantial implications for not only practical concerns (intervention, assessment) but also for the field's conceptualization of a disorder historically marked by substantial debate. We hope that the results of this work motivate further research concerning the nature of psychopathic personality and encourages other researchers to consider population as a potential moderator of findings.

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Table 1

Content Scale Descriptions for the PPI

Content Scale	Descriptions
Impulsive Nonconformity	A reckless indifference to social hierarchy and customs
Blame Externalization	A propensity to rationalize one's behaviors while placing blame on others
Machiavellian Egocentricity	An exploitative, callous interpersonal style
Carefree Nonplanfulness	A lack of concern regarding planned behavior
Stress Immunity	Lack of anxiety response to normative anxiety-provoking stimuli
Social Potency/Social Influence	A socially dominant interpersonal style
Fearlessness	An eagerness for dangerous behaviors with a marked absence of anxiety or fear
Coldheartedness	Shallow affect, lack of sentimentality

Note. PPI = Psychopathic Personality Inventory.

Table 2

Benning et al. (2003) and Neumann et al. (2008) Three-factor Solutions for the PPI

<i>Content scale</i>	Benning et al. (2003)			Neumann et al. (2008)		
	A	B	C	A	B	C
Impulsive Nonconformity	.66	.23	-.12	.75	-.02	.15
Blame Externalization	.58	-.22	-.15	.57	-.28	-.20
Machiavellian Egocentricity	.71	.04	.09	.77	-.06	.13
Carefree Nonplanfulness	.41	-.19	.20	.26	-.40	.73
Stress Immunity	-.30	.84	.26	-.27	.85	.09
Social Potency	-.03	.60	-.11	.29	.57	-.10
Fearlessness	.35	.48	.04	.60	.16	.03
Coldheartedness	.00	.05	.89	-.02	.14	.65

Note: Values > |.30| in boldface. Benning et al. (2003) and Neumann et al. (2008) used principal axis factor analysis with varimax rotation. Congruence coefficients for factors A, B, and C are .95, .92, and .78. PPI = Psychopathic Personality Inventory.

Table 3

Samples used in PPI Analyses

<i>Study</i>	<i>Citation(s)</i>	<i>Sample N</i>	<i>Sample Type</i> (0 = <i>Community</i> , 1 = <i>Offender</i>)	<i>Percentage</i> <i>Men</i>	<i>Percentage</i> <i>African</i> <i>American/Black</i>	<i>Published?</i>
1	Benning et al 2003	353	0	100.0%	-	Yes
2	Benning et al. 2005	325	0	44.0%	19.6%	Yes
3	Berardino et al. 2005	105	1	0.0%	33.3%	Yes
4	Bjork et al. 2012	31	0	58.0%	-	Yes
5	Carlson et al. (2009)	104	0	37.5%	-	Yes
6	Curry et al (2011)	90	0	100.0%	-	Yes
7	Derefinko & Lynam (2006)	338	0	37.1%	-	Yes
8	Derefinko & Lynam (unpublished)	193	0	100.0%	-	No
9	Drislane et al. (2014)	600	0	43.8%	8.9%	Yes
10	Edens et al. (1998)	916	0	36.6%	3.4%	No
11	Edens et al. (2000)	194	0	34.0%	19.6%	Yes
12	Edens et al. (2001)	252	0	29.4%	17.9%	Yes
13	Fulton et al. (2010)	509	0	23.4%	37.0%	Yes
14	Fulton et al. (2014)	77	0	0.0%	-	Yes
15	Fulton (unpublished)	615	0	13.0%	-	No
16	Gonsalves et al. (2013)	142	1	100.0%	17.5%	Yes
17	Huss et al. (2009)	208	0	31.3%	3.4%	No
18	Long et al. (2014)	81	0	84.0%	85.2%	Yes
19	Mahaffey & Marcus (2006)	66	1	100.0%	4.0%	Yes
20	Marcus & Hammack (unpublished)	161	0	14.9%	-	No
21	Marcus & Norris (2014)	170	0	100.0%	6.5%	Yes
22	Neumann et al. (2008)	1224	1	100.0%	43.0%	Yes
23	Patrick et al. (2006)	306	1	-	-	Yes
24	Phillips et al. (2014)	205	1	0.0%	19.0%	Yes
25	Poythress et al. (2010)	1502	1	83.2%	33.3%	Yes
26	Ray et al. (2009)	91	1	70.3%	-	No
27	Ross et al. (2009) (community)	134	0	28.4%	11.2%	Yes
28	Ross et al. (2009) (prisoners)	159	1	55.3%	21.4%	Yes
29	Sadeh & Verona (2008)	155	0	100.0%	-	Yes
30	Salnaite et al. (2011) Sellbom et al. (2005);	444	0	-	-	Yes
31	Sellbom & Verona (2007); Sellbom et al. (2012)	711	0	55.8%	-	Yes
32	Sellbom et al. (2012) (correctional)	697	1	100%	-	Yes

Note. All samples were included in the construction of the overall matrix. PPI = Psychopathic Personality Inventory.

Table 4

Samples used in PPI-R Analyses

<i>Study</i>	<i>Citation(s)</i>	<i>Sample N</i>	<i>Sample Type (0 = Community, 1 = Offender)</i>	<i>Percentage Men</i>	<i>Percentage African American/Black</i>	<i>Published?</i>
1	Anestis et al. (2011)	332	0	-	-	Yes
2	Campbell et al. (2009)	215	0	25.5%	-	Yes
3	Coffey et al. (2015)	361	0	46.70%	-	No
4	Kopkin et al. (2015)	100	0	47.00%	0.00%	Yes
5	Denson et al. (2009)	200	1	85.50%	20.50%	Yes
6	Edens & McDermott (2010)	201	0	53.2%	11.5%	Yes
7	Geniole et al. (2013)	189	0	-	-	Yes
8	Geniole et al. (2014)	18	0	-	10.00%	No
9	Gheytanchi (2008)	38	1	100.00%	-	Yes
10	Gonsalves et al. (2013)	48	1	100.00%	0.00%	Yes
11	Hughes et al. (2013)	134	0	28.40%	-	Yes
12	LaMarre & Carlson (2009)	104	0	43.80%	3.80%	Yes
13	Lander et al. (2012)	1169	0	27.10%	33.60%	Yes
14	Latzman et al. (2014)	64	0	47.00%	-	Yes
15	Miller et al. (2011)	786	0	54.00%	6.00%	Yes
16	Miller et al. (2012)	419	0	21.00%	4.10%	No
17	Nespoli (2012)	985	0	100.00%	72.70%	Yes
18	Lilienfeld & Widows (2005) (Community)	212	0	50.00%	9.90%	Yes
19	Ragsdale & Bedwell (2013)	54	0	50.00%	5.60%	Yes
20	Ragsdale et al. (2013)	257	0	48.0%	14.00%	Yes
21	Ray & Jones (2011)	131	0	38.90%	10.80%	Yes
22	Ray & Jones (2012)	85	1	75.30%	-	Yes
23	Ray et al. (2009)	380	0	25.50%	-	Yes
24	Ruchensky et al. (2016)	52	1	100.00%	-	Yes
25	Rufino & Boccaccini (2013)	134	0	56.70%	9.00%	Yes
26	Seibert et al. (2011)	188	0	100.00%	13.00%	Yes
27	Vidal et al. (2010)	304	0	22.70%	-	Yes
28	Witt et al. (2009a)	299	0	30.40%	-	Yes
	Witt et al. (2009b)	85	1	100.00%	32.90%	Yes
	Young-Lundquist et al. (2012)					

Note. Gheytanchi (2008) was omitted from the overall correlation matrix because its correlation matrix was non-positive definite. PPI-R = Psychopathic Personality Inventory – Revised.

Table 5

Nested Model Fit Statistics

	Model	<i>df</i>	-2LL	Δ -2LL	<i>p</i>
1	PPI – Fixed (All)	868	2,426.48	-	-
2	PPI – Fixed (Subgroup)	840	1750.99	675.49	< .001
	Forensic	252	469.46	-	-
	Community	588	1,281.53	-	-
1	PPIR – Fixed (All)	756	2,485.19	-	-
2	PPIR – Fixed (Subgroup)	728	2,314.60	170.59	< .001
	Forensic	140	222.50	-	-
	Community	588	2,092.11	-	-

Note. Values from a fixed effects meta-analysis of $k = 32$ studies of the PPI and $k = 28$ studies of the PPI-R using multiple group analysis in Mplus (Cheung, 2015b). PPI = Psychopathic Personality Inventory. PPI-R = Psychopathic Personality Inventory – Revised. *df* = Degrees of Freedom. -2LL = -2 Log Likelihood.

Table 6

Exploratory Factor Analyses of PPI Community and Offender Samples with Varimax Rotation

	Community ($k = 22, n = 6,661$)			Offender ($k = 10, n = 4,497$)		
<u>Content scale</u>	A	B	C	A	B	C
Impulsive Nonconformity	.65	.36	-.06	.77	-.02	.03
Blame Externalization	.67	-.13	-.12	.49	-.36	-.17
Machiavellian Egocentricity	.73	.12	.11	.74	-.17	.19
Carefree Nonplanfulness	.51	-.04	.16	.38	-.41	.35
Stress Immunity	-.31	.74	.22	-.23	.84	.14
Social Potency	.06	.59	-.02	.26	.57	-.02
Fearlessness	.44	.61	-.03	.64	.24	-.04
Coldheartedness	.12	.08	1.24	.00	.11	.96

Note: Factor loadings $\geq .30$ are in boldface. Congruence coefficients for factors A, B, and C are .96, .80, and .97.

PPI = Psychopathic Personality Inventory.

Table 7

Exploratory Factor Analyses of PPI Community and Offender Samples with Promax Rotation

	Community ($k = 22, n = 6,661$)			Offender ($k = 10, n = 4,497$)		
<u>Content scale</u>	A	B	C	A	B	C
Impulsive Nonconformity	.66	.28	-.07	.77	.01	-.02
Blame Externalization	.68	-.21	-.09	.44	-.35	-.20
Machiavellian Egocentricity	.73	.03	.13	.73	-.14	.15
Carefree Nonplanfulness	.50	-.11	.18	.34	-.39	.33
Stress Immunity	-.30	.78	.14	-.12	.85	.15
Social Potency	.08	.59	-.07	.33	.58	-.04
Fearlessness	.46	.56	-.07	.68	.26	-.08
Coldheartedness	.05	.04	1.24	.02	.15	.96

Note: Pattern coefficients are reported. Factor loadings $\geq .30$ are in boldface. Community factor correlations for three-factor solution: A with B = .10, B with C = .12, A with C = .04. Offender factor correlations for three-factor solution: A with B = -.17, B with C = -.05, A with C = .06. Congruence coefficients for factors A, B, and C are .94, .89, and .97. PPI = Psychopathic Personality Inventory.

Table 8

Exploratory Factor Analyses of PPI-R Community and Forensic Samples with Varimax Rotation

	Community ($k = 22, n = 7,018$)			Offender ($k = 6, n = 508$)		
<u>Content scale</u>	A	B	C	A	B	C
Impulsive Nonconformity	.67	.42	-.06	.81	-.03	.02
Blame Externalization	.64	-.12	-.04	.56	-.34	-.08
Machiavellian Egocentricity	.67	.12	.17	.79	-.07	.21
Carefree Nonplanfulness	.51	-.02	.28	.33	-.35	.47
Stress Immunity	-.24	.60	.28	-.26	.84	.10
Social Influence	.02	.50	.00	.21	.57	-.04
Fearlessness	.37	.65	-.00	.59	.27	.04
Coldheartedness	.21	.12	1.01	-.02	.15	.90

Note: Factor loadings $\geq .30$ are in boldface. Congruence coefficients for factors A, B, and C are .95, .77, and .96.
PPI-R = Psychopathic Personality Inventory – Revised.

Table 9

Exploratory Factor Analyses of PPI-R Community and Offender Samples with Promax Rotation

	Community ($k = 22, n = 7,018$)			Offender ($k = 6, n = 508$)		
<u>Content scale</u>	A	B	C	A	B	C
Impulsive Nonconformity	.69	.40	-.12	.82	-.02	-.06
Blame Externalization	.64	-.15	-.04	.52	-.34	-.14
Machiavellian Egocentricity	.66	.09	.14	.78	-.05	.13
Carefree Nonplanfulness	.48	-.06	.25	.27	-.34	.44
Stress Immunity	-.26	.59	.22	-.15	.85	.14
Social Influence	.04	.50	-.05	.28	.57	-.05
Fearlessness	.40	.64	-.07	.63	.28	-.01
Coldheartedness	.07	.03	1.08	-.02	.17	.90

Note: Pattern coefficients are reported. Factor loadings $\geq .30$ are in boldface. Community factor correlations for three-factor solution: A with B = .02, B with C = .16, A with C = .17. Offender factor correlations for three-factor solution: A with B = -.15, B with C = -.05, A with C = .13. Congruence coefficients for factors A, B, and C are .95, .79, and .97. PPI-R = Psychopathic Personality Inventory – Revised.