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Examining personality trait patterns in transdiagnostic dimensions of psychopathology

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Abstract
Research has indicated that a dimensional conceptualisation of psychopathology may be more accurate than the current categorical approach. Two symptom dimensions, Internalising and Externalising, have emerged, and have been linked to major trait domains of personality (the Big Five). However, previous studies have tended to focus on broader personality domains, neglecting to examine associations between sub-domains (facets). The current study addressed this gap by examining associations between facets of the Big Five and Internalising and Externalising. A sample of 290 adults (M_{age} = 37.0, SD = 14.0; 74% female) responded to a survey which included the IPIP-NEO and ASEBA Adult Self Report. Hierarchical multiple regressions identified personality facets that may represent vulnerability factors for Internalising and Externalising. For Internalising, multiple facet-level associations were found within Neuroticism, Extraversion, and Conscientiousness, and in the latter two cases both positive and negative associations were identified. For Externalising, most facet-level associations were found within Neuroticism and Extraversion (and to a lesser extent, Conscientiousness and Agreeableness), and were in the expected direction. In both cases, the inclusion of facets provided novel and useful information about the relationship between personality and psychopathology, which may be used to improve current methods for assessing and treating mental dysfunction.

Keywords Personality · Transdiagnostic · Dimensional psychopathology · Internalising · Externalising

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The idea that psychopathology should be described in terms of discrete categories of psychological dysfunction has been challenged in recent decades. Critics have pointed to high rates of comorbidity, as well as substantial variation in symptomatology within diagnostic categories, as evidence that these categories do not adequately represent distinct psychological processes (Clark et al., 1995; Krueger & Markon, 2006). Critics have also argued that the categorical approach can cause sub-threshold presentations to go untreated, as diagnostic criteria typically emphasise the number of symptoms rather than overall symptom severity (Krueger & Eaton, 2015). This criticism of categorical taxonomies has led to increased interest in alternative methods of classifying psychopathology, many of which have favoured a more dimensional approach that emphasises types and severity of symptoms over categories of dysfunction (e.g., Insel et al., 2010; Kotov et al., 2017). Researchers in this area have also noted strong overlap between these dimensional models and personality models such as the Five Factor Model (FFM), which suggests that a few key shared factors may underlie both. Additional research into these factors would enhance our understanding of mental disorders, which could in turn lead to improvements in the diagnosis and treatment of psychopathology (DeYoung & Krueger, 2018; Kotov et al., 2017).

Given that an estimated 792 million people worldwide are afflicted by mental illness (Dattani et al., 2018), and mental illness is the cause of approximately 14.3% of total deaths each year (Walker et al., 2015), it is important that mental health treatment is effective. Accurate conceptualisation and diagnosis is a vital part of this, and if current diagnostic models are incorrect, treatment methods based on these models are likely to also be insufficient.

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As such, to further improve upon dimensional approaches, the current study focuses on a novel aspect of these models: examining how the Big Five personality traits at the facet-level are related to major symptom dimensions of psychopathology.

Modelling psychopathology: the dimensional approach

Research investigating the latent factor structure of psychopathology (e.g., Griffith et al., 2010; Kim & Eaton, 2015; Krueger, 1999) has provided strong empirical support for dimensional conceptualisations of mental illness. While no single model has yet been agreed upon, two key 'transdiagnostic' dimensions encompassing symptoms of multiple categories of mental disorder have been identified that represent distinct expressions of emotional dysfunction: Internalising, which reflects a tendency to exert excessive control and inward focus over psychological distress, and Externalising, which reflects a pattern of low emotional regulation and maladaptive externalised behaviour. These two dimensions are strongly correlated at approximately $r = 0.50$, representing a shared general risk factor for psychological dysfunction (Krueger, 1999; Krueger & Markon, 2006; Vollebergh et al., 2001). However, they are distinguished by distinct associations with a variety of mental disorders. The typical pattern shows depressive and anxiety disorders to load more strongly on Internalising, and substance use and impulse control disorders to load more strongly on Externalising (e.g., Kim & Eaton, 2015). The dimensional approach has been further supported by heritability studies, where genetic transmission of potential psychological dysfunction seems to be primarily in the form of a general vulnerability (for either Internalising or Externalising symptoms) rather than in the form of specific disorder categories (Hicks et al., 2013; Starr et al., 2014).

Research on dimensional approaches has culminated in the development of the Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al., 2017), a multi-tiered, transdiagnostic model of psychopathology. This model places Internalising and Externalising alongside three other dimensions of dysfunction, and accounts for both shared and unique variance in these dimensions. Advocates of the HiTOP suggest that categorical diagnostic systems would be improved by integrating dimensional models, arguing that a more widespread understanding of the dimensional nature of psychological symptoms could improve research outcomes, and could also improve the assessment and treatment of mental illness (Conway et al., 2019; Kotov et al., 2017).

Dimensional psychopathology and the five factor model

The domains of the 'Big Five' or FFM – Neuroticism, Extraversion, Conscientiousness, Agreeableness, and Openness to Experience – have been linked to many common mental disorders. Most prominently, they are the basis for the alternative model of personality disorder described in section III of the DSM-5, wherein personality disorders are conceptualised as dysfunctional variants of the Big Five domains (with the exception of Openness, although this continues to be disputed; APA, 2013; Widiger & Mullins-Sweatt, 2009; Chmielewski et al., 2014). Research has also shown that patterns of extreme scores in these domains predict a variety of other mental disorders. For example, most depressive and anxiety disorders are associated with high Neuroticism, low Conscientiousness, and low Extraversion, and many substance-use and impulse control disorders have been linked to moderately higher Neuroticism, low Conscientiousness, and low Agreeableness (Bienvenu et al., 2004; Kotov et al., 2010; Malouff et al., 2005; Ruiz et al., 2008). There is also evidence to suggest that shared genetic markers may contribute to these associations (An et al., 2019).

The trait patterns found in these studies effectively distinguish between two sets of disorders that reflect the major transdiagnostic dimensions of Internalising and Externalising symptoms. Several recent studies support this view. In a longitudinal study, Mezquita et al. (2015) found that Neuroticism predicted higher Internalising scores in a sample of young adults ($\beta = 0.58$) five years later. Conversely, lower Conscientiousness ($\beta = -0.27$) and higher Extraversion ($\beta = 0.16$), as well as lower Agreeableness ($\beta = -0.25$) predicted higher Externalising scores. Additional support has come from cross-sectional undergraduate data, where Agreeableness and Conscientiousness were negatively associated with five Externalising behaviours (between $r = -0.21$ and -0.41, and -0.16 and -0.39, respectively), and Neuroticism and Extraversion were associated with two Internalising symptom types ($r = 0.48$ and -0.29 for depression, 0.58 and -0.14 for anxiety; Sleep et al., 2018). Recent neuroimaging data has also supported these links, with shared neuroanatomical profiles found for high Neuroticism and low Extraversion with Internalising, and low Conscientiousness and Agreeableness with Externalising (Hyatt et al., 2019).

The many links found between the DSM-5 alternative model of personality disorder, the FFM, and Internalising and Externalising (and the broader HiTOP model) indicate that these three models share a joint factor structure characterised by substantial overlap (Kotov et al., 2017; Wright & Simms, 2015). This seems to suggest that, contrary to

the assumption that psychopathology and personality are different constructs, the respective dimensional models of psychopathology and personality may be measuring the same few psychological constructs at different levels (Samuel et al., 2010). That is, a level that is more transient and changeable (emotion and behaviour), and another than is more persistent and inflexible (personality). This has important theoretical implications. All else being equal, it suggests that normative personality traits form the primary (perhaps biological; DeYoung & Krueger, 2018) basis for how a person will respond to and express psychological distress – whether in the form of emotional/behavioural dysfunction, or personality dysfunction. It is the aim of this study to further elucidate the relationship between personality and psychopathology, with the hope that these models can be theoretically and empirically integrated.

Personality facets and dimensions of psychopathology

Most research linking transdiagnostic psychopathology and personality has focused on the five primary domains of the FFM. Fewer studies have focused on personality sub-domains such as the ten 'aspects' of the Big Five Aspect Scale (DeYoung et al., 2007) or the thirty 'facets' of the revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) (see Online Resource for descriptions).

There is evidence to suggest that sub-domains may have explanatory power beyond that offered by domain-level associations. The relationship between Openness and schizotypy – a dimensional trait associated with Schizotypal Personality Disorder and, in the extreme, psychosis (Ettinger et al., 2014) – provides a useful example. Where evidence directly linking Openness to schizotypy would suggest little to no relationship between the two, closer examination of the Openness domain's aspects reveals a more nuanced picture. The two aspects of Openness to Experience – 'Openness' and 'Intellect' – appear to be differentially associated with *positive schizotypy* (positive symptoms of schizotypal and psychotic disorders), whereby positive schizotypy is positively associated with 'Openness' but negatively associated with 'Intellect' (Chmielewski et al., 2014; DeYoung et al., 2012; Widiger & Crego, 2019). In other words, the relationship between Openness and schizotypy can *only* be understood through examination of sub-domains; looking only at higher order domain-level associations obscures this relationship.

Personality sub-domain differences have been also observed for other mental disorders, even in the absence of broader domain-level associations (Bienvenu et al., 2004). For example, based on a community sample of NEO-PI-R facet scores, Bienvenu et al. found that MDD was associated with significantly higher 'Openness to Feelings' (an Openness facet), and that Social Anxiety Disorder (SAD) was associated with significantly lower 'Trust' (an Agreeableness facet), despite non-significant domain-level associations for both pairs. In some cases, the opposite was found – in this same study (which focused on disorders typically associated with the Internalising dimension), many disorders were associated with all facets of Neuroticism except for 'Impulsiveness' (which, as a form of disinhibition, seems more closely related to Externalising symptoms; Bienvenu et al., 2004). Again, this indicates that there is clear predictive value in examining sub-domain patterns.

Rather than focusing on strict disorder categories, the previously discussed evidence supporting dimensional models of psychopathology suggests that it would be preferable to identify associations between personality sub-domains and transdiagnostic symptom dimensions such as Internalising and Externalising. This would support the ongoing construction of empirically derived models by identifying unique sub-domain patterns related to Internalising and Externalising symptoms. To date, only one study has investigated facet-level differences between measures approximating these dimensions. Walton et al. (2017) showed that a broad substance use dimension was uniquely associated with the Extraversion 'Excitement-Seeking' facet and the Conscientiousness 'Self-Discipline' facet, whereas two Internalising dimensions ('distress' and fear') were associated with a unique pattern of facets across all domains. While informative, this study was limited insofar as the researchers were unable to construct an Externalising dimension due to sampling limitations, and their Internalising scales were not validated measures of Internalising symptoms. This is a common problem – most studies in this area have utilised arguably inadequate measures of Internalising and Externalising by combining separate scales to form single variables. For example, Walton et al. (2017) created a single 'Internalising' factor from measures of anxiety and depression. Fortunately, recent reviews have highlighted several alternative scales that are better suited to this purpose (Achenbach et al., 2016; Kotov et al., 2017), such as the Achenbach System of Empirically Based Assessment [ASEBA] suite's Adult Self Report [ASR] (Achenbach & Rescorla, 2003).

The current study

The primary aim of this study will be to explore how personality facets for each Big Five domain differentially predict scores on common dimensions of psychopathology. It will address a gap in the current literature by explicitly examining associations between Internalising and Externalising (using the ASEBA ASR; Achenbach & Rescorla, 2003) and personality traits at the facet-level, rather than

only at the domain-level. While this is an explorative study, we predict that personality facet scores will offer greater predictive precision, clarity, and utility than that provided by personality domains as predictors. For example, while both Internalising and Externalising symptoms have been associated with the Neuroticism domain (Kotov et al., 2010; Mezquita et al., 2015), certain Neuroticism facets may be uniquely associated with either Internalising or Externalising dimensions, whereas other facets may be associated with both or neither dimension. If found, these results could have important implications for future research and clinical work – for example, assessment of scores on certain facets could improve the assessment and diagnosis of mental illness, or could inform the development of personality-targeted treatment approaches.

Method

Participants

Participants were recruited through social media, from the university's first-year psychology pool, and from Qualtrics (2019) participant panels (Qualtrics participants represented about 26% of the final sample). Participants were required to be aged eighteen or above, proficient in English, and capable of accessing Qualtrics survey software via a stable internet connection.

Three hundred and twelve adult participants responded to the survey. Eight responses were removed due to non-completion, and 14 responses were removed due to irregular responding (e.g., straight-line responses). Ambiguous cases were retained. After removal of invalid cases, 290 participants (mean age = 37.0 years, $SD = 14.0$), including 74 males (26%), 215 females (74%), and one participant reporting non-binary gender (< 1%), were included in this study.

Measures

We used the International Personality Item Pool representation of the NEO-PI-R (IPIP-NEO; Goldberg, 1999) to measure FFM personality traits. The IPIP-NEO is a 300-item measure of the FFM domains and facets, developed as a public domain alternative to the NEO-PI-R (Costa & McCrae, 1992). Respondents are asked to rate their agreement with a series of statements (e.g., "I have a vivid imagination", "I am relaxed most of the time") on a 5-point Likert scale from 1 ("strongly disagree") to 5 ("strongly agree"). The IPIP-NEO is considered a reliable measure, with Cronbach's alpha (α) between 0.84-0.89 for the domain scales, and 0.60-0.89 (mean α = 0.73) for the facet scales (Goldberg, 1999). For the current study, internal consistency was between α = 0.91-0.96 for the domain scales and 0.72-0.92 for the facet scales (see Online Resource for individual scale alphas). The IPIP-NEO correlates strongly with the NEO-PI-R, supporting its validity as a measure of the Big Five as conceptualised by Costa and McCrae.

The ASEBA Adult Self Report (ASR; Achenbach & Rescorla, 2003) was used to measure transdiagnostic symptom dimensions. The ASR is a 126-item measure that provides risk estimates for seven DSM-5 diagnostic domains, as well as severity estimates for two higher order (Internalising, Externalising) and eight lower order ('syndrome scales' such as 'anxious/depressed' and 'attention problems') transdiagnostic domains of psychological dysfunction. Items are rated from 0 ("not true") to 2 ("very/often true"), where respondents rate how 'true' each item was for them over the past six months (e.g., "I cry a lot", "I am mean to others"). The ASR includes several additional questions concerning several demographic and life variables (e.g., social and familial functioning), but these were excluded with approval from ASEBA (Ref: 1797–10-01–18). The ASR has demonstrated good psychometric properties, with a retest reliability of 0.89 for Internalising, 0.91 for Externalising, and between 0.78-0.91 for the syndrome scales used in the current study. Internal consistency was α = 0.93 for Internalising, 0.89 for Externalising, and 0.78-0.88 for the relevant syndrome scales (Achenbach & Rescorla, 2003). For the current study, internal consistency was 0.95 for Internalising, and 0.90 for Externalising.

Procedure

This study was approved by the UNE Human Research Ethics Committee (HE18-271). After providing informed consent, participants completed a 30–45 min online survey comprising the above measures and demographic questions. Participants who completed the survey could enter a prize draw to win one of five $50 gift cards, and could also receive a summary of their personality profile based on responses to the IPIP-NEO. First year psychology students received course credits for participation.

Statistical analyses

Ten hierarchical multiple regression analyses were conducted using IBM SPSS 22 to examine associations between the facets of each Big Five domain and either Internalising or Externalising dimensions. For each analysis, the four non-target domains were added in Step 1 alongside Age as covariates, and the six facets for the target domain were added in Step 2. Internalising was included as the outcome variable for analyses 1–5, and Externalising was included as the outcome variable for analyses 6–10. To achieve normality of the regression residuals in the Externalising analyses, a square root transformation was applied to the Externalising

(positively skewed) variable. All other multiple regression assumptions were met.

A high correlation (> 0.80) was noted between facet N3 (Depression) and the Internalising dimension, suggesting insufficient discriminant validity for these scales. This was further confirmed by comparison of shared variance and average variance extracted (AVE) values (as described by Farrell, 2010), with higher shared variance found for both variables. Removal of up to three N3 items did not solve this problem, and the Internalising scale could not be modified due to licensing restrictions. As the primary study aims could only be met by simultaneously evaluating all personality facets, we retained the N3 items. However, an alternative analysis with N3 excluded is provided in the Online Resource.

Due to the large number of hypothesis tests in this study, a Benjamini-Hochberg (BH) procedure was conducted (as described by Glickman et al., 2014) with a false discovery rate of 0.05 on all facet-level tests (60 in total). This procedure allows for the reduction of false positives in significance testing (i.e., rejection of a true null hypothesis); exploratory studies with many hypothesis tests are particularly vulnerable to high false positive rates, and so use of BH procedure ensured that this risk was minimised.

Results

The sample mean (19.6) and standard deviation (14.8) for the Internalising symptom dimension were higher than previous norms for non-clinical respondents ($M = 9.1–11.9$, $SD = 7.6–8.8$; Achenbach & Rescorla, 2003). For the non-transformed Externalising dimension, the mean (9.4) and standard deviation (8.2) were similar to previous norms ($M = 7.1–10.4$, $SD = 5.8–8.3$; Achenbach & Rescorla, 2003). Internalising and Externalising were significantly correlated ($r = 0.65$, $p < 0.001$). Based on a recommended T score threshold of > 60 (Achenbach & Rescorla, 2003), an estimated 56 participants (19.3%) exceeded the threshold for clinically significant Internalising symptoms, and 40 participants (13.8%) exceeded the threshold for Externalising symptoms.

Correlations between Big Five domains and Internalising and Externalising were generally consistent with previous findings (e.g., Kotov et al., 2010; Mezquita et al., 2015; Ruiz et al., 2008; Sleep et al., 2018). Internalising was positively correlated with Neuroticism, and negatively correlated with Extraversion and Conscientiousness. Externalising was positively correlated with Neuroticism, and negatively correlated with Conscientiousness and Agreeableness. We also found two associations that were not present in previous studies: Internalising was negatively correlated with Agreeableness, and Externalising was positively correlated with Openness. Correlations for Internalising and Externalising and the Big Five domains are presented in Table 1.

Results of the multiple regression analysis that examined associations between Neuroticism facets and Internalising are presented in Table 2. In Step 1, the five covariates (Age and the other four domain variables) were significantly associated with Internalising, $F(5, 284) = 63.90$, $p < 0.001$, accounting for 53% of variation in the criterion. In Step 2, addition of Neuroticism facets to the model explained a significant 19% of additional variance in Internalising. Benjamini–Hochberg adjusted significance tests indicated that high levels of Depression (N3) and Vulnerability (N6) were associated with high levels of Internalising. In total, the model explained 72% of the variation in Internalising, $F(11, 278) = 63.86$, $p < 0.001$.

Results of the regression for the Extraversion facets and Internalising are presented in Table 3. Step 1 significantly predicted Internalising, $F(5, 284) = 96.05$, $p < 0.001$, accounting for 63% of the variance. In Step 2, Extraversion facets explained a significant 6% of additional variance. Low levels of Friendliness (E1), Gregariousness (E2), and Activity Level (E4), and high levels of Excitement-Seeking (E5), were significantly associated with high levels of Internalising when controlling for all other variables. In total, the model explained 69% of variation in Internalising, $F(11, 278) = 57.20$, $p < 0.001$.

Results of the regression for Conscientiousness facets and Internalising are presented in Table 4. Step 1 significantly predicted Internalising, $F(5, 284) = 110.20$, $p < 0.001$, accounting for 66% of the variance. In Step 2, Conscientiousness facets explained a significant additional 3% of the variance. Higher Dutifulness (C3), and lower Self-Discipline (C5) and Cautiousness (C6) were significantly associated with higher Internalising when controlling for all other variables. Overall, the model explained 69% of variation in Internalising, $F(11, 278) = 57.61$, $p < 0.001$.

Results of the regression for Agreeableness facets and Internalising are presented in Table 5. Step 1 significantly predicted Internalising, $F(5, 284) = 115.45$, $p < 0.001$,

Table 1 Pearson's (r) correlations for internalising and externalising with the big five domains

Variable	Neuroticism	Extraversion	Conscientiousness	Agreeableness	Openness
Internalising	0.77***	-0.48***	-0.50***	-0.18**	0.02
Externalising	0.58***	-0.00	-0.56***	-0.45***	0.14*

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 2 Neuroticism facets with other big five domains and age as predictors of internalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.30***	0.05	-0.28	-0.27	-0.13***	0.04	-0.12	-0.11
Extraversion	-0.29***	0.03	-0.53	-0.46	-0.10***	0.03	-0.19	-0.12
Conscientiousness	-0.20***	0.03	-0.35	-0.31	-0.02	0.03	-0.03	-0.02
Agreeableness	-0.02	0.03	-0.03	-0.03	-0.01	0.03	-0.01	-0.01
Openness to Experience	0.13***	0.03	0.22	0.19	0.09***	0.02	0.16	0.13
Anxiety (N1)					0.07	0.12	0.04	0.02
Anger (N2)					-0.08	0.09	-0.04	-0.03
Depression (N3)					**0.83*** **	0.10	0.49	0.26
Self-Consciousness (N4)					0.11	0.12	0.05	0.03
Immoderation (N5)					0.13	0.09	0.06	0.05
Vulnerability (N6)					**0.35** **	0.13	0.17	0.09

** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure to all 60 hypothesis tests in this study

Table 3 Extraversion facets with other big five domains and age as predictors of internalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.10*	0.04	-0.10	-0.09	-0.11**	0.04	-0.11	-0.09
Neuroticism	0.29***	0.02	0.70	0.56	0.23***	0.02	0.55	0.36
Conscientiousness	-0.06*	0.03	-0.11	-0.09	-0.05	0.03	-0.09	-0.06
Agreeableness	0.02	0.03	0.03	0.03	0.05	0.03	0.08	0.06
Openness to Experience	0.06*	0.02	0.10	0.09	0.06*	0.03	0.10	0.07
Friendliness (E1)					**-0.30** **	0.11	-0.15	-0.09
Gregariousness (E2)					**-0.29** **	0.10	-0.15	-0.10
Assertiveness (E3)					0.01	0.11	0.01	0.00
Activity Level (E4)					**-0.30***	0.12	-0.10	-0.08
Excitement-seeking (E5)					**0.28** **	0.11	0.13	0.09
Cheerfulness (E6)					-0.11	0.11	-0.04	-0.03

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure to all 60 hypothesis tests in this study

Table 4 Conscientiousness facets with other big five domains and age as predictors of internalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.14***	0.04	-0.14	-0.12	-0.16***	0.04	-0.15	-0.14
Neuroticism	0.25***	0.02	0.62	0.48	0.20***	0.02	0.48	0.27
Extraversion	-0.15***	0.03	-0.26	-0.20	-0.17***	0.03	-0.31	-0.21
Agreeableness	-0.02	0.02	-0.04	-0.03	-0.05	0.03	-0.07	-0.05
Openness to Experience	0.11***	0.02	0.19	0.17	0.10***	0.02	0.17	0.14
Self-efficacy (C1)					-0.08	0.16	-0.03	-0.02
Orderliness (C2)					0.03	0.09	0.01	0.01
Dutifulness (C3)					**0.49** **	0.17	0.16	0.10
Achievement-striving (C4)					0.01	0.12	0.00	0.00
Self-discipline (C5)					**-0.27** **	0.10	-0.13	-0.09
Cautiousness (C6)					**-0.43*** **	0.11	-0.19	-0.14

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

Table 5 Agreeableness facets with other big five domains and age as predictors of internalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.15***	0.04	-0.14	-0.13	-0.15***	0.04	-0.14	-0.12
Neuroticism	0.23***	0.02	0.55	0.38	0.22***	0.02	0.54	0.35
Extraversion	-0.15***	0.03	-0.27	-0.21	-0.13***	0.03	-0.24	-0.14
Conscientiousness	-0.07**	0.02	-0.13	-0.11	-0.08***	0.02	-0.15	-0.11
Openness to Experience	0.11***	0.02	0.19	0.17	0.10***	0.03	0.18	0.13
Trust (A1)					**-0.25***	0.10	-0.11	-0.09
Morality (A2)					0.09	0.14	0.03	0.02
Altruism (A3)					0.10	0.16	0.03	0.02
Cooperation (A4)					0.08	0.13	0.03	0.02
Modesty (A5)					-0.09	0.11	-0.04	-0.03
Sympathy (A6)					-0.02	0.13	-0.01	-0.00

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

accounting for 67% of the variance. In Step 2, Agreeableness facets explained an additional 1% of additional variance, which was not a significant increase over Step 1, $p = 0.27$. Only the Trust (A1) facet showed a significant negative association with Internalising when controlling for all other variables. Overall, the model explained 68% of variation in Internalising, $F(11, 278) = 53.46$, $p < 0.001$.

Results of the regression for the Openness facets and Internalising are presented in Table 6. Step 1 significantly predicted Internalising, $F(5, 284) = 102.39$, $p < 0.001$, accounting for 64% of the variance. In Step 2, Openness facets explained a significant 5% of additional variance. After applying the BH procedure, only higher Imagination (O1) was significantly associated with higher Internalising when controlling for all other variables. In total, the model explained 69% of variation in Internalising, $F(11, 278) = 56.30$, $p < 0.001$.

Results of the multiple regression analysis for Neuroticism facets and Externalising are presented in Table 7. In Step 1, Age and the other four domain variables were significantly associated with Externalising, $F(5, 284) = 47.08$, $p < 0.001$, accounting for 45% of variation in the criterion. In Step 2, addition of the Neuroticism facets explained a significant 18% of additional variance in Externalising. Higher Anger (N1), Depression (N3), and Immoderation (N5) were all associated with higher Externalising after controlling for all other variables and applying BH adjusted significance levels. In total, the model explained 63% of variation in Externalising, $F(11, 278) = 43.62$, $p < 0.001$.

Results of the regression for Extraversion facets and the Externalising dimension are presented in Table 8. Step 1 significantly predicted Externalising, $F(5, 284) = 69.30$, $p < 0.001$, accounting for 55% of the variance. In Step 2, Extraversion facets explained a significant 6% of additional

Table 6 Openness to experience facets with other big five domains and age as predictors of internalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.18***	0.04	-0.17	-0.15	-0.15***	0.04	-0.14	-0.12
Neuroticism	0.23***	0.02	0.57	0.39	0.23***	0.02	0.57	0.34
Extraversion	-0.10***	0.02	-0.19	-0.15	-0.15***	0.03	-0.28	-0.19
Conscientiousness	-0.08**	0.03	-0.13	-0.11	-0.07**	0.03	-0.13	-0.09
Agreeableness	0.03	0.03	0.04	0.04	0.02	0.03	0.03	0.03
Imagination (O1)					**0.32*****	0.08	0.15	0.13
Artistic Interests (O2)					0.01	0.11	0.01	0.00
Emotionality (O3)					-0.00	0.12	-0.00	0.00
Adventurousness (O4)					0.24	0.12	0.09	0.06
Intellect (O5)					0.21*	0.10	0.10	0.07
Liberalism (O6)					-0.21*	0.10	-0.08	-0.07

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

Table 7 Neuroticism facets with other big five domains and age as predictors of externalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.01**	0.00	-0.14	-0.13	-0.01	0.00	-0.07	-0.06
Extraversion	-0.00	0.00	0.00	0.00	0.01*	0.00	0.13	0.08
Conscientiousness	-0.02***	0.00	-0.44	-0.40	-0.01**	0.00	-0.17	-0.12
Agreeableness	-0.02***	0.00	-0.30	-0.27	-0.01**	0.00	-0.16	-0.13
Openness to Experience	0.01***	0.00	0.20	0.18	0.01**	0.00	0.14	0.11
Anxiety (N1)					-0.01	0.01	-0.06	-0.03
Anger (N2)					**0.04*** **	0.01	0.21	0.15
Depression (N3)					**0.04*** **	0.01	0.29	0.16
Self-Consciousness (N4)					-0.02*	0.01	-0.15	-0.08
Immoderation (N5)					**0.04*** **	0.01	0.22	0.17
Vulnerability (N6)					0.02^	0.01	0.14	0.07

^$p = 0.05$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

Table 8 Extraversion facets with other big five domains and age as predictors of externalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.00	0.00	-0.05	-0.04	0.00	0.00	0.00	0.00
Neuroticism	0.01***	0.00	0.39	0.31	0.02***	0.00	0.54	0.36
Conscientiousness	-0.01***	0.00	-0.24	-0.19	-0.01***	0.00	-0.24	-0.16
Agreeableness	-0.02***	0.00	-0.31	-0.28	-0.01***	0.00	-0.21	-0.16
Openness to Experience	0.01***	0.00	0.26	0.24	0.00	0.00	0.09	0.06
Friendliness (E1)					0.02	0.01	0.11	0.06
Gregariousness (E2)					-0.02	0.01	-0.11	-0.07
Assertiveness (E3)					**0.03** **	0.01	0.18	0.12
Activity Level (E4)					-0.00	0.01	-0.01	-0.01
Excitement-seeking (E5)					**0.03** **	0.01	0.19	0.13
Cheerfulness (E6)					0.02	0.01	0.08	0.06

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

variance. Higher Assertiveness (E3) and Excitement-Seeking (E5) were significantly associated with higher Externalising when controlling for all other variables. In total, the model explained 61% of variation in Externalising, $F(11, 278) = 39.27$, $p < 0.001$.

Results of the regression for Conscientiousness facets and Externalising are presented in Table 9. Step 1 significantly predicted Externalising, $F(5, 284) = 69.30$, $p < 0.001$, accounting for 55% of the variance. In Step 2, Conscientiousness facets explained a significant 7% of additional variance; lower Cautiousness (C6) was significantly associated with higher Externalising when accounting for all other variables. Overall, the model explained 62% of variation in Externalising, $F(11, 278) = 40.72$, $p < 0.001$.

Results of the regression for Agreeableness facets with Externalising are presented in Table 10. Step 1 significantly predicted Externalising, $F(5, 284) = 61.97$, $p < 0.001$, accounting for 52% of the variance. In Step 2, Agreeableness facets explained a significant 8% of additional variance. Lower Cooperation (A4) was associated with higher Externalising at BH levels of significance when accounting for all other variables. In total, the model explained 60% of variation in Externalising, $F(11, 278) = 37.76$, $p < 0.001$.

Results of the regression for the Openness facets with Externalising are presented in Table 11. Step 1 significantly predicted Externalising, $F(5, 284) = 72.71$, $p < 0.001$, accounting for 56% of the variance. In Step 2, Openness facets explained a significant 3% of additional variance, but no facets were associated with externalising after applying the BH procedure. Overall, the model predicted 59% of variation in Externalising, $F(11, 278) = 36.66$, $p < 0.001$.

Table 9 Conscientiousness facets with other big five domains and age as predictors of externalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	0.001	0.00	0.01	0.01	-0.00	0.00	-0.02	-0.02
Neuroticism	0.02***	0.00	0.65	0.50	0.02***	0.00	0.50	0.28
Extraversion	0.01***	0.00	0.26	0.20	0.01**	0.00	0.15	0.10
Agreeableness	-0.02***	0.00	-0.34	-0.32	-0.01***	0.00	-0.27	-0.19
Openness to Experience	0.01***	0.00	0.18	0.16	0.01**	0.00	0.15	0.12
Self-efficacy (C1)					0.01	0.01	0.05	0.03
Orderliness (C2)					-0.00	0.01	-0.02	-0.02
Dutifulness (C3)					0.01	0.02	0.04	0.02
Achievement-striving (C4)					-0.00	0.01	-0.01	-0.00
Self-discipline (C5)					-0.02	0.01	-0.10	-0.06
Cautiousness (C6)					**-0.05*** **	0.01	-0.28	-0.21

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

Table 10 Agreeableness facets with other big five domains and age as predictors of externalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.00	0.00	-0.03	-0.03	-0.00	0.00	-0.01	-0.01
Neuroticism	0.02***	0.00	0.55	0.38	0.02***	0.00	0.51	0.33
Extraversion	0.01***	0.00	0.29	0.22	0.01**	0.00	0.20	0.12
Conscientiousness	-0.02***	0.00	-0.32	-0.27	-0.01***	0.00	-0.25	-0.19
Openness to Experience	0.01*	0.00	0.10	0.09	0.01**	0.00	0.16	0.12
Trust (A1)					-0.01	0.01	-0.06	-0.05
Morality (A2)					0.00	0.01	0.02	0.01
Altruism (A3)					0.01	0.01	0.02	0.01
Cooperation (A4)					**-0.05*** **	0.01	-0.21	-0.15
Modesty (A5)					-0.02*	0.01	-0.11	-0.08
Sympathy (A6)					-0.02	0.01	-0.07	-0.05

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

Table 11 Openness to experience facets with other big five domains and age as predictors of externalising

	Model 1				Model 2			
Variable	*B*	*SE*	*β*	*sr*	*B*	*SE*	*β*	*sr*
Age	-0.00	0.00	-0.03	-0.03	0.00	0.00	0.00	0.00
Neuroticism	0.02***	0.00	0.55	0.37	0.02***	0.00	0.51	0.31
Extraversion	0.02***	0.00	0.33	0.27	0.01***	0.00	0.25	0.18
Conscientiousness	-0.01***	0.00	-0.24	-0.19	-0.01***	0.00	-0.23	-0.16
Agreeableness	-0.01***	0.00	-0.24	-0.22	-0.01***	0.00	-0.26	-0.21
Imagination (O1)					0.02*	0.01	0.10	0.08
Artistic Interests (O2)					-0.01	0.01	-0.04	-0.03
Emotionality (O3)					0.02	0.01	0.08	0.06
Adventurousness (O4)					0.00	0.01	0.02	0.01
Intellect (O5)					0.01	0.01	0.07	0.05
Liberalism (O6)					0.00	0.01	0.01	0.01

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Facet B-weights in bold remained significant after application of the BH procedure

Discussion

The goal of this study was to examine associations between Big Five personality facets (Costa & McCrae, 1992; Goldberg, 1999) and transdiagnostic dimensions of psychopathology (Internalising and Externalising). As predicted, we found that these psychopathology dimensions were associated with some, but not all, personality facets within each Big Five domain. The results suggest that a facet-level investigation can provide important information beyond that offered by a domain-level analysis.

Main findings and comparison with previous studies

Big five facets and internalising

Accounting for the BH procedure, the Internalising dimension was significantly associated with facets from all Big Five domains. Within Neuroticism, Internalising symptoms were associated with higher Depression (N3) and Vulnerability (N6). The direction of these facet-level associations was consistent with previous research linking higher Neuroticism domain scores to higher Internalising (Mezquita et al., 2015; Sleep et al., 2018) and with the bivariate relationship found in the current sample, but it is notable that not all facets played a significant role in this association.

Despite the strong relationship between Depression (N3) and Internalising (which may indicate insufficient discriminant validity between the two variables), it should be noted that the Depression facet theoretically reflects a depressive *temperament*, which differs from depression as Internalising *psychopathology*. Temperament differs from psychopathology in that temperament is a biologically based, temporally stable state of behaviour and emotion, whereas psychopathology is a temporary psychological state that is influenced by a person's underlying temperament (Clark et al., 1994; Cloninger et al., 1993; McCrae & Costa, 2008; Thomas & Chess, 1977). Viewed in this way, the correlation between these variables may still be meaningful, as it suggests that a person with a depressive temperament is more likely to experience the broader category of Internalising symptoms.

The association between Vulnerability and the Internalising dimension indicates that those who struggle with being vulnerable (e.g., lacking self-confidence in times of crisis) are more likely to experience Internalising symptoms. Interestingly, the Anxiety facet (N1) was not significantly associated with Internalising in the original analysis, but emerged as a significant predictor when Depression was removed (see Online Resource). This suggests that the relationship between Anxiety and Internalising may be largely explained by their shared relationship with Depression. However, this result conflicts with the findings of Walton et al. (2017), in which the Anxiety and Depression facets were jointly correlated with both 'Distress' and 'Fear' dimensions of Internalising (Vulnerability was only associated with these dimensions in the absence of other facets).

Within Extraversion, higher Internalising was associated with higher Excitement-Seeking (E5), and lower Friendliness (E1), Gregariousness (E2), and Activity Level (E4). This is mostly consistent with previous research, which suggests higher Internalising is associated with lower Extraversion (Sleep et al., 2018), and is mostly consistent with the domain-level bivariate correlation in the current sample. However, given the presentations typical of Internalising disorders (e.g., dysthymic, avoidant), the positive association between Internalising and Excitement-Seeking is surprising. Future research is needed to clarify this finding, but it is possible that this reflects the presence of a subset of depressive respondents who experience sub-threshold bipolar symptoms (Fornaro et al., 2013). Alternatively, this finding might be explained by the overall pattern of facets, and not simply the isolated association between Activity Level and Internalising (see below for further discussion).

Within Conscientiousness, higher Internalising was associated with higher Dutifulness (C3) and lower Self-Discipline (C5) and Cautiousness (C6). Findings were mostly consistent with the negative association between Conscientiousness and Internalising disorders found in some (Kotov et al., 2010; Malouff et al., 2005) though not all (Hyatt et al., 2019; Mezquita et al., 2015) previous studies and the current sample. These results suggest that a particular pattern of traits – reflecting a higher expectation to fulfill obligations, difficulty following through on this expectation, and a lack of caution – may present a risk for heightened Internalising symptoms. This is generally consistent with previous research on goal achievement and mental health outcomes, which has found higher rates of depressive symptoms in people who struggle to disengage from unattainable valued goals (Dickson et al., 2016) or repeatedly fail to achieve them (Stoeber et al., 2014).

Regression analyses for Agreeableness and Openness with Internalising explained less variance overall than the preceding domains, consistent with the negligible domain-level associations seen in most previous studies (Kotov et al., 2010; Malouff et al., 2005; Mezquita et al., 2015). However, a small but significant negative correlation was found between Agreeableness and Internalising, which appeared to be due to an association with lower Trust (A1). This finding is not unique; Walton et al. (2017) found similar correlations between Agreeableness and both 'Distress' and 'Fear' dimensions of Internalising also explained by the Trust facet.

This suggests that a deficit in Trust may be the only Agreeableness sub-trait that contributes to Internalising symptoms. The one association with Internalising found among Openness facets – higher Imagination (O1) – was found without a domain-level correlation. This could be explained by the tendency for people with Internalising symptoms to engage in forms of 'imaginative' distorted thinking (e.g., rumination, catastrophising) which can trigger or exacerbate negative emotion (Beck, 1963; Beck & Haigh, 2014).

Overall, the results for the Big Five domain facets and Internalising suggest that there is value in examining associations between personality traits and transdiagnostic dimensions beyond the domain-level. For Neuroticism, the association with Internalising was driven by two or three key facets, indicating that not all facets are relevant to the experience of Internalising symptoms. Similarly, not all facets of Extraversion and Conscientiousness were associated with Internalising, and for these domains a more complex pattern of positive and negative associations emerged.

Big five facets and externalising

Accounting for the BH procedure, Externalising was associated with facets from all Big Five domains except for Openness. Within Neuroticism, higher Externalising was associated with higher Anger (N2), Depression (N3), and Immoderation (N5). These associations are consistent with domain-level associations for Neuroticism and Externalising found in some previous studies (Bienvenu et al., 2004; Kotov et al., 2010; Malouff et al., 2005) and the current sample. However, as was found for Internalising, not all Neuroticism facets were significantly associated with Externalising. Results also revealed Anger and Immoderation to be unique predictors of Externalising (and not Internalising). These findings indicate that a facet-level analysis is useful for both gaining a deeper understanding of the relationship between these two constructs, and understanding how Neuroticism is differently associated with Internalising and Externalising. In this case, while both dimensions were associated with Depression, Internalising symptoms seem more prominent in people who generally feel a heightened sense of Vulnerability or Anxiety (based on the alternative results presented in the Online Resources), and Externalising symptoms seem more prominent in people who are prone to Anger and Immoderate behaviour.

Within Extraversion, higher Externalising was associated with higher Assertiveness (E3) and Excitement-Seeking (E5). Although not all facets were significantly associated with Externalising, the direction of the associations was consistent with the significant domain-level correlations for Extraversion found here and in other studies (Mezquita et al., 2015; Walton et al., 2017). This finding differed from the pattern of positive and negative associations found for Extraversion with Internalising. However, these results were less surprising, as both associated facets represent behaviours typical of Externalising disorders. For example, aggression (the Assertiveness facet) is common in Antisocial Personality Disorder, and impulsivity/pleasure-seeking (the Excitement-Seeking facet) is common in Substance Use and other Impulse Control Disorders (Alcorn et al., 2013).

Both Conscientiousness and Agreeableness were significantly negatively correlated with Externalising, a finding that is consistent with most previous findings (Kotov et al., 2010; Malouff et al., 2005; Ruiz et al., 2008). However, within each of these domains, only Cautiousness (C6) and Cooperation (A4) were significant predictors (and both directionally consistent with its respective domain).

In summary, the results for the Big Five domain facets and Externalising suggest that examination of facets can provide novel information in addition to that provided by a domain-level analysis. Neuroticism and Extraversion showed the most facet-level associations with Externalising, and each associated facet within these domains predicted Externalising in a direction consistent with its corresponding domain. Conscientiousness and Agreeableness, on the other hand, while still relevant, showed fewer facet-level associations, indicating that only a few facets outside of Neuroticism and Extraversion appear pertinent to Externalising symptomatology.

Interpretations and implications for future research

Earlier in this article, we discussed previous research on the joint structure of personality and psychopathology (Kotov et al., 2017; Wright & Simms, 2015). We suggested that one interpretation of this relationship might be that normative personality traits form the basis for a person's typical expression of, and response to, psychological distress (Clark et al., 1994; Cloninger et al., 1993; DeYoung & Krueger, 2018; Thomas & Chess, 1977). While the current study does not offer causal data to confirm this theory, it does provide new information about the various relationships between personality facets and psychopathological dimensions. It would be worthwhile to further explore these relationships in future studies, as this would improve the current understanding of psychopathology, and could lead to more effective treatment methods targeted at personality characteristics, rather than just symptoms of psychopathology (for more on personality-targeted interventions, see e.g., Martin et al., 2014; Allan et al., 2018; Allemand & Fluckiger, 2017).

The first pattern was identified for the facets of Neuroticism with Internalising, and Neuroticism and Extraversion with Externalising. These relationships suggest that it is not the domain-level score, but a pattern of scores across *specific facets* that predicts whether and how a person will respond to distressing stimuli. While previous studies (e.g., Mezquita

et al., 2015; Sleep et al., 2018) have indicated that a person higher on Neuroticism is more likely to score highly on Internalising or Externalising symptoms than a person with lower Neuroticism, the findings of the current study suggest that not all facets are relevant to this relationship. Rather, it is higher scores on facets such as Depression (N3) and Immoderation (N5) that best predict psychopathology, and not necessarily a higher overall Neuroticism score (which may result from higher scores on other Neuroticism facets). Furthermore, Internalising or Externalising symptoms have their own unique facet 'profiles', suggesting that a person's standing on these specific facets (alongside facets in other domains) will influence their response to distress.

The second pattern was identified for Extraversion and Conscientiousness facets with Internalising. Here a mixture of positive and negative facet associations were observed within each personality domain. In this case, facets presenting a higher risk of psychopathology may reflect an *incompatibility of trait-related goals*. That is, in isolation, the positive association between Excitement-Seeking (E5) and Internalising may seem contradictory. However, alongside negative associations found for Gregariousness (E2) and Activity Level (E4), a clearer picture emerges of a person who is motivated to seek excitement and stimulation (E5), but unmotivated to engage in certain behaviours that would allow them to effectively seek out exciting activities (social interaction [E2] and energetic engagement with the world [E4]). This incompatibility of trait-related goals may cause internal dissonance, and if not resolved, may result in psychological distress in the form of Internalising symptomatology (DeYoung & Krueger, 2018).

The third pattern found was for the Trust (A1) facet and Internalising, and the Cautiousness (C6) and Cooperation (A4) facets with Externalising. Here domain-level associations were found which were seemingly due to the presence of just one important facet. These findings indicate that the facets in question are particularly relevant to the experience of psychopathology, and indeed, all three can be theoretically linked to Internalising or Externalising. For example, a reduced capacity for interpersonal trust could make it difficult for a person to develop strong relationships (Rotenberg, 1994), leading to increased isolation and eventual depression (Kim et al., 2012), or may cause or result from social anxiety (Kaplan et al., 2015). Similarly, a reduced capacity for cooperation could make a person more likely to express Externalising symptomatology when distressed (Milledge et al., 2018). A higher rating on any of these facets alone may not be sufficient to cause psychological dysfunction; however, they may increase the risk of dysfunction in combination with heightened scores on other facets associated with Internalising or Externalising (e.g., facets from Neuroticism). This possibility could be explored in future studies.

Overall, this study identified facet patterns within certain personality domains that differentially predicted Internalising and Externalising. After controlling for Age and all other Big Five domains and applying the Benjamini–Hochberg procedure, the facets listed in Table 12 were identified as significant predictors.

Limitations, conclusions, and recommendations for future research

Several limitations of this study should be noted. First, this was a cross-sectional, correlational study, which does not allow for causal interpretations. Future experimental research should investigate the causal effects of personality facets on psychopathology and their implications.

Furthermore, use of a convenience sample may limit the generalisability of these findings to other populations. Only a few participants rated highly for Externalising in the current sample (see Online Resources for descriptives), so it is uncertain whether people with severe symptoms would show a similar distribution of facet scores. Future research could examine whether the same relationships exist in clinical populations. The sample was also relatively small due to budgetary constraints. We maximised statistical power by conducting separate analyses for each trait, rather than simultaneously assessing all 30 facets as predictors, and by applying a BH procedure to establish conservative significance levels for all hypothesis tests. However, a larger sample that allows for analysis of all facets simultaneously might provide more accurate results, and might reveal additional cross-domain facet patterns that were not identified in this study.

Finally, a large correlation between the Depression (N3) facet and Internalising was identified, which may indicate that these scales do not measure sufficiently

Table 12 Personality Facets that Predicted Internalising and Externalising

Internalising	Externalising
Depression (N3) +	Anger (N2) +
Vulnerability (N6) +	Depression (N3) +
Friendliness (E1) –	Immoderation (N5) +
Gregariousness (E2) –	Assertiveness (E3) +
Activity Level (E4) –	Excitement-Seeking (E5) +
Excitement-Seeking (E5) +	Cautiousness (C6) –
Dutifulness (C3) +	Cooperation (A4) –
Self-Discipline (C5) –	
Cautiousness (C6) –	
Trust (A1) –	
Imagination (O1) +	

Relationships are significant at $p < 0.05$ after controlling for Age and all other domains, and applying the Benjamini–Hochberg procedure. + and – indicate relationship direction

distinct constructs. This problem was not solved by modifying N3, so we retain this variable in order to properly test the hypotheses. We therefore recommend that these results be interpreted with caution, and have included an alternative analysis with N3 excluded in the Online Resource.

Despite these limitations, this study makes important contributions to research on personality and transdiagnostic psychopathology. Where most previous studies have studied relationships at the domain-level, we looked specifically at the facet-level, filling an important gap in the literature. The most interesting outcome of this study was the finding of contradictory facet patterns within personality domains with significant associations. Many of these were unexpected, suggesting a need for further study. In short, the current results indicate that the relationship between personality and psychopathology cannot be understood solely at the domain-level; sub-domain associations provide novel and useful information about how personality and psychopathology relate, and it is recommended that future studies include these variables to better understand how these key dimensions interact. We believe this would lead to an overall improvement in our understanding of the structure of psychopathology, which could in turn reveal new avenues for the improvement of current treatment methodologies.

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Data availability The dataset generated and analysed during the current study is available from the corresponding author upon reasonable request.

Declarations

Ethics approval This study was performed in line with the principles of the Declaration of Helsinki. The study was approved by the UNE Human Research Ethics Committee (HE18-271).

Consent to participate Informed consent was obtained from all individual participants included in the study.

Competing interests The authors have no competing interests to disclose.

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