Differential mapping of psychopathic traits and general psychopathology in a large young adult sample

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ABSTRACT

Psychopathy is a personality disorder characterised by affective-interpersonal features and an impulsive-antisocial lifestyle. Psychopathy commonly co-occurs with other forms of psychopathology, but current understanding of how behavioural features of psychopathy co-occur with, or are distinct from, other mental health problems is limited. In this study, we analysed data from a large sample of young adults to study the relationship between different facets of psychopathic traits and general psychopathology ('p'). Data were collected between 2010-2016 and included 1,324 U.S. undergraduate students (mean$_{age}$=19.7 years; 57% female). Linear regression models revealed that the antisocial facet of psychopathy was distinct from p, whilst the lifestyle facet was correlated with p and externalising behaviour. Interpersonal and affective facets were correlated with internalising behaviours. Collectively, these findings suggest that psychopathic traits of severe, premeditated antisocial behaviour are distinct from general psychopathology, whereas impulsive and uninhibited lifestyle traits are a shared feature of psychopathology.

INTRODUCTION

Psychopathy is a personality disorder characterised by a collection of separable yet interrelated traits including affective-interpersonal features (e.g., lack of remorse and consideration for others' feelings, manipulation of others, grandiose sense of self-worth) and an impulsive-antisocial lifestyle (e.g., chaotic or risky behaviours, offences against others) (Hare & Neumann, 2008). The prevalence of psychopathy in community samples as ascertained using screening interviews and questionnaires is thought to be around 0.6% in the UK (Coid et al., 2009a) and 1.2% in the USA (Neumann & Hare, 2008). The aetiology of psychopathy is complex, with both genetic and environmental risk factors, as well as high rates of comorbidity with other psychiatric disorders. However, psychopathy, in particular the affective-interpersonal features of the psychopathy phenotype (e.g., lack of empathy and reduced reactivity to stress) have also been conceived as being at least partially distinct from common mental illness and general psychopathology (Cleckley, 1976; Widiger & Crego, 2018). Elucidating whether specific aspects of psychopathic personality have elements that are not captured by general psychopathology would be of broad interest to researchers and clinicians; understanding how behavioural features related to psychopathy co-occur with or are distinct from other mental health problems can provide important information regarding how prevention and intervention efforts should be targeted. A clearer understanding of such associations and distinctions has the scope to guide intervention efforts regarding whether, as a disorder, psychopathy will need approaches that go beyond transdiagnostic approaches that have been shown to work across other forms of psychopathology. If particular aspects of psychopathic personality appear substantially distinct from other forms of psychopathology, this suggests that transdiagnostic approaches may need to be supplemented by more specific or novel interventions targeted at specific features of psychopathic personality.

Recent evidence from a number of longitudinal cohort studies suggests that disorders and symptoms of common mental illness frequently co-occur and are highly correlated in the general population (Caspi et al., 2020; Lahey et al., 2012; McElroy et al., 2017; Shields et al., 2019).

Genetically informative studies further indicate shared genetic and environmental risk factors across a number of psychiatric disorders and symptoms despite potentially diverse aetiological origins (Allegrini et al., 2020). For example, depression and anxiety (i.e., internalising symptoms) tend to arise in the same individual, whilst disruptive behaviour disorders and substance abuse (i.e., externalising symptoms) emerge in the same individual, and common neurocognitive substrates have been identified across the spectrum of psychopathology (Caspi et al., 2020; Goodkind et al., 2015; McTeague et al., 2017). As a result, empirical studies about the structure of psychopathology and dimensional disorder families are gaining in popularity (Kotov et al., 2017). Several statistical frameworks have been developed to examine the dimensional nature of psychopathology and address the common co-occurrence of symptoms. For example, the Hierarchical Taxonomy of Psychopathology (HiTOP; (Kotov et al., 2017)) combines individual symptoms into homogenous traits, working from the ground up using symptom-level information to ultimately derive higher-order dimensional psychopathology spectra such as internalising and externalising. Ultimately, the expression of common mental illness varies across individuals, but it is thought to be captured by a single general or latent factor (or "superspectra" as denoted by HiTOP) describing the common variance among psychiatric symptoms, termed the 'p factor' (Caspi et al., 2014a; Lahey et al., 2012). The findings related to the p factor have been replicated (Caspi et al., 2014b), p has been shown to be stable across development (Greene & Eaton, 2017; McElroy et al., 2017; Snyder et al., 2017), and has been found to predict adverse mental health outcomes in longitudinal studies (Pettersson et al., 2018; Sallis et al., 2019). In recent years, studies have examined the construct validity of p itself, and also how p relates to other neurocognitive features such as executive function and self-regulation strategies (Romer, Hariri, et al., 2021; Romer & Pizzagalli, 2021; Shields et al., 2019), psychiatric characteristics such as autistic traits (Miller et al., 2019; Ronald, 2019), and structural brain measures such as white matter integrity and grey matter volume (e.g., Durham et al., 2021; Kaczkurkin et al., 2019; Mewton et al., 2022; Moberget et al., 2019; Romer, Elliott, et al., 2021; Romer et al., 2018, 2019, 2023).

Theories about comorbidity between common mental illness and psychopathy have long been debated. Indeed, self-reported psychopathy and/or conduct disorder has been shown to load onto p as well as an externalising factor across multiple studies (e.g., (Caspi et al., 2014b; Romer et al., 2018b)), but it is unclear from these studies whether certain specific facets of psychopathy are driving this relationship with p, or whether other facets may instead be more distinct from p. Some of the interpersonal and affective features associated with psychopathy (e.g. lack of remorse) are often considered distinct from other forms of psychopathology; however, it has also been suggested that certain lifestyle facets of psychopathy (e.g. risk-taking and narcissism) may relate to broader internalising and externalising behaviours and general psychopathology (i.e., p), as suggested by prior factor-analytic work in incarcerated, high-risk, and general population young adult samples (Dotterer et al., 2017; Hare & Neumann, 2008; Neumann & Pardini, 2014; Williams et al., 2007). For example, clinical descriptions of psychopathy emphasise reduced risk of internalising and affective disorders (e.g. anxiety and depression), whilst the phenotypic presentation of the antisocial and lifestyle facets of psychopathy closely aligns with the externalising dimension of general psychopathology (Edens et al., 2006; Frick et al., 1999; Hare & Neumann, 2008). Clinical observations have been corroborated by dimensional analyses showing that affective and interpersonal features of psychopathy are either unrelated to or negatively associated with anxiety/depression (at least in male populations; (Anestis et al., 2017; Sevecke et al., 2009). Yet internalising appears to be less elevated in individuals with psychopathy than in those with antisocial personality disorder without psychopathy, and it has been proposed that the affective-interpersonal features of psychopathy might be 'protective' against some forms of psychopathology, particularly internalising features (Cleckley, 1976; Hare; Widiger & Crego, 2018). However, when a person-centred (as opposed to variable-centred) approach such as latent profile analysis is adopted, studies have found that both internalising (including depression, anxiety, and PTSD) and externalising features can be elevated in individuals who display all aspects of psychopathic features compared to those demonstrating only some psychopathic features (Colins et

al., 2017; Neumann et al., 2024; Roy et al., 2023). In line with this, a recent meta-analysis found that psychopathy demonstrates a small, positive association with internalising symptoms of anxiety and depression (Batky et al., 2024).

By contrast, population-based longitudinal studies suggest that higher levels of traits associated with the antisocial facet of psychopathy are broadly related to poor mental health outcomes across both internalising and externalising dimensions including ADHD, substance use, depression, trauma-related disorders and anxiety (Odgers et al., 2008; Sevecke et al., 2009). Recent findings also suggest that there are different aetiological routes to psychopathy, with some individuals presenting with all features of psychopathy coupled with internalising symptomatology, (De Brito et al., 2021). These individuals may be thought of as having a 'behavioural phenocopy' of primary psychopathy, which is thought to occur in the absence of increased levels of affective disorders, particularly anxiety (De Brito et al., 2021; Hicks & Drislane, 2018). In the context of these previous findings, it should also be considered whether or the extent to which individuals with elevated psychopathic features are able to accurately and reliably report on their negative affective experiences (which is necessary to assess internalising symptoms), particularly as the affective facet of psychopathy has been inversely associated with emotion regulation strategies linked to internalising difficulties (Garofalo et al., 2020). Collectively, this clinical and epidemiological evidence indicates that co-morbidity between psychopathy (or at least some of its specific features) and common psychiatric symptoms is likely (Hare & Neumann, 2008), but that further investigation of the scope and direction of these relationships is warranted.

Lastly, population-based factor-analytic research has shown that, much like general psychopathology (Caspi et al., 2014a; Caspi & Moffitt, 2018; Kotov et al., 2017), the structure of psychopathy is best captured by dimensional rather than categorical models, and that psychopathic traits are distributed dimensionally within the general population (Edens et al., 2006; Hare & Neumann, 2008; Lilienfeld & Fowler, 2006; Patrick et al., 2007). Psychopathy is defined by a complex set of traits and characteristics. Dominant studies investigating the factor structure of

psychopathy have proposed a four-facet model in which personality and behavioural factors are each split into two sub-facets capturing interpersonal vs. affective features, and lifestyle vs. antisocial features (Cooke & Michie, 2001; Dotterer et al., 2017; Hare & Neumann, 2005, 2008; Williams et al., 2007). Moreover, findings about behavioural and neurobiological underpinnings of psychopathic traits in the general population seem to mirror findings from clinical and forensic populations, suggesting continuous aetiological mechanisms underpinning different aspects of psychopathy which may differentially relate to general psychopathology (i.e., p) (DeBrito et al., 2021; Koenigs et al., 2011; Seara-Cardoso & Viding, 2015). However, no studies have yet examined the relationship between different sub-facets of psychopathy as posited by the four-factor model within the p-factor framework. In this study, we used structural equation modelling to investigate whether different features of psychopathy are distinct from p in a large sample of young adult university students, or whether and which specific psychopathic features may be a broader reflection of general psychopathology. We hypothesised that lifestyle and antisocial facets of psychopathy would be related to p, and that affective and interpersonal facets would be relatively distinct from p.

Transparency and openness

De-identified data for this study are available by request at https://haririlab.com/projects/procedures.html. Code is available at https://github.com/UCL-CANDL/pfactorPsychopathy. Sample size was determined by the larger Duke Neurogenetics Study, full details of which are reported in (Kim, Elliott, et al., 2022; Kim, Knodt, et al., 2022; Romer, Hariri, et al., 2021). We report all data exclusions and measures for the present study below. The Duke Neurogenetics Study was approved by the Duke University School of Medicine Institutional Review Board. All participants provided informed consent.

METHODS

Participants

Participants were 1,324 full-time university students aged 18-22 years (Mean$_{age}$=19.70, SD=1.25; 57.3% (N=758) females) recruited for the Duke Neurogenetics Study. All participants had English as their first language or equivalent level of fluency. Participants were asked to indicate their race from six pre-defined categories. Six hundred and eight (49.7%) participants identified as Caucasian/White, 363 (27.4%) as Asian, 156 (11.8%) as African American/Black, 104 (7.9%) as bi- or multiracial, 3 (0.23%) as American Indian, and 40 (3.0%) as Other. One hundred and thirty-six (10.3%) participants indicated that they were from Hispanic or Latino descent, while 1188 (89.7%) were not.

All participants were in good general physical health and free of the following conditions: 1) medical diagnoses of cancer, stroke, head injury with loss of consciousness, untreated migraine headaches, diabetes requiring insulin treatment, chronic kidney or liver disease, or lifetime history of psychotic disorder, 2) use of psychotropic, glucocorticoid, or hypolipidemic medication (at the time of, or at least 10 days prior to study participation), and 3) conditions affecting cerebral blood flow and metabolism (e.g., hypertension). Participants were not excluded on the basis of psychiatric diagnosis.

Questionnaire Measures

The Duke Neurogenetics Study assessed a range of demographic, behavioural and biological traits among young adult university students. As part of their participation in the larger study, participants completed a battery of self-report questionnaires measuring demographic characteristics and symptoms of psychopathology, and were assessed on symptoms from different psychiatric disorders using the electronic Mini International Neuropsychiatric Interview (e-M.I.N.I). This symptom measure was used because of its ability to reliably capture self-reported symptoms of common mental disorders electronically in large samples, with reliability estimates similar to those in studies using human-administered versions of this interview (Reilly et al., 2019). Symptoms were endorsed categorically as present/absent, resulting in a continuous total symptom count (i.e., a sum

of total symptoms endorsed for each disorder). Symptom counts had a median of 0 and a mean of less than 1 so were treated as continuous variables and Z-scored in subsequent analyses. Past or current psychiatric diagnoses were not exclusion criteria. This strategy afforded broader representation of psychopathology in our sample, and about 20% of the final sample met criteria for at least one Axis I or II disorder (Romer et al., 2018a).

Socioeconomic status

Socioeconomic status (SES) was measured by participants placing themselves and their biological mother and father on a ladder respective to other people in the United States. Participants were told that on the ladder, the people who are best off (most money, education, and most respected jobs) are at the top, while the people who are the worst off (least money, education, and least respected jobs) are at the bottom. The ladder had 10 steps (coded 1-11). The final variable was generated by taking the mean of the self, mother and father evaluations (Min=1.33, Max=11, Median=7.67, Mean=7.44, SD=1.70).

Internalising

Several dimensional measures of psychopathology symptoms were also administered alongside the e-MINI. Given that recent factor-analytic approaches to psychopathology take a dimensional approach, dimensional symptom measures were included in favour of symptom counts where possible. Participants completed the 62-item Mood and Anxiety Symptom Questionnaire (MASQ-SF) assessing depression and anxiety symptoms experienced in the last week (Watson et al., 1995), and the 20-item Center for Epidemiological Studies–Depression Scale (CESD) assessing depression symptoms in the last week (Weissman et al., 1977). To index depression as an observed variable in the current study, two variables were derived from these measures: 1) the mean of Z-scored values from the anhedonic depression and general distress subscales from the MASQ-SF, and 2) CESD total scores. Participants also completed the 20-item State-Trait Anxiety Inventory– Trait Anxiety Scale (STAI-T) to measure trait anxiety (Spielberger et al., 1999). To index anxiety, two additional variables were calculated: 1) the mean of Z-scored values from the anxious arousal

and general distress subscales from the MASQ-SF, and 2) STAI-T total scores. In line with

approaches used in previous factor analytic modelling of p, fear/phobia symptoms were indexed by

taking the mean of Z-scored symptom counts of social phobia, panic disorder, and agoraphobia

from the e-M.I.N.I., as no separate dimensional measures of fear were collected (Caspi et al.,

2014b; Romer et al., 2018b; Romer, Hariri, et al., 2021; Sheehan et al., 1998).

Externalising

Total scores from the 10-item Alcohol Use Disorders Identification Test (AUDIT) were

used to measure alcohol abuse and dependence symptoms (Saunders et al., 1993). Symptom counts

from the cannabis abuse and dependence section of the e-M.I.N.I. were used to measure cannabis

abuse and dependence. Total score of the 13-item Recreational Drug Use Questionnaire (RDU) was

used to measure other lifetime substance use. Measures of antisocial personality disorder were not

included, but the Self Report of Psychopathy- Short Form (SRP-SF;(Paulhus et al., 2015)) captured

psychopathic traits and is discussed further below. As a result, it should be noted that the

externalising factor referred to throughout this paper primarily represents substance use behaviours.

However, the term 'externalising' is maintained in order to maintain terminology consistency and

follow the same mapping in the models as the externalising factor in other similar papers and

samples (Caspi et al., 2014b; Romer et al., 2018b).

Thought Disorder

Symptom counts from the e-M.I.N.I. were used for three variables measuring obsessive-

compulsive disorder, mania, and psychosis respectively.

Psychopathy

The SRP-SF was developed as an extension of the Psychopathy Checklist-Revised (PCL-

R;(Hare, 1985; Hare & Neumann, 2006)). Like the PCL-R, the SRP assesses four facets (affective,

interpersonal, lifestyle, antisocial) of antisocial personality and psychopathic traits which can also

be modelled in terms of the traditional two-factor dimensions. The SRP-SF was developed for use

in the general population and has shown a good fit with the 4-factor structure of psychopathy in

samples across the globe (Neumann et al., 2015). Moreover, the short-form version of the SRP (29 items) shows comparable validity in community samples to the long-form version (64 items), suggesting the short-form version is a viable alternative to the longer version in community assessments (Gordts et al., 2017). The SRP-SF has also shown adequate construct validity, structural and external validity, reliability and internal consistency in both offender and non-offender samples, including college students, in European, North and South American samples (Declercq et al., 2015; Gordts et al., 2017; Neumann et al., 2015; Neumann & Pardini, 2014; Seara-Cardoso et al., 2020; Williams et al., 2007). The SRP-SF consists of 29 items in total, with 7 items being scored per facet. Note that for the antisocial facet, previous research uses either question 2 ('*I have never been involved in delinquent gang activity*') or question 20 ('*I was convicted of a serious crime*') – hence 29 total items, but only 28 used for scoring. For each question, participants indicated the degree to which they agreed with the statement on a scale of 1-5. The SRP-SF had good reliability in the DNS as calculated by Cronbach's alpha ($\alpha = 0.90$). The individual SRP-SF subscales had good reliability except for the SRP Antisocial facet (Interpersonal $\alpha = 0.82$, Affective $\alpha = 0.75$, Lifestyle $\alpha = 0.78$, Antisocial $\alpha = 0.53$). When calculating the antisocial facet, scoring question 20 ('convicted of a serious crime') rather than question 2 ('involved in gang activity') yielded higher reliability ($\alpha = 0.71$). However, question 2 was used in this study because participants were young adults, and conviction may therefore be unlikely given their age.

Dimensional psychopathology factors

Structural equation model fitting and comparison

Using the questionnaire measures as observed symptom factors to assess internalising, externalising and thought disorders, we fit two types of model to derive a latent factor for general psychopathology, *p*: a bifactor model and a higher-order model (Caspi et al., 2014b; Romer et al., 2018a)(Figure 1). Latent factors are hypothesised to account for the pattern of covariance among observed variables. In the bifactor model (Figure 1a), general psychopathology (*p*) is represented by

a single latent factor that directly influences all of the observed symptom factors. In addition, styles of psychopathology are represented by three specific factors (internalising, externalising and thought disorder), each of which influences a smaller subset of observed symptom items and explains the variance of the observed symptoms after general psychopathology is accounted for. The classic higher-order or bifactor model generally assumes that the specific factors are uncorrelated. We therefore specified the specific factors as orthogonal. Moreover, although some models of *p* include an additional thought disorder factor, when a higher-order factor is included, there is no residual variance representing the thought disorders. Model fit was not improved with the inclusion of a specific thought disorder factor, and therefore we re-specified the models to be consistent with previous research (Caspi et al., 2014b; Romer et al., 2018a), whereby thought disorder is subsumed in *p*. Thus, the resulting models included only internalising and externalising as specific factors (Figure 1a). Model fits and factor loadings are presented in Table 1. The data fit the bifactor model well: χ^2 (36, N=1,324)=156.01, CFI=0.97, TLI=0.96, RMSEA=0.05 90% CI [0.04-0.06]; the CFI and TLI values were greater than 0.95 and the RMSEA value was less than 0.06, demonstrating good model fit (Hu & Bentler, 1999). Loadings on *p* were all positive and statistically significant ($p<0.05$) except for alcohol abuse ($p=.064$). The fit was slightly less good for the higher-order model (i.e., the CFI, TLI and RMSEA values do not quite reach the criteria used here for "good" model fit by some accounts (Hu & Bentler, 1999), other criteria would deem this model fit acceptable (Bollen & Curran, 2006)), where *p* does not load directly onto the observed variables, but instead loads onto the specific factors which in turn load onto the observed variables (Figure 1b): χ^2 (42, N=1,324)=286.65, CFI=0.95, TLI=0.93, RMSEA=0.07 90% CI [0.06-0.07]. Loadings on *p* were all positive and statistically significant ($p<0.05$). For both models, the loadings for the two specific factors (internalising and externalising) were all positive and statistically significant (all $p<.001$)(Table 1).

[INSERT FIGURE 1 AND TABLE 1 ABOUT HERE]

Statistical Analyses

Deriving factor scores for p, internalising and externalising

To assess the structure of general psychopathology in this sample, structural equation modelling was performed to derive latent factors for *p*, internalising and externalising using Onyx v 1.0-1026 (Oertzen et al., 2015) and the Lavaan package v 0.6-7 (Rosseel, 2012) for Rv4.2.2 (R Core Team, 2022). Factor scores for *p*, internalising and externalising were derived from the structural equation model using the R function 'lavPredict', which computes estimated values for latent variables in a model. To obtain reliability estimates (omega total and omega hierarchical), the function 'compRelSEM' from the package 'semTools' was used (Jorgensen et al., 2022), with *p* specified as the higher-order factor for the higher-order model.

Assessing the reliability of psychopathy facet scores

To investigate the internal consistency of the SRP-SF scale, the 'alpha' function from the package 'psych' was used (Revelle, 2024). To investigate how the different facets of psychopathy as assessed by the SRP related to each other, and to the derived factor scores for *p*, internalising and externalising, we performed correlations between these measures. Spearman's Rho correlations were performed because the data were non-normally distributed (assessed visually and via Shapiro-Wilk Test for Normality, *p*<.001), a common observation when investigating psychopathic traits among the general population (e.g., (Coid et al., 2009b).

Relating psychopathy facets to general psychopathology, internalising, and externalising

To investigate how the different observed facets of psychopathy relate to latent factors of psychopathology, six linear regression models were run predicting *p*, internalising and externalising scores, derived from the bifactor and higher-order structural equation models respectively. Both the Spearman's Rho correlations and linear regression models were run using JASP v0.18.1.3 (JASP Team, 2024) and the linear regression models were run in Rv4.2.2 (R Core Team, 2022). All models included sex and SES as additional regressors. Age was not included to balance degrees of

freedom in the models against the fact that the age range of the sample was relatively limited (18-22 years).

RESULTS

Descriptive Statistics

Descriptive statistics of the dimensional symptom variables (p, internalising and externalising) derived from the bifactor and higher-order models (both raw and log-transformed as used in the linear models), as well as psychopathy facet scores from the SRP are shown in Table 2. Mean SRP sub-facet scores were broadly in line from findings in other young adult community samples (e.g., (Foulkes et al., 2014; Gordts et al., 2017)).

[INSERT TABLE 2 ABOUT HERE]

Associations Between Variables

Correlations between factor scores of dimensional psychopathology (p, internalising and externalising scores) from the bifactor and higher-order models and the observed measures of interest (psychopathy facet scores) and covariates (SES and sex) are shown in Table 3.

[INSERT TABLE 3 ABOUT HERE]

To assess potential issues of multicollinearity among variables, the variance inflation factor (VIF) was calculated for each of the model terms. All VIFs were lower than 5 (SRP Interpersonal: 2.41; SRP Affective: 2.53; SRP Lifestyle: 2.02; SRP Antisocial: 1.41; SES: 1.02; Sex:1.18), suggesting there was no evidence of multicollinearity (Sheather, 2009). Therefore, all variables were included in a single model per predictor, and ordinary least squares regression was used.

To address our research question of how different facets of psychopathy relate to p, internalising and externalising, linear estimated ordinary least squares regression models were conducted predicting scores for p, internalising and externalising derived from the bifactor and higher-order models, with the SRP facets as predictor variables, and SES and sex included as

additional regressors. We first ran the linear regression models with 'raw' p, internalising and externalising scores, but the residuals in these models were not normally distributed. We therefore log-transformed the $p,$ internalising and externalising scores to use in the regression models. A constant of 2 was added to scores of p, internalising and externalising before the log transform to ensure that all data were positive and non-zero prior to transformation since the estimation of factor scores were roughly Z-scored and thus had negative values. All Cook's distance values in all models were less than 1, suggesting no datapoints had a large influence on the models (Speekenbrink, 2020). The coefficients of these models are presented in Table 4.

[INSERT TABLE 4 ABOUT HERE]

Higher SRP Lifestyle scores significantly correlated with higher p factor scores when controlling for all other variables. SES and sex were also significantly related to p; higher SES indicated lower p factor scores, whereas females were more likely to score higher on p than males. Results were comparable across the bifactor and higher-order models with the exception of sex, which did not significantly relate to p in the higher-order model (p=0.56).

Higher SRP interpersonal scores and higher SRP affective scores significantly related to higher internalising, even when controlling for all other variables. SES and sex also significantly correlated with internalising; higher SES indicated lower internalising scores, and females were more likely to score higher on internalising traits than males. Results were comparable across the bifactor and higher-order models with the exception of SRP Lifestyle scores, which were significantly related to internalising in the higher-order model only (p=0.03).

Lastly, higher SRP Lifestyle scores also significantly correlated with higher externalising scores when controlling for all other variables. SES and sex significantly correlated with externalising scores; higher SES indicated higher externalising scores, whereas females were more likely to score lower on externalising traits than males. Results were comparable across the bifactor and higher-order models.

DISCUSSION

This study examined the relationship between different psychopathic traits and general psychopathology (*p,* internalising and externalising) in young adult university students. Our findings demonstrated that the antisocial facet of psychopathy appears to be distinct from general psychopathology, whilst the lifestyle facet was correlated with general psychopathology as well as externalising. The interpersonal and affective facets were not related to general psychopathology, but were related to internalising. These findings suggest that measurement of key psychopathic traits involving severe and premeditated antisocial behaviour captures features distinct from general psychopathology, whereas impulsive and uninhibited (lifestyle) traits of psychopathy are related to general psychopathology.

The antisocial facet in this sample appears to be somewhat separate from the dimensional construct of general psychopathology. This finding is at odds with data from multiple countries showing a positive relationship between antisocial behaviour and both internalising and externalising (Lynam et al., 2000; Odgers et al., 2008; Pliszka et al., 2000; Vermeiren et al., 2002). Other work in incarcerated samples of adolescent males has found that those with higher psychopathy scores also exhibit higher levels of externalising such as aggression and substance abuse (Forth & Burke, 1998; Gretton et al., 2004). The pattern of our findings may be due, in part, to the fact that our study was conducted in a volunteer sample of university students with relatively low levels of psychopathic traits and severe antisocial behaviour. Moreover, the antisocial facet of psychopathy captures the most severe forms of proactive, premeditated aggression beyond what is expected in typical externalising behaviours (for example, "serious criminal behaviour", "trying to hit people with a vehicle"). As such, our findings indicate that presence of such premeditated antisocial behaviour is indeed differentiated from more commonly occurring externalising problems and general psychopathology, which are typically characterised by impulsivity or poor decision making.

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Prior theoretical and empirical work has suggested that the affective and interpersonal features of psychopathy may be somewhat distinct from common mental illness and general psychopathology (Benning et al., 2005; Cleckley, 1976; R. D. Hare & Neumann, 2008). For example, across independent undergraduate student samples and a sample of incarcerated men, prior work found that different features of psychopathic personality exhibit divergent relationships with internalising and externalising psychopathology - with affective and interpersonal features of psychopathy associated with lower anxiety and alcohol dependence, and impulsive antisocial features with higher anxiety and alcohol dependence (Benning et al., 2005). Our finding of the lifestyle vs. affective and interpersonal facets differentially relating to p factor and externalising vs. internalising psychopathology further underscores that different aspects of psychopathy may relate in different ways to specific dimensional subsets of psychopathology. The finding that the Lifestyle facet is related to general psychopathology and externalising is in line with prior research that has shown associations between antisocial lifestyle features of psychopathy and psychopathology (most strongly externalising, but in some cases internalising as well) (Blonigen et al., 2011; Patrick et al., 2005; Willemsen & Verhaeghe, 2012). Our finding that higher scores on the affective and interpersonal facets of psychopathy relate to higher internalising may appear at odds with prior findings of negative (or no) association between affective features and internalising traits (Willemsen & Verhaeghe, 2012). However, it is worth noting that neither affective nor interpersonal facets related to general psychopathology in our study and the internalising factor extracted from our models is not comparable to analyses using internalising scores that are not independent of general psychopathology. Furthermore, one prior study has reported a similar relationship in adolescent male offenders (although in this study, psychopathy was measured via the Youth Self-Report)(Sevecke et al., 2009). One reason for the inconsistency in findings across studies may be due to the structure of the bi-factor model, although our results were similar when using scores derived from the hierarchical model.

Interestingly, in other investigations of the *p* factor, it has often been found that males load higher on to *p* than females (Romer et al., 2018b, 2019, 2023), whereas we found that females tended to score higher on *p* than males. It's possible that these differences are due in part to the inclusion of psychopathy and delinquency measures in the modelling of *p*, but further research into sex-based associations with *p* is warranted in larger and more diverse samples.

Given that the externalizing latent factor was operationalized without including conduct problems or antisocial behaviour indicators (so as to avoid criterion overlap with the psychopathy facets indexed by the SRP-SF), the externalizing factor as modelled in this study is somewhat different from previous studies in that it primarily represented substance use. Therefore, this factor likely reflects a combination of disinhibition and addiction symptoms, with less representation of symptoms of antipathy or hostility. This could provide an alternative explanation for the lower correlations between psychopathy facets and psychopathology factors, including p and externalizing. It may also explain why the lifestyle facet most prominently represented by disinhibition showed more consistent relationships with the psychopathology factors.

It is well-established that symptoms of psychopathology are not static across the lifespan (Caspi et al., 2020). Although similar personality and neurocognitive features have been identified in adults with psychopathy and children with psychopathic traits and conduct problems, it is acknowledged that these features and behaviours also are not static (Fontaine et al., 2010; Viding & McCrory, 2018; Waller et al., 2013). However, much like the experience of one disorder predicting the later experience of other disorders (Caspi et al., 2020), psychopathic features are predictive of increased persistent antisocial behaviour and adult psychopathy (Hawes et al., 2018; Lynam et al., 2007; Viding & McCrory, 2018). Therefore, given the cross-sectional nature of our study and the fact that participants were young adults aged 18-22, it is possible that the relationships between facets of psychopathy and general psychopathology will be different at different points in time and across development, but also that psychopathic traits in early childhood would have predicted presentation at 18-22, and that features at 18-22 will be predictive of externalising and psychopathic

traits into mid-life. Future studies should use longitudinal designs to assess relationships between symptom patterns over time, which may also shed light on possible causal links between psychopathy and general psychopathology.

It is also important to note that the results of the regression analyses reflect the unique variance of each psychopathy facet when controlling for the others. In terms of the zero-order correlations, the relationships between all psychopathy facets and p, internalising and externalising are all of a similar magnitude (rhos of about 0.2), with the exception of the relationship between the lifestyle facet and externalising (rho of 0.4). Thus, the specific associations for the different facets shown in the regressions reflect results when controlling for the other facets and not just how these are defined in the raw scores. Moreover, the R^2 values were small in most cases, again suggesting that the models accounted for a relatively small amount of *unique* variance attributable to each specific facet.

Based on the results of this study, individuals who may benefit from general transdiagnostic approaches to address common internalising or externalising problems appear to be somewhat distinct from individuals with high levels of severe and persistent antisocial behaviour that is characteristic of the antisocial facet of psychopathy. Therefore, whilst those with high levels of some psychopathic traits such as lifestyle features may still benefit from general transdiagnostic intervention/prevention approaches, individuals with significant levels of proactive aggression/antisocial behaviour may need additional support which specifically addresses these behavioural features.

This study has several limitations. First, it is important to note that the data were collected from a convenience sample of volunteer undergraduate students. The levels of reported psychopathic traits were not as severe as would be expected in e.g., an incarcerated group of individuals or a sample of offenders, and findings about associations between persistent antisocial behaviour, psychopathy and general psychopathology should therefore be interpreted with this caveat in mind. However, prior work has found strong support for the four-factor latent variable

model of psychopathy reflected in the SRP subscales in a community sample, despite relatively low levels of psychopathic traits (Hare & Neumann, 2006). To this end, it also will be important for future studies to examine these associations in samples with more variation in demographic features such as socioeconomic status and age, as well as in clinical samples. Moreover, although we did not have specific hypotheses regarding the impact of sex on the association between psychopathy facets and general psychopathology, it would be useful for future work to examine these relationships in males versus females separately, rather than simply controlling for sex in the overall sample. Second, it is likely that the associations between psychopathy facets and general psychopathology are not static and change across development. The effects of shared and unique genetic and environmental risk factors shape the association between psychopathic traits and general psychopathology over time. Therefore, longitudinal studies combining multiple levels of information about risk (e.g., genetic, environmental, neurocognitive) are warranted. Such studies may also shed light on causal relationships between these features that were not possible to assess in the present cross-sectional analyses. However, causal specificity may in fact be impossible to determine if symptom profiles are dynamic and ever-changing, as demonstrated by longitudinal studies with decades of data (Caspi et al., 2020). Although commonly used across studies of psychopathy, the utility and validity of self-reported assessments of psychopathic traits have been questioned (Lilienfeld & Fowler, 2006), highlighting the importance of considering alternative or corroborating forms of assessments for these traits in future studies. Lastly, the inference drawn in this study somewhat assumes a binary description about whether psychopathy facets are distinct from or related to general psychopathology. In reality, these relationships are likely more nuanced, and this is highlighted by the fact that the effect sizes identified in this study were relatively small.

There are also a number of considerations about the interpretation of the p factor. Statistically, p is a latent variable estimated on a covariance matrix of psychopathology symptoms (Fried et al., 2021). As such, the interpretations of what p actually represents have been questioned, with alternative interpretations suggesting that p is simply a different way of showing that observed

factors (i.e., symptoms) are positively related (Bader & Moshagen, 2022; Bornovalova et al., 2020; Heinrich et al., 2023). In other words, some argue that *p* is simply the sum of its parts, and there has been much debate over the specific statistical approaches and frameworks used to model p (Fried et al., 2017, 2021; Greene et al., 2023; Watts et al., 2020, 2023). In short, the idea of the statistical model of p versus the conceptual idea of p (i.e., the concept that all psychopathology is influenced by common aetiology) have become conflated (for a recent comprehensive review of these debates, see (Caspi et al., 2024)). More research is warranted into the underlying mechanisms that generate the data used to derive *p*. However, investigating the *p* factor and general psychopathology as dimensional characteristics as opposed to discreet disorder categories is a crucial first step in describing how diverse symptoms relate to one another (Caspi & Moffitt, 2018). The *p* factor may be a more accurate representation of an individual's life and disease course, acknowledging the common co-occurrence of symptoms and the fact that symptoms ebb and flow across the lifespan.

CONCLUSIONS

Collectively, our findings suggest that psychopathic traits involving severe and premeditated antisocial behaviour are distinct from general psychopathology in a young adult volunteer sample, whereas impulsive and uninhibited (lifestyle) traits of psychopathy are a shared feature of general psychopathology. These findings are in contrast to prior research suggesting an inverse association between psychopathic traits and internalising symptoms, and encourage further examination of the association between psychopathic traits and internalising symptoms, including the use of person-centred models that would enable examination of whether such associations vary, for example, as a function of early life adversity (Kimonis, 2023). Further understanding how specific features of psychopathic traits are differentially related to general psychopathology in both community and high-risk or clinical/incarcerated samples is a crucial next step in helping identify individuals who may need additional support or different types of interventions beyond those broadly targeting transdiagnostic symptoms.

Author Contributions

Conceptualization: COC, JCF, EV; Methodology: COC, JCF, ARK, ALR, ARH; Formal Analysis: COC, JCF; Investigation: COC, JCF, ARK, ALR; Writing – original draft preparation: COC, JCF; Writing – Review & Editing: EV, ARH, ARK, ALR.

Conflicts of Interest

The authors declare that there were no conflicts of interest with respect to the authorship of the publication of this article.

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