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The network structure of psychopathic personality traits in a non-institutionalized sample

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Abstract

Central and peripheral traits of psychopathy remain highly debated and the contribution of positive adjustments in the psychopathy network is unclear. Indeed, the structure of psychopathic personality traits could vary across populations and settings. Using network analysis, we estimated a model based on the 18 Elemental Psychopathy Assessment facets in a large college student sample ($N = 2291$). We then examined the accuracy and stability of the network, and finally performed bootstrapped difference tests to determine central and peripheral traits involved in our model. Centrality indices were highly stable and emphasized the major contribution of Callousness, Dominance and Unconcern facets in the psychopathy network. Conversely, Thrill-seeking, Impersistence and Distrust facets were more peripheral in the network. Our results support that callousness is a reliable indicator of psychopathy regardless of the sample characteristics, and that some positive adjustments (i.e., boldness) could be useful to index psychopathy in non-incarcerated samples. Future research should investigate the network structure of psychopathic traits across different settings.

Keywords: psychopathy; psychopathic traits; boldness; emotional stability; network analysis.

1. Introduction

Despite the constant progression and the high level of research occurring during the last decades, psychopathy remains a largely debated concept. Classically, psychopathy has been described as a severe personality disorder and a categorical entity consisting of affective (callousness, lack of remorse/guilt), interpersonal (manipulative tendencies, grandiose sense of self-worth), erratic lifestyle (impulsivity, irresponsibility), and antisocial (disinhibition, criminal versatility) factors (Hare, 2003; Hare & Neumann, 2005). Recent approaches conceptualize psychopathy as a dimensional, even a multidimensional, construct referring to various profiles and associated with inconsistent manifestations at clinical and subclinical levels (Lilienfeld, Watts, Smith, Berg, & Latzman, 2015). The identification of central and peripheral traits in the psychopathy network is therefore of considerable importance, as it could impact the evaluation, prevention, and treatment of individuals displaying these characteristics.

Subtyping models distinguished between primary and secondary variants of psychopathy (e.g., Karpman, 1941; Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). Primary psychopathy refers to the affective deficits of psychopathy (e.g., lacking anxiety and fear). Secondary psychopathy is characterized by impulsivity and aggression, and may also exhibit heightened anxiety. An important body of literature supports the existence of these psychopathy variants in college samples (e.g., Falkenbach, Stern, & Creevy, 2014) which can be differentiated by anxiety, borderline and narcissistic traits levels. Psychopathy could thus be conceived as a configuration of different traits with varied expressions.

Nevertheless, if some traits such as egocentricity, callousness, manipulation and poor impulse control are consensually admitted as relevant to the construct, others, including positive adjustment, are debated. These debated components were grouped under the appellations of "boldness" for the Triarchic Psychopathy Measure (TriPM; Patrick, 2010),

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"fearless dominance" for the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005), or "emotional stability" for the Elemental Psychopathy Assessment (EPA; Lynam et al., 2011)¹. Boldness-related traits all refer to high self-assurance, social efficacy and capacity to remain calm and focused despite danger and stressful events. The Triarchic Model of Psychopathy (Patrick et al., 2009) considers boldness, with meanness (coldheartedness) and disinhibition (poor impulse control), as a core component of the construct. This model, based on an extensive review of psychopathy literature, aims to return to Cleckley's (1941) original description of psychopathic personalities and to overcome the limitations of classical evaluation tools. Indeed, boldness-related traits are weakly represented in historical measures of psychopathy such as the Psychopathy Checklist-Revised (PCL-R; Hare, 2003). Since participants in the PCL development sample were all criminals, positive adjustment indicators, less frequent in carceral populations, were dropped out in the item selection process, while they were highly represented in Cleckley's descriptions.

Consequently, data regarding the involvement of boldness-related traits in the psychopathy construct are conflicting and provide material for a debate on the nature of this disorder (Lilienfeld et al., 2012; Lynam & Miller, 2012). On the one hand, two influential meta-analyses (Marcus, Fulton, & Edens, 2013; Miller & Lynam, 2012) have reported a reduced association of boldness-related traits with total and factor scores of the PCL-R. On the other hand, another meta-analysis (Lilienfeld et al., 2016), and a study based on clinical perceptions (Berg, Lilienfeld, & Sellbom, 2017) have shown that boldness is not significantly less related to global psychopathy than are the other facets when analyses were performed on non-PCL-R measures.

¹ Throughout the article, we reference these traits collectively as boldness-related traits but use original appellations when discussing specific measures.

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Research in this field has impacted psychiatric classifications. Although the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM–5; APA, 2013) had retained a categorical model of personality for its main part (Section II), an alternative model, that used dimensional traits and impairments, was placed in Section III. Regarding Antisocial Personality Disorder (ASPD), this alternative model has shown to outperform Section II in predicting psychopathic traits (Few, Lynam, Maples, MacKillop, & Miller, 2015; Wygant et al., 2016). Section III also includes a psychopathy specifier added to reflect boldness-related traits (low anxiety, low withdrawal, and attention seeking). Here again, results are unclear and the relevance of the specifier in predicting psychopathy is still debated. Thus, these advances have yet to reach a consensus on the atypical nature of psychopathy. Nevertheless, several possibilities are available to address this issue, among which (1) a better connection between psychopathic traits and science of personality, and (2) the use of innovative methods to determine the central traits of the psychopathy network.

Indeed, it seems now accepted that psychopathy can be understood and assessed through general models of personality such as the Five Factor Model (FFM; Costa & McCrae, 1992). Expert-rater, translational, and empirical approaches both emphasize psychopathy in terms of Neuroticism (impulsiveness), Extraversion (low warmth and high excitement seeking), Agreeableness (low straightforwardness, low altruism, low compliance, low modesty, and low tender-mindedness) and Conscientiousness (low dutifulness, low self-discipline, and low deliberation) (for a review see Lynam, Miller, & Derefinko, 2018). However, a restriction of this approach is its limited ability to encompass extreme levels of personality traits. Lynam et al. (2011) brought an important contribution to this topic by developing the Elemental Psychopathy Assessment (EPA), a self-report questionnaire assessing maladaptive variants of 18 FFM facets closely related to psychopathy measures. The EPA has shown its construct validity by substantial convergent correlations with well-

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validated psychopathy measures, self-reported antisocial behavior, reactive and proactive aggression, and substance use (e.g., Lynam et al., 2011; Wilson, Miller, Zeichner, Lynam, & Widiger, 2011). All in all, a better connection between psychopathy and general personality literature could help to overcome some disagreements, regarding core traits of psychopathy, and to reduce the gap between these two fields.

Concurrently, innovative statistical tools, such as network analysis, have taken an increasingly important place in psychopathology research, and more recently in psychopathy research. The classical view describes symptoms as passive indicators of an underlying disease. Conversely, for the network approach (Borsboom & Cramer, 2013), psychopathological constructs, such as personality disorders, may be conceptualized based on direct causal relationships between traits or symptoms. Psychological networks consist of nodes representing observed variables, connected by edges representing statistical relationships. Regarding psychopathic traits, Verschuere et al. (2018), in a network analysis of the PCL-R in three large samples, identified "Callousness/lack of empathy" as the most central traits for two US offender samples, and "Irresponsibility", "Parasitic Lifestyle" and "Callousness/lack of empathy" as especially central to the networks for a Dutch forensic psychiatric sample. Similarly, Prezler, Marcus, Edens, and McDermott (2018) underlined the high centrality of the affective factor, more especially "Lack of remorse", in the psychopathy network of forensic and civilly committed individuals. Conversely, interpersonal, lifestyle, and antisocial factors had a more peripheral position in the network.

These results raise the importance of replicating network analyses across different populations. The network of psychopathic traits could be substantially different in the general population. To our knowledge, no study has proposed a network analysis of psychopathy, based on a general personality model, in a community sample. So, the objective of this study

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is to fill this gap by proposing a network analysis of psychopathic traits in a student sample using the Elemental Psychopathy Assessment.

2. Method

2.1. Participants and procedure

The data were collected through an online survey that was distributed to students from different French universities. The link was shared on social networks in groups specifically dedicated to students. The final sample consisted of 2291 young adults (737 males, 32%; 1554 females, 68%) of which 8% of the data were previously excluded (outliers). Participants ranged in age from 18 to 28 years old ($M = 19.9 \pm 1.95$). Regarding the education domain of the participants, 31% were students in medical and paramedical courses, 13% in human sciences, 11% in science or engineering, 8% in law, 8% in economics, commerce, management or communication, 5% in letters, 5% in education or pedagogy, 4% in history, geography, or political science, 1% in art and design, 1% in art history or archaeology, 0.48% in philosophy and 13% were students in another field. The objectives of the study were presented to all participants at the beginning of the online questionnaire, specifying that this was a study on personality and behaviors. The participants were assured of the anonymity of their answers. The study followed the guidelines of the Helsinki declaration. Ethical issues of the current research were explored at a research meeting.

2.2. Materials

Psychopathic traits were assessed using The Elemental Psychopathy Assessment-Short Form (EPA-SF; Lynam et al., 2013). It is a 72-item inventory, rated on a 5-point scale, that assesses 18 facets (with 4 items each) identified as descriptive of psychopathy: Distrust, Manipulation, Self-Centeredness, Opposition, Arrogance, Callousness, Disobliged, Impersistence, Rashness, Coldness, Dominance, Thrill-Seeking, Unconcern, Anger, Self-Contentment, Self-Assurance, Urgency, and Invulnerability. These 18 facets can also be

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combined into a total score or used to score four factors: Interpersonal Antagonism (e.g., "Other people describe me as cold-hearted") Emotional Stability (e.g., "I'm not the type to get depressed about the things I've done wrong"), Disinhibition (e.g., "I tend to jump right into things without thinking very far ahead") and Narcissism (e.g., "I deserve special treatment").

2.3. Data analysis

We used the *bootnet* R-package (Epskamp, Borsboom, & Fried, 2018) to estimate a network model based on the facets of the Elemental Psychopathy Assessment Short-Form (EPA-SF), and the *qgraph* package (Epskamp, Cramer, Waldorp, Schmittmann, & Borsboom, 2012) to plot the network. The network structure is a Gaussian graphical model, which is a network of partial correlation coefficients. In line with Epskamp et al. (2018) recommendations, we (1) estimated the accuracy of edge-weights, by drawing bootstrapped confidence intervals, (2) investigated the stability of centrality indices, and (3) performed bootstrapped difference tests between edge-weights and centrality indices to test whether these differ significantly from each other.

2.3.1. Network estimation and measures of node centrality

A network consists of nodes (in our case the EPA-SF facets) and edges (relationships between nodes). In the visualization of the network, nodes represent the 18 psychopathic traits measured by the EPA-SF. The thickness and the color of edges represent their association strength and valence (red: negative association, green: positive association). More influential nodes are central to the network, and stronger connected nodes closer together in the network.

Using *qgraph* package, we calculated three indices of centrality: strength, closeness, and betweenness. Strength refers to how well a node is directly connected to other nodes. Closeness reflects how well a node is indirectly connected to other nodes. Betweenness refers to how important a node is in the average path between two other nodes. From a clinical standpoint, a node high in strength is likely to activate many other nodes and may be a good

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target for intervention (Fried et al., 2017). This is why we only used strength - which is considered the main indicator of centrality - to relate the centrality of facets in the network. Nonetheless, we reported closeness and betweenness to make available all the metrics favoring an understanding of the network structure.

2.3.2. *Stability of the centrality indices and centrality differences*

We then investigated the stability of the centrality order indices based on subsets of the data. In the network perspective, stability refers to the network resistance to change if selected participants were dropped from the analyses. The stability of the centrality order can be determined with subset bootstrapping using the *bootnet* R-package which provide this indicator over a wide range of sampled participants. To quantify the stability of centrality indices it is possible to use a correlation stability coefficient (*CS*-coefficient). In line with Epskamp et al. (2018), *CS* ($cor = 0.7$) represent the maximum proportion of cases that can be dropped, such that with 95% probability the correlation between original centrality indices and centrality of networks based on subsets is 0.7 or higher (very large effect). To interpret centrality differences the *CS*-coefficient should not be below 0.25, and preferably above 0.5.

Finally, we used *bootnet* R-package to conduct bootstrapped difference tests on the centrality indices to identify eventual significant differences in centrality.

2.3.3. *Supplementary materials*

We make all model output (e.g. bootstrapped edge-weights, centrality stability test, centrality difference test, items and subscales of the EPA-SF) available in the supplementary materials.

3. Results

3.1. *Network structure of the 18 EPA-SF facets*

The left side of Figure 1 displays the correlational structure of the EPA-SF facets in our sample. The strength of the relations between EPA-SF facets (main indicator of centrality)

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translates into the thickness of the edges between them and the distance that they are plotted from each other. The estimated network is characterized by strong edges between Antagonism facets such as Self-centeredness and Callousness, between Emotional Stability facets such as Unconcern and Self-contentment, and Unconcern and Invulnerability, and between Narcissism facets such as Self-assurance and Dominance. We can also observe a strong edge between Urgency and Anger, two facets of different psychopathy factors (Disinhibition and Narcissism, respectively). Interestingly, we also obtained several negative edges between Emotional Stability and Disinhibition facets.

3.2. Centrality indices and network stability

The right side of Figure 1 depicts the strength, closeness, and betweenness of the 18 facets. Centrality differences analysis regarding the strength (available in the supplementary materials) has shown that Callousness, Dominance, Unconcern were the most central facets in the network. These three facets, which did not differ significantly from each other, showed a significantly higher strength than thirteen other facets in the network. Conversely, Arrogance, Coldness, Thrill-seeking, and Distrust, did not differ from each other and had significantly lower levels of strength than all other facets of the network.

The results of stability and accuracy analysis available in the supplementary materials indicated that our network was accurately estimated. Confidence intervals around edge weights were very small and the *CS*-coefficient was .75 for strength and closeness and .67 for betweenness, suggesting that centrality indices were highly stable and well over the recommended value of .50, which allows for interpreting differences in centrality.

4. Discussion

This study aimed to investigate the network structure of psychopathic personality traits in non-institutionalized settings. To that end, we assessed the 18 facets composing the EPA-SF in a large college student sample ($N = 2291$). We first estimated a network model based on

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the EPA-SF facets, then we examined accuracy and stability of the network, and finally performed bootstrapped difference tests to determine central and peripheral traits involved in the psychopathy network. Using the EPA-SF, which includes an Emotional Stability factor, we proposed a model of psychopathy perceived as a complex system of positive adjustments and maladaptive characteristics.

Despite these singularities, our study can be compared to previous network analysis evaluating psychopathic traits in incarcerated samples. Indeed, our results suggest that Callousness is the most central traits in the psychopathy network, which clearly supports recent findings in this field (Prezler et al., 2018; Verschuere et al., 2018). For instance, Verschuere et al. reported that the "Callous/lack of empathy" factor, as evaluated by the PCL-R, was the most central traits in two US offender samples, and one of the three most important traits in a Dutch psychiatric offender sample. According to early clinical descriptions (e.g., Cleckley, 1941; Gough, 1948) and more recent works on youth psychopathy (e.g., Frick, Ray, Thornton, & Kahn, 2014), callousness/lack of guilt and empathy, also called callous-unemotional (CU) traits, seem to be powerful markers of psychopathy, and this regardless of the sample characteristics.

Our results also provide information about the role of boldness-related traits in the psychopathy construct. Among Emotional Stability facets, Unconcern showed strong direct and indirect connections with the other nodes and was one of the three most central facets in the network. Invulnerability, and Self-contentment, although not among the most central facets, have shown intermediate levels of strength. However, negative correlations observed between Emotional Stability facets and Urgency, Anger, Impersistence, Dominance, and Distrust do not allow to claim that Emotional Stability is fully central in the psychopathy network. Conversely, Thrill-seeking, Impersistence (i.e., Disinhibition), Coldness, and Distrust (i.e., Antagonism) displayed more peripheral place in the network. Narcissism factor,

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including Dominance and Anger facets, brought a significant and stable contribution in the psychopathy network.

These network differences between populations could be explained by the social valuation of certain traits and their ability to lead to success and social adjustment. Boldness-related traits could foster social integration and academic success (Guelker, 2012), while callousness and dominance can be considered as a resource to build success in competitive environments. Conversely, antagonism and disinhibition traits such as Thrill-seeking, Impersistence, Distrust, linked to more explosive and reprehensible behaviors, would lead to institutionalization and poor achievement (DeLisi, 2019). As a result, the network of psychopathy could simply be a reflection of the environment in which individuals evolve and the adjustments that they have been able to put in place. Moreover, it is possible that the negative impact of Narcissism and Antagonism on externalizing behaviors or socialization depends on the levels of Emotional Stability and Disinhibition. As some authors have already pointed out (e.g., Marcus et al., 2013), it is, therefore, essential to increase research on the interactions between psychopathic traits to predict their outcomes. Similarly, it is necessary to consider carefully psychopathy subtypes in college students. Primary and secondary psychopathy have also been differentiated on general personality dimensions (Neuroticism, Conscientiousness, Openness, Extraversion) and may be associated with different behavioral manifestations (Falkenbach, Reinhard, & Zappala, 2019).

This study has several limitations. First, all participants were young adults recruited in a community sample of college students. The generalization of our results is therefore limited by these characteristics and may not be appropriate to other types of populations. Yet, the dimensional approach to personality disorders proposed in recent research (see HiTOP project, Krueger et al., 2018) implies continuity of personality traits between clinical and general populations, thus demanding evidence in supposed healthy populations. Second, our

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results may have been influenced by the high proportion of medical and paramedical students in the sample (31%). Indeed, some findings suggest a possible link between subclinical psychopathic tendencies and field of study. For instance, commerce students displayed increased scores on primary psychopathy than arts, science and law students (e.g., Wilson & McCarthy, 2011). Third, although internet data collection methods, using online completion of self-report questionnaires have shown to be consistent with more traditional methods (Gosling, Vazire, Srivastava, & John, 2004), it cannot be excluded that participant self-selection may have biased the results. However, there is also scientific evidence available that Internet-based data collections are commonly able to produce generalizable results (e.g., Best, Krueger, Hubbard, & Smith, 2001). Fourth, the use of a self-report scale to assess psychopathic traits could be arguable, given the tendency to deception, manipulation and lie observed in these individuals. Nevertheless, meta-analytic data showed that psychopathy scores were moderately and negatively associated with social desirability and faking good (Ray, Weir, Poythress, & Rickelm, 2011) and self-report questionnaires are consensually accepted as the best tools for assessing psychopathy in non-institutionalized settings (e.g., Sellbom, Lilienfeld, Fowler, & McCrary, 2018). So far, there is no reason to assert the invalidity of such measures. Furthermore, Verschuere et al. (2018) have underlined the importance of being able to supplement the PCL-R studies contribution, particularly regarding network analysis and boldness-related traits implication. Our study directly addressed these issues. Fifth, some studies have shown that psychopathy may have a different gender expression (e.g., Salekin, Rogers, & Sewell, 1997). Given that the previous network analyses focused on male samples, and given the large proportion of women in our sample, our results may reflect a gender difference rather than a forensic vs community sample difference. Additionally, previous network analyses of psychopathy did not use tools evaluating

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boldness-related traits. Therefore, it would be interesting to promote boldness assessment in the forensic population to draw more accurate conclusions.

Despite these limitations, our study has several strengths. The recruitment of a large sample of participants, the use of a well-validated tool to evaluate psychopathy based on a general personality model, and the innovative statistical procedures performed are important to emphasize. Regarding clinical and theoretical implications, our results suggest that psychopathy encompasses a set of dominance and callousness traits regardless of the sample characteristics, while some Emotional Stability and Disinhibition facets contribution (e.g., Unconcern, Thrill-seeking, Impersistence) could differ between carceral and community individuals. However, given that stability and replicability of network analyses of mental disorders is unclear, our results should be interpreted with caution, and their replication in other community samples is essential.

Future research should include more detailed analyses of potentially pertinent demographic variables and should investigate the network structure of psychopathic traits across different samples to highlight the paradoxical condition of psychopathic personality traits.

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Declaration of interest

The authors report no conflicts of interest.

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PSYCHOPATHY NETWORK

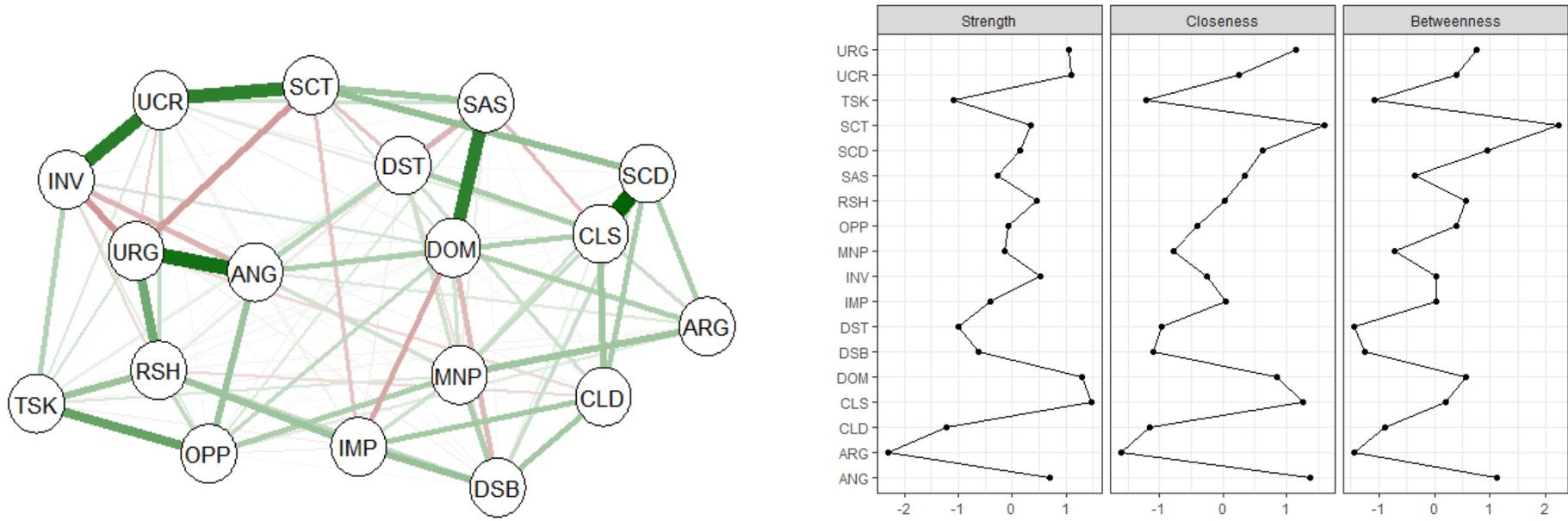


Fig. 1. Estimated network structure of 18 psychopathic traits (left panel) and the corresponding centrality indices (right panel). Centrality indices are shown as standardized z-scores. The network structure is a Gaussian graphical model, which is a network of partial correlation coefficient. Positive correlations plotted in green, negative correlations plotted in red. Nodes represent the EPA-SF facets: ANG = anger, ARG = arrogance, CLS = Callousness, CLD = coldness, DSB = disobliged, DST = distrust, DOM = dominance, IMP = impersistence, INV = invulnerability, MNP = manipulation, OPP = opposition, RSH = rashness, SAS = self-assurance, SCD = self-centeredness, SCT = self-contentment, TSK = thrill-seeking, UCR = unconcern, URG = urgency.