



Exploring the associations between psychodynamic constructs and psychopathology: A network approach

Larissa Vierl^{1,2} | Florian Juen^{1,3} | Cord Benecke² | Susanne Hörz-Sagstetter^{1,4}

¹Akademie für Psychoanalyse und Psychotherapie München e.V., Munich, Germany

²Department of Psychology, University of Kassel, Kassel, Germany

³Department of Psychology, University of Innsbruck, Innsbruck, Austria

⁴Psychologische Hochschule Berlin, Berlin, Germany

Correspondence

Larissa Vierl, Akademie für Psychoanalyse und Psychotherapie München e.V., Schwanthalerstraße 106, 80339 Munich, Germany.
Email: larissa.vierl@med.uni-muenchen.de

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Abstract

Psychodynamic therapy effectively reduces symptomatology by focusing on underlying (unconscious) processes instead of symptoms. Nevertheless, the exact interrelationship between psychodynamic constructs and psychopathology remains unclear. This study uses network analysis to explore these associations.

We computed a cross-sectional partial correlation network between psychodynamic constructs (i.e., personality functioning, interpersonal relations, and active and passive modes of intrapsychic conflicts according to the Operationalized Psychodynamic Diagnostics [OPD] system) and psychopathology (i.e., depression and somatization) in a naturalistic sample of 341 adults registering for psychodynamic outpatient therapy. We estimated node centrality, node predictability, and bridge symptoms and used community detection analysis. Bootstrap methods were applied to assess network stability.

Psychodynamic constructs and psychopathology resulted in separate but connected clusters. Personality functioning emerged as the most influential node in the network and was bridging the clusters. The network was found to be highly stable, allowing reliable interpretations.

The results offer important insights on how psychodynamic constructs relate to psychopathology, which can be used to inform treatment approaches. The findings suggest that personality functioning may be an important intervention target. However, future research is needed to include a broader range of diagnoses. In addition, longitudinal studies may clarify the direction of causality.

INTRODUCTION

Psychodynamic therapy (PDT) is an umbrella term denoting different psychotherapeutic modalities based on psychoanalytic and psychodynamic principles. While some current methods differ substantially from the

original psychoanalytic therapy of Sigmund Freud (e.g., transference-focused psychotherapy; Kernberg et al., 2008), all methods share the focus on psychological roots of emotional suffering, which are thought to often be unconscious (Boll-Klatt & Kohrs, 2018). According to psychodynamic theory, gaining insight into unconscious

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or partially unconscious processes underlying the disorder is mutative and ultimately may decrease symptomatology (Benecke, 2014). Overall, PDT has proven effective across various mental disorders (Fonagy, 2015) and different treatment modalities (Abbass et al., 2021; Woll & Schönbrodt, 2020).

The Operationalized Psychodynamic Diagnostics (OPD) system was developed as a multiaxial diagnostic and classification system based on psychodynamic principles (OPD Task Force, 2001; 2008). The second edition (OPD-2; OPD Task Force, 2008) can be used for standardized diagnostics, treatment planning, and process evaluation. It also contributed to (scientific) communication within the field due to its precision in terminology. Five axes can be assessed: (I) Experience of illness and prerequisites for treatment; (II) interpersonal relations; (III) intrapsychic conflicts; (IV) personality functioning, i.e. “structure”; and (V) mental and psychosomatic disorders according to the International Classification of Diseases (11th ed.; ICD-11; World Health Organization, 2019) or the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013). The axes can be reliably rated through a 1- to 2-h psychodynamic interview by trained clinicians (Cierpka et al., 2007; Zimmermann et al., 2010) or through time-economic empirically supported questionnaires (e.g., Benecke et al., 2018; Ehrental et al., 2012). The three axes most relevant for the psychodynamic approach (axes II, III, and IV) will be described briefly in the following. A detailed description of the axes can be found in the OPD-2 (OPD Task Force, 2008).

Interpersonal relations are conceptualized as repetitive maladaptive interpersonal behaviour patterns that are thought to play a pivotal role in developing and maintaining mental disorders (Benjamin, 1974; Luborsky & Crits-Christoph, 1997). The axis captures subjective experiences concerning oneself and others and the environmental response. The variety of (dysfunctional) interpersonal behaviour patterns is structured as a circumplex model (i.e., a two-dimensional, circular space), which is defined by two orthogonal, bipolar interpersonal dimensions on the axes affiliation (hostility vs. friendliness) and control (dominance vs. submissiveness) (Benjamin, 1974). In addition, the circumplex space is divided into octants that reflect eight specific interpersonal traits (i.e., domineering, vindictive, cold, socially inhibited, nonassertive, overly accommodating, self-sacrificing, and intrusive).

Intrapsychic conflicts can be understood as common, life-determining motives in crucial life areas (e.g., relationships, the family of origin, and profession)

and are considered to be central in many mental disorders. The OPD distinguishes seven topics of intrapsychic conflicts (i.e., individuation vs. dependency, submission vs. control, need for care vs. self-sufficiency, conflict of self-value, guilt conflict, oedipal conflict, and identity conflict) and describes a separate category for a limited perception of conflicts and feelings. The predominant way of dealing with the conflict can be rated as active, passive, or a combination of both modes. The two modes (i.e., active and passive) represent the extreme ways of dealing with the unconscious inner conflict while defending against typical aspects of the conflict. Defence is a psychic process that helps a person distance oneself from the full awareness of unpleasant and frightening thoughts, feelings, and behaviours (Freud, 1938). The passive modes are generally associated with a more regressive behaviour. For example, patients in the passive mode tend to show an exaggerated need for closeness or may express wishes concerning security and care. In contrast, patients in the active modes often behave contrary to their true feelings (i.e., “reaction formation”). For example, in the active mode of the individuation vs. dependency conflict, attachment needs are suppressed and interpersonal closeness is avoided in favour of an exaggerated need for autonomy (OPD Task Force, 2008).

The OPD *Level of Structural Integration Axis* (OPD-LSIA) is “a measure of individual differences in severity of personality dysfunction” (Zimmermann et al., 2012, p. 1). The level of structural integration, synonymous with personality functioning, is operationalized by the OPD by four dimensions with a self-related and an object-related subdomain each (i.e., perception, regulation, communication, and attachment), describing fundamental psychic capacities. The OPD differentiates four levels of structural integration (high, moderate, low integrated, and disintegrated level of structural integration). The level of structural integration of a patient provides crucial information for choosing suitable psychotherapeutic methods (e.g., more supportive for structurally impaired patients vs. more expressive techniques for structurally less impaired patients) (Rudolf, 2010).

In psychodynamic theory, the above-mentioned constructs are underlying factors for developing and maintaining psychopathology and are, therefore, central in PDT (Ermann, 2020). It has been shown that all constructs are positively associated with general psychopathology (Benecke et al., 2018; Henkel et al., 2022; Zimmermann et al., 2012). Frank and Huber (2021) demonstrated that an improvement in the level of structural integration during inpatient PDT is connected to symptom reduction. Structural integration has also been

related to the severity of post-traumatic stress symptomatology (Baie et al., 2020) and has been found to mediate between child maltreatment and psychopathology (Freier et al., 2021; Krakau et al., 2021).

High levels of intrapsychic conflicts have been found to be associated with symptom severity and impairment of life satisfaction (Benecke et al., 2018). These connections become particularly clear in the passive modes of conflict processing, as those are more often associated with negative affect (Benecke et al., 2018). For example, a high passive mode in the conflict of self-value is associated with low self-esteem and shame, resulting in a high symptom burden. In contrast, a strong active mode in this conflict reflects a narcissistic pattern, with patients being very convinced of themselves. As long as this pattern can be maintained, the person feels confident, and no symptoms are shown; only when the coping mode collapses may severe symptoms develop. Consequently, patients in the active mode show a reduced awareness of their problematic personality traits, resulting in less psychological strain (Henkel et al., 2022).

Finally, the overall level of interpersonal difficulties has been found to be associated with poorer treatment outcomes (Ruiz et al., 2004) and has been shown to be related to symptomatology across different psychiatric disorders (McEvoy et al., 2013). Moreover, greater interpersonal difficulties have been found to be associated with lower levels of self-esteem, psychological distress, and psychological functioning (Lo Coco et al., 2018). Yet, inconsistent findings have been found in the associations between the specific interpersonal traits and treatment outcomes. While some studies have found hostile or dominant interpersonal problems linked with poorer outcomes (Alden & Capreol, 1993; Horowitz et al., 1993), others have found no association of specific interpersonal problems with negative treatment outcomes (Puschner et al., 2005; Ruiz et al., 2004).

Taken together, all of the above-mentioned psychodynamic constructs have been found to be related to psychopathology. Traditional statistic methods, however, cannot assess relations simultaneously. However, understanding the complex associations between psychodynamic constructs and psychopathology is essential to increasing research and treatment progress. One statistical method suited to assess associations simultaneously is network analysis (Borsboom & Cramer, 2013). Network analysis is a fairly new data analysis technique used in psychological research to improve our understanding of complex associations in psychopathology (Borsboom & Cramer, 2013). The approach captures and visualizes the relationships between given constructs in

a data-driven manner (Boschloo et al., 2015). All included variables are considered within one statistical model, allowing to calculate correlations between all pairs of variables while partialling out the effect of all other included variables (Borsboom & Cramer, 2013). Each variable is represented by a “node,” whereas an “edge” represents the relationship between two nodes (e.g., partial correlation). If two variables are statistically independent after controlling for all of the other nodes in the network, then no edge will be present between the two nodes (Epskamp & Fried, 2018). Network analysis can identify specific nodes that are most central to the network. Applied to clinical data, these nodes are hypothesised to play a crucial role in maintaining psychopathology, as they are more strongly connected to other nodes in the network than less central nodes (Robinaugh et al., 2016). Theoretically, treatment efficacy may be maximized by interventions targeting central symptoms, as they should deactivate many other symptoms within the network (McNally, 2016). This is supported by studies, finding central symptoms to better predict treatment outcome than peripheral symptoms (e.g., Levinson et al., 2022; Olatunji et al., 2018). Network analysis can also be used to identify which nodes cluster together (Newman & Girvan, 2004) and which nodes link specific clusters (i.e., bridge symptoms) (Jones et al., 2019). Clinically, identifying bridge symptoms offers empirical information about how a symptom of one cluster might activate symptoms of another cluster, thereby helping clinicians to identify targets for interventions that could potentially disrupt the flow between comorbid disorders (Levinson et al., 2018). Viewing the relations between symptoms as paramount in choosing an intervention shifts away from current treatment approaches that rely on distinct disorders (Borsboom & Cramer, 2013). Taken together, the network analysis approach holds significant promise in moving psychopathology research forward, because the results can improve our understanding of psychopathology and treatment approaches (McNally, 2016). Therefore, an increasing amount of studies have used network models to study associations between symptoms of mental disorders and have used bridge symptoms to understand comorbidity (e.g., Contreras et al., 2019; Monteleone & Cascino, 2021). However, network analysis can not only elucidate interactions on the symptom level but also provide the opportunity to decipher the interrelationships among higher order constructs, such as subscales or global scores (Hoorelbeke et al., 2016). The decision to estimate the network on an item, subscale, or global score level depends on the research question (De Beurs et al., 2019).

AIM OF THE PRESENT STUDY

The network approach could also be used to provide new insights into how psychodynamic constructs relate to psychopathology. Therefore, the present study employed network analysis to explore the associations between psychodynamic constructs and psychopathology. The aims of the study were (i) to evaluate how psychodynamic constructs (i.e., interpersonal relations, active and passive modes of intrapsychic conflicts, and level of structural integration according to the OPD) are associated with psychopathology (i.e., depression and somatization), (ii) to perform network inference parameters to detect the node that is most important within the network, (iii) to use bridge centrality to examine which psychodynamic construct has the strongest connection with psychopathology, and (iv) to detect communities within the network to examine if psychodynamic constructs are conceptually different to psychopathology or whether they build a shared cluster.

We expected psychodynamic constructs and psychopathology to allocate in two distinct clusters with positive interrelations between the clusters based on psychodynamic theory. A great association is expected between depression and somatization because somatic components are common in depressive disorders. Further, according to previous findings, we expected a great association between psychopathology and the level of structural integration and a more significant association between psychopathology and the passive mode of conflict coping than the active mode. Due to the exploratory character of the present study, no hypotheses were formed regarding the most critical construct in the network and regarding bridge symptoms.

METHODS

Participants and procedure

We investigated a sample of treatment-seeking adults who registered for outpatient psychodynamic psychotherapy at the “Akademie für Psychoanalyse und Psychotherapie München e.V.” in Munich, Germany. The institute offers psychodynamic and psychoanalytic individual and group therapy for children, adolescents, and adult patients and is a training institute for psychodynamic and psychoanalytic treatment. Patients who register for outpatient treatment are invited to a personal interview at the institute, where they receive extensive psychiatric assessments performed by experienced psychiatrists and psychologists. After the interview, the patients receive

treatment recommendations and contacts of eligible psychotherapists.

At first contact, all consecutive adult patients who registered between September 2020 and January 2022 ($n = 1104$) were asked to complete basic documentation for quality assurance, which comprises a battery of socio-demographic and clinical measures. Those who agreed to participate ($n = 838$, consent rate: 75.9%) were sent a link to an online survey via e-mail. Of those who received the e-mail ($n = 812$), $n = 368$ completed the questionnaire battery (response rate: 45.3%). Only adult patients (age ≥ 18 years) who completed all questionnaires and had no more than 10% of missing items in each questionnaire were included in the data analysis. In the case of several registrations, only data of the first registration to the outpatient clinic were used, such that no patient was included twice. No other inclusion criteria were set. The final sample of the present study consisted of $N = 341$ patients (70.7% female; age: $M = 34.5$, $SD = 12.5$, range = 18–79). All participants gave written and signed informed consent to scientifically use data in a pseudonymised form.

Measures

Psychopathology

Two subscales of the German version of the Patient Health Questionnaire (PHQ-D; Löwe et al., 2002), an established self-assessment screening instrument for common mental disorders, were used to assess the patients' current depressive and somatic symptoms. The severity of somatization was assessed with the subscale PHQ-15, which assesses the fifteen most common somatic symptoms (e.g., stomach pain, back pain, and dizziness) according to the DSM-5. Thirteen items were rated on a scale from 0 (*not bothered at all*) to 2 (*bothered a lot*), and two items were rated on a scale from 0 (*not at all*) to 2 (*nearly every day*). The severity of depressive symptoms was assessed with nine items of the subscale PHQ-9 ranging from 0 (*not at all*) to 3 (*nearly every day*), corresponding to the DSM-5 symptoms for major depressive disorder. Total scores on both instruments are computed as the sum score of the items, thus representing the severity level of the disorders. PHQ-15 total scores can range from 0 to 30, where scores of 5, 10, and 15 represent cut-off points for mild, moderate, and severe somatic symptoms. PHQ-9 total scores can range between 0 and 27. Scores of 5, 10, 15, and 20 represent cut-off points for mild, moderate, moderately severe, and severe depression. Good psychometric properties of both subscales were demonstrated, with high internal reliability

values for both scales with Cronbach alpha ranging between 0.79 and 0.88 (Gräfe et al., 2004). Further, good levels of validity have been reported, by validating the PHQ-D against the Structured Clinical Interview for DSM-IV (SCID-IV) using clinical and nonclinical German samples (Gräfe et al., 2004). In the current sample, Cronbach alpha for the PHQ-15 was 0.78 and for the PHQ-9 0.85.

Psychodynamic constructs

The short form of the Inventory of Interpersonal Problems (IIP-32; Horowitz et al., 2000; Thomas et al., 2011) was applied to assess interpersonal problems. The IIP-32 is a brief, self-administered questionnaire consisting of 32 items rated on a five-point Likert scale from 0 (*not at all*) to 4 (*very much*). The items were divided into the first 19 questions beginning with the phrase “It is hard for me to ... ,” and the remaining 13 questions asking about behaviours that “are done too much.” The IIP-32 is based on the interpersonal circumplex model (Horowitz, 1996). Each item belongs to one of the octants of the interpersonal circumplex along the dimensions of dominance and affiliation (i.e., domineering, vindictive cold, socially inhibited, nonassertive, overly accommodating, self-sacrificing, and intrusive). The total score has been shown to adequately capture a wide range of interpersonal problems, with higher scores indicating more severe overall interpersonal difficulties. The German version was psychometrically evaluated by Thomas et al. (2011), finding adequate to good subscale reliabilities ($\alpha = 0.70\text{--}0.86$) and validity. McDonald's ω for the IIP-32 total score in our sample was 0.90.

The OPD Conflict Questionnaire (OPD-CQ; Benecke et al., 2018) is a 66-item self-report measure for active (CQ-a) and passive (CQ-p) modes of coping with six intrapsychic (mostly unconscious) motivational conflicts (i.e., individuation vs. dependency, submission vs. control, need for care vs. self-sufficiency, conflict of self-value, guilt conflict, and oedipal conflict), as well as defended perception of conflicts and affects. Items are rated on a 5-point Likert scale from 0 (*completely false*) to 4 (*completely true*), with higher scores indicating a more significant presence of the conflict. Psychometric properties for most scales were good (McDonald's $\omega = 0.74\text{--}0.86$), apart from some scales, which showed insufficient internal consistency with McDonald's ω ranging between 0.52 and 0.68 (Benecke et al., 2018; Gisch et al., 2020). In the current sample, McDonald's ω was good, with 0.87 for the total scale, 0.85 for the active mode, and 0.88 for the passive mode.

Moreover, we used the short version of the OPD Structure Questionnaire (OPD-SQS; Ehrental et al., 2015) to assess the self-reported domains of personality structure, according to the conceptualization in the OPD. The OPD-SQS consists of 12 items with three subscales (i.e., self-perception, interpersonal contact and relationship model). The items are rated on a 5-point Likert scale from 0 (*completely false*) to 4 (*completely true*). Higher scores represent greater structural impairment, that is lower levels of structural integration. The total score ranges from 0 (*highest structural level*) to 48 (*lowest structural level*). The OPD-SQS has shown good psychometric properties, with an internal consistency of Cronbach $\alpha = 0.88$ (Ehrental et al., 2015). In this sample, McDonald's ω for the total scale was 0.90.

Statistical analysis

All statistical procedures were estimated with RStudio version 4.0.3 (R Core Team, R, 2020). The analytic code is available in the Supporting Information.

Item selection

Because we were interested in the interrelationships between the broader included constructs, we used the global scores of the questionnaires as nodes. Yet, instead of the OPD-CQ total score, we decided to separately include the active and passive mode due to the described differences concerning psychopathology and other psychodynamic constructs (Benecke et al., 2018; Henkel et al., 2022). Calculating on subscale level would have resulted in too many parameters, which would have threatened both power and stability and, therefore, interpretability of the network structure. For all included variables, a higher value indicates more difficulties.

Missing data

Missing item-level data ranged between 0% (PHQ-9) and 0.24% (PHQ-15) of the sample and were imputed using multivariate imputation for continuous variables with the use of predictive mean matching as implemented in the *MICE* package (Van Buuren & Groothuis-Oudshoorn, 2011; version 3.13.0). We imputed data 10 times and retained the mean value of the imputed datasets.

Network estimation

We followed the recommendation of Isvoranu and Epskamp (2021) for psychological networks with small sample sizes and estimated a regularized partial correlation network via the Extended Bayesian Information Criterion (EBIC) (Foygel & Drton, 2010) graphical lasso (glasso) (Tibshirani, 1996). Consistent with standard practices, we used a hyperparameter γ of 0.5. This method minimizes false-positive edges by shrinking spurious edges to zero, resulting in a more parsimonious network structure. Because the input data were skewed, we applied a nonparanormal transformation to relax the normality assumption before conducting the networks (Zhao et al., 2012). Pearson correlations provided the input for the network estimation. We computed and visualized the network using the R package *qgraph* (Ehrental et al., 2012; version 1.9). With six included nodes, 15 parameters were estimated. Nodes were placed using a modified version of the Fruchterman–Reingold algorithm (Fruchterman & Reingold, 1991) to place more connected nodes closer to one another (Jones et al., 2018). No specific minimum, maximum, or cut values have been used for network visualization.

Network inference

To identify the most central nodes, we calculated centrality indices using the centrality function in the *qgraph* package (Ehrental et al., 2012; version 1.9). We focus on expected influence (*EI*) in our results, defined as the summed weight of edges that it shares with all other nodes in the network while taking negative associations into account (Robinaugh et al., 2016). We did not focus on other metrics (i.e., betweenness and closeness) because they have been found to be unsuitable and unstable in psychological networks (Bringmann et al., 2019). In addition to the *EI* centrality estimation, we estimated the network's predictability (Haslbeck & Waldorp, 2018), using the centrality function in the *qgraph* package (Epskamp et al., 2012; version 1.9). While network centrality is a relative measure, node predictability is an absolute measure of the interconnectedness of a node. Predictability is defined as the variance of each node explained by all its neighbouring nodes. Therefore, node predictability is of clinical importance because it quantifies how much a node can be predicted by intervening on all other nodes in the network (Haslbeck & Fried, 2017).

Bridge symptoms

Bridge symptoms were estimated to identify the nodes that link the psychodynamic constructs to psychopathology (Jones et al., 2019). Bridge strength (*BS*) was calculated using the bridge function of the R package *networktools* (Jones, 2020; version 1.2.3). The index is defined as the sum of the edge weights connecting a node to the nodes in the other community.

Clustering

We used the spinglass algorithm implemented within the *igraph* package (Csardi & Nepusz, 2006; version 1.2.6) to analyse clusters in the network. The spinglass algorithm is a modularity-based community detection algorithm suitable for uncovering the community structure of relatively small networks that include both positive and negative edges (Traag & Bruggeman, 2009; Yang et al., 2016). Because the spinglass algorithm is not deterministic, we repeated the algorithm 1000 times and used the median outcome.

Accuracy and stability estimation

As recommended in the literature (Borsboom et al., 2018), network stability and the precision of estimated parameters (i.e., edge weights, *EI* and *BS*) were estimated using bootstrapping routines (number of bootstrap samples = 2000) implemented in the R package *bootnet* (Epskamp & Fried, 2020; version 1.4.3). To estimate the accuracy and stability of the edge weights, we calculated the 95% confidence intervals (CIs) around the original edge value. A narrower 95% CI indicates greater edge accuracy. Further, the CI of a present edge is supposed not to cross zero (Epskamp et al., 2018). Moreover, we computed a 'multiverse' plot of the edge weight bootstrap results to demonstrate the stability of the edge weights across bootstrap replications. The plot should show horizontal lines of the same colour to indicate stable estimation of the edge weights (Epskamp, 2020).

To examine the stability of the *EI* centrality order, we calculated the correlation-stability coefficient (CS-coefficient). The CS-coefficient indicates the percentage of the data that could be dropped to retain with 95% certainty a correlation of 0.7 with the original dataset. In order to interpret a network, CS-coefficients are recommended to be above 0.50, whereas CS-coefficients below 0.25 indicate unstable networks (Epskamp et al., 2018).

In addition, we performed difference tests using nonparametric bootstrapping routines to compare centrality estimates (i.e., *EI* and *BS*) and individual edge weights. These difference tests can be used to determine which nodes, bridge symptoms, or edges are significantly different from another. Nodes significantly more central to at least 50% of all other network nodes are interpreted as the most central symptoms. Likewise, the difference test was used to detect the strongest edges and identify bridge symptoms. We interpreted those symptoms as bridge symptoms, with a greater *BS* to at least 50% of the other nodes within the same cluster.

RESULTS

In total, $N = 341$ patients were included in the analyses. Before the nonparanormal transformation, somatization (PHQ-15) scores ranged from 1 to 25, with a mean of 10.2 ($SD = 5.0$). 13.2% of the patients showed minimal somatic symptoms, 34.9% mild somatic symptoms, 33.1% moderate somatic symptoms, and 18.8% severe somatic symptoms. Depression (PHQ-9) scores ranged from 1 to 27, with a mean of 13.1 ($SD = 5.6$). 4.1% of the patients showed minimal depressive symptoms, 26.4% mild depressive symptoms, 29.9% moderate depressive symptoms, 25.5% moderately severe depressive symptoms, and 14.1% severe depressive symptoms. OPD Structure Questionnaire (OPD-SQS) scores ranged from 0 to 48, with a mean of 22.5 ($SD = 9.9$); Inventory of Interpersonal Problems (IIP-32) scores ranged from 0.0 to 2.8 with a mean of 1.6 ($SD = 0.5$); the passive mode of the OPD Conflict Questionnaire (CQ-p) ranged from 0.1 to 3.3 with a mean of 1.8 ($SD = 0.6$); and the active mode of the OPD Conflict Questionnaire (CQ-a) ranged from 0.1 to 2.5, with a mean of 1.4 ($SD = 0.4$).

Network stability

The network was highly accurate and stable, allowing reliable interpretations (Epskamp et al., 2018). In detail, the results from the edge weight bootstrap show that edges were stable, with relatively narrow CIs (see Figure S1). Similarly, the multiverse plot indicates a stable estimation of the edge weights, as it shows similar edge weight values across the bootstrap samples (see Figure S2). Finally, the case-dropping bootstrap to assess the stability for centrality resulted in a CS-coefficient for the *EI* centrality of 0.75, indicating very high stability (see Figure S3).

Network estimation

Figure 1 shows the resulting network plot, including psychopathology and psychodynamic constructs. Edges between nodes represent partial correlations controlling for all other items in the network. A correlation and adjacency matrix of the network can be seen in Tables S1 and S2, respectively. Of 15 possible edges, eleven were evident in the final graph. Only one negative edge emerged between the active and the passive mode of conflict coping (partial correlation of $r = -0.07$), showing that higher levels on the active mode of conflict coping decreased the probability of coping with inner conflicts in the passive mode and vice versa. The strongest positive associations within the network emerged between the passive mode of conflict coping and interpersonal relations ($r = 0.36$), between the level of structural integration and interpersonal relations ($r = 0.36$), between depression and somatization ($r = 0.34$), between the level of structural integration and the passive mode ($r = 0.30$) and between the level of structural integration and depression ($r = 0.27$). Of note, in the edge weight difference test these edges were found to be significantly stronger than most other edges in the network, but not significantly different from each other (see Figure S4).

Additionally, we examined the associations between psychodynamic constructs and psychopathology. The associations were stronger for depression (sum of between-domain edge weights = 0.50) than somatization (sum of between-domain edge weights = 0.16). For both depression and somatization, the associations were strongest with the level of structural integration, followed by the passive mode of conflict coping. Interpersonal relations were only marginally associated with depression but not associated with somatization. The active mode of conflict coping was not associated with psychopathology.

Network inference

The level of structural integration was identified as the most central node ($EI = 1.11$). According to the centrality difference test, the *EI* centrality of the level of structural integration was significantly higher than the *EI* centrality of all other nodes (see Figure S5). On the other hand, the lowest node centrality was detected for the active mode of conflict coping ($EI = 0.10$). The raw *EI* centrality values are visualized in Figure 2a and are presented in Table S3.

The average node predictability was 0.41, meaning that over average 41% of the variance of each node was predicted by the other nodes in the network. The level of structural integration had the highest predictability

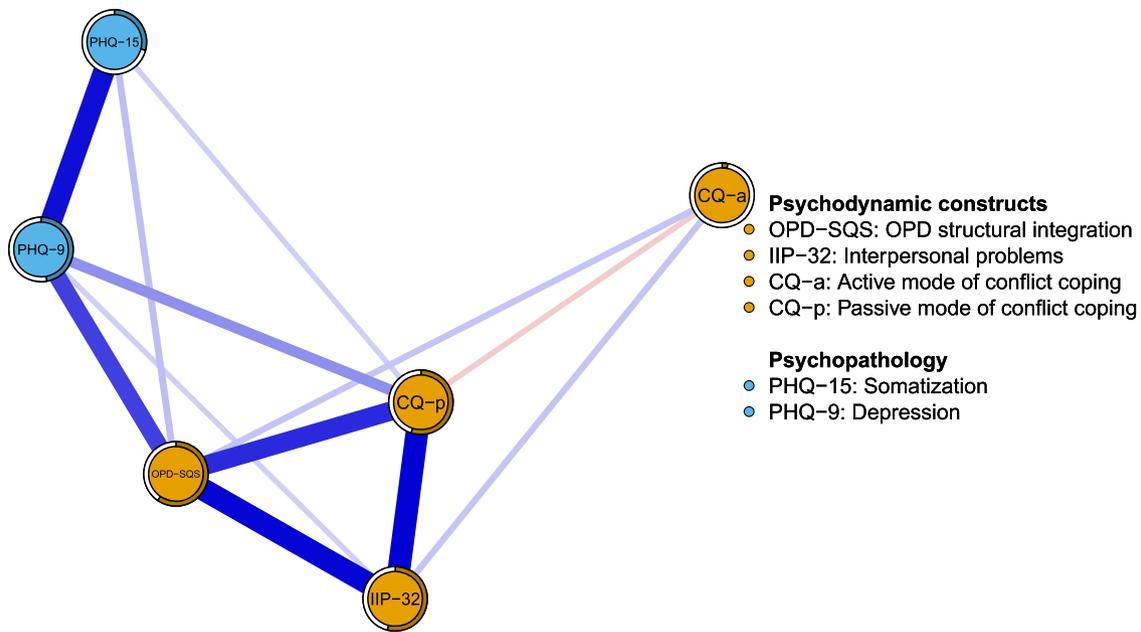


FIGURE 1 Network model visualizing the partial correlations between psychodynamic constructs (orange) and psychopathology (blue). Blue edges indicate positive; red edges indicate negative relationships. Thicker and more saturated edges represent stronger relationships. The filled part of the circle around each node depicts predictability

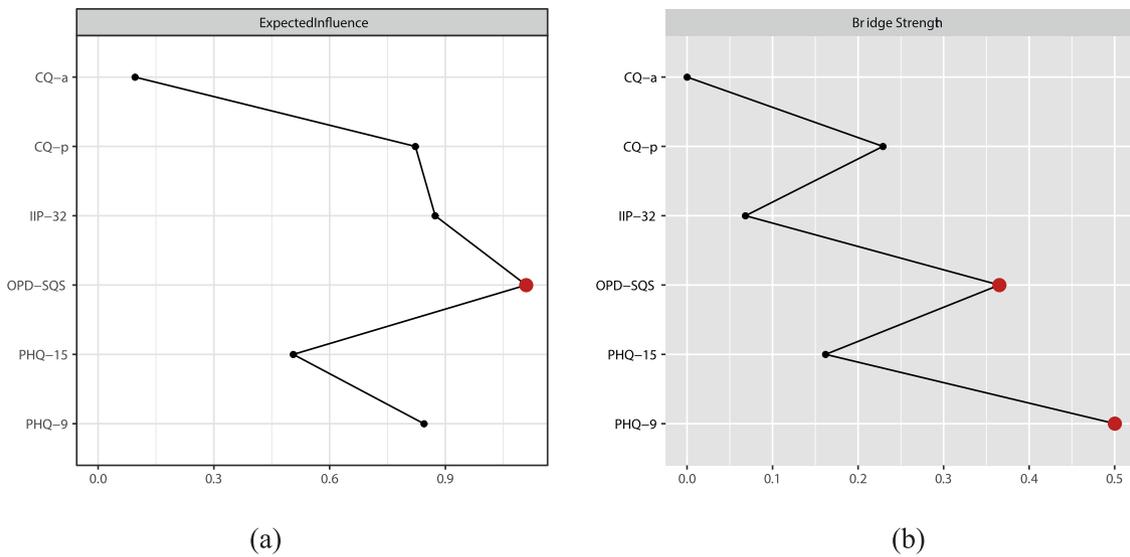


FIGURE 2 (a) Expected influence (EI) and (b) bridge strength (BS) of the network. Red dots denote the most central symptom and the bridge symptoms.

($R^2 = 0.60$) and is, therefore, the construct that is best predicted by (or the best at predicting) all remaining nodes in the network. The node with the lowest predictability was the active mode of conflict coping ($R^2 = 0.03$), demonstrating its poor connection to all other included variables. The network plot visualizes the predictability scores as pie charts around each node (see Figure 1), while the values are reported in Table S3.

Bridge analysis

The strongest bridge symptom of the psychodynamic constructs was the level of structural integration ($BS = 0.37$). At the same time, depression ($BS = 0.50$) was the strongest bridge symptom from the psychopathology cluster because their bridge strengths were found to be significantly greater than the bridge strengths of most other nodes within their cluster (see Figure S6). The raw BS

values are presented in Table S3 and presented in Figure 2b.

Clustering

Three clusters were detected, representing psychopathology, psychodynamic constructs (i.e., interpersonal relations, passive mode of conflict coping, and the level of structural integration), and the active mode of conflict coping. The stability of the clusters was good, with a mean of 2.7 clusters detected in 1000 times. For the sake of clarity and consistency, we present the network figure that shows all psychodynamic constructs belonging to the same group within the paper. However, a visualization of the clusters as they were found in the community detection analysis is presented in Figure S7.

DISCUSSION

The present study used a network approach to explore how psychodynamic constructs (i.e., interpersonal relations, active and passive modes of intrapsychic conflict coping, and the level of structural integration assessed by the OPD) and psychopathology (i.e., depression and somatization) are associated in a sample of $N = 341$ adults seeking psychodynamic outpatient psychotherapy. The network structure resulted in separate, but connected clusters for psychodynamic constructs and psychopathology, bridged by the level of structural integration. The level of structural integration was also the most central (i.e., most influential) node in the network. Within-cluster associations were more substantial compared to between-cluster associations. The great association between depression and somatization is reasonable because there is a basic somatic component in depressive disorders.

The formation of separate clusters aligns with psychodynamic theory, which postulates that psychodynamic constructs and psychopathology are independent, but interconnected domains (OPD Task Force, 2008). Interestingly, the active mode of conflict coping was found to form its own cluster, suggesting its independence from both psychopathology and the other included psychodynamic constructs. This finding is supported by its marginal predictability ($R^2 = 0.03$), demonstrating its low interconnectedness within the network. Further, no associations were found between the active mode of conflict coping and psychopathology. In contrast, the passive mode of conflict coping was associated with both depression and somatic problems. Their operationalization can explain this difference: passive modes are associated with

a tendency to experience negative affects (e.g., fear, helplessness, shame, guilt, envy, jealousy), resulting in depression, somatic problems or other mental disorders (OPD Task Force, 2008). In contrast, people who resolve their intrapsychic conflicts in the active mode show only a few symptoms as long as this way of coping works. These people develop symptoms and seek psychotherapeutic help only when their defence breaks down. The fact that a pronounced active mode nevertheless represents a latent vulnerability is indicated by the correlations with the level of structural integration and interpersonal problems. For example, an individual with an active conflict of self-value and pronounced narcissistic traits may be very successful at work, hardly questioning himself and his decisions, showing a controlling and self-absorbed interpersonal style at work and living in a relationship with a younger girlfriend who admires him very much. If this girlfriend decides to end the relationship, the person may experience this as a major insult, gradually weakening his defences, introducing questions of self-doubt, and leading to a severe depression. This might be the first time in his life that he develops symptoms and eventually seeks help.

However, because only depression and somatic problems were included within our network, the generalizability of our results is limited to these disorders. Yet, our results are generally supported by recent findings by Henkel et al. (2022), finding more significant correlations between the global severity index (GSI) of the Brief Symptom Inventory (BSI; Derogatis & Spencer, 1982) with the passive modes of conflict coping, compared to the active modes.

The negative association between the active and the passive mode of conflict coping was somewhat expected in this clinical sample, because they describe contrasting ways of solving an inner conflict (e.g., exaggerated autonomy vs. exaggerated need for closeness). It would be interesting to compare this association between patients with different levels of structural integration to see if the negative relation also holds with patients at higher levels of structural integration. Patients with higher levels of structural integration (i.e., better personality functioning) are meant to have more mature and more flexible ways of dealing with unpleasant experiences, enabling these patients to vary between active and passive modes. Therefore, one would expect the association between the two modes to be less negative (or even positive). On the other hand, patients with lower levels of structural integration show rather rigid defence mechanisms. Thus, their mode of conflict coping is more likely to be either active or passive.

In addition, the two modes of conflict coping also differed in the association with interpersonal difficulties.

The relatively small association between the active mode of conflict coping and interpersonal problems may reflect the lack of patients' conscious knowledge regarding their own interpersonal difficulties. Therefore, in addition to self-reports, reports of others may be necessary to get an objective view of their interpersonal difficulties. Future studies may therefore verify our findings using OPD interview data of trained clinicians.

Except for the negative association between the two conflict modes, only positive associations were found within the network. These positive associations are in line with previous studies showing the psychodynamic constructs to be positively correlated with each other and with psychopathology (Benecke et al., 2018; Henkel et al., 2022; Zimmermann et al., 2012). Also, psychoanalytic theories postulate positive associations between the constructs. According to the theory, intrapsychic conflicts are thought to originate in conflictual interpersonal relationships (Rudolf, 2010). Further, in contrast to the traditional view, where conflicts were understood to be primarily intrapsychic, contemporary concepts stress the interpersonal dimension of inner conflicts. For example, difficulties in the person's significant relationships (e.g., with attachment figures) early in life may result in a conflict between striving for autonomy and dependency, which can be reflected in difficulties in current relationships (Ermann, 2020). Interpersonal relations are also related to the level of structural integration. Individuals with lower levels of structural integration tend to have more difficulties in emotion regulation and are prone to carry conflicts out interpersonally instead of processing them mentally (OPD Task Force, 2008). Structural integration has also been found to be related to intrapsychic conflicts, with some conflicts (i.e., individuation vs. dependency) being typically linked to lower levels of structural integration (Grande et al., 1998), as both results from deficits in early childhood development. Other conflicts (e.g., guilt conflict), in contrast, are typically associated with moderate or higher levels of structural integration (Rudolf, 2013).

The study identifies the level of structural integration as operationalized by the OPD to be the most influential construct in the network (i.e., most central and highest predictability) and to link psychodynamic constructs to psychopathology. Yet, because only the global score was included in our network, our findings cannot identify which specific structural functions are most relevant in patients with depression or somatization. However, for clinical case formulations a more detailed understanding of the various aspects of personality functioning is required (Tanzilli et al., 2021).

The OPD defines structural impairment as deficits in developmentally acquired basic and clinically meaningful

psychological capacities. For example, lower levels of structural integration manifest themselves in reduced abilities to notice, differentiate, regulate, or express emotions and in greater impulsivity. The concept of structural integration also includes aspects of interpersonal regulation, with lower levels of structural integration being characteristic of maladaptive interpersonal interactions. These symptoms are quite similar to symptoms described in personality disorders. It is, therefore, not surprising that lower levels of structural integration have been found to be associated with higher levels of severity in personality disorders (Doering et al., 2013). Further, it has been found that personality functioning is conceptually and empirically related to the Criterion A of the new DSM-5 Alternative Model of Personality Disorder (AMPD) (Hörz-Sagstetter et al., 2021; Zimmermann et al., 2015), which states that a personality disorder diagnosis requires an impairment in personality functioning. Criterion B, on the other hand, specifies the specific clinically relevant personality traits (Krueger et al., 2014). A similar proposal has been made for the ICD 11 (Tyrer et al., 2011). Besides, there is strong evidence for a general factor of personality pathology, which may explain the high comorbidity among personality disorder diagnoses (Sharp et al., 2015; Wright et al., 2016).

Structural integration has also been found to be associated with psychopathology, with medium to large correlations (Benecke et al., 2009; Crempien et al., 2017; Ehrental et al., 2015; Freier et al., 2021). Obbarius et al. (2021) argue that this relationship may be due to the fact that patients with lower levels of structural integration have more difficulties in dealing with intra- or interpersonal aversive effects, which may result in emerging or persisting symptoms. Similar to our findings, greater correlations between the level of structural integration and depression than somatic problems have been found (Krakau et al., 2021; Obbarius et al., 2021). Further, it has been shown that the level of structural integration is associated with the severity of depressive symptoms (Crempien et al., 2017), mediates between child maltreatment and values of depression (Dagnino et al., 2020; Freier et al., 2021; Krakau et al., 2021), and predicts a more complicated symptom course and a poorer course in patients with depression (Zeeck et al., 2020). A clinical example is an individual with high structural impairments in the areas of self-regulation (e.g., controlling anger and intense affects) and in interaction with significant others (e.g., fear of being rejected by others) may at the same time report severe depressive symptoms. Consequently, the importance of the level of structural integration in the network and its connection to psychopathology, especially to depression, is reasonable. The findings indicate that when the impairment in

structural integration decreases, also all other domains, including symptomatology, may be decreased. In other words, increasing personality functioning may result in less psychological strain. The level of structural integration may thus be a potential key target for treatment. However, our results do not give any information on the causal link. Even though nodes with high centrality are thought to be clinically relevant constructs and viable intervention targets (Levinson et al., 2022; Robinaugh et al., 2016), time-series data are needed to examine the direction of the influence. Suppose it could be established that structural integration has a causal effect on psychopathology: in that case, the findings indicate that patients may benefit from PDT focusing on structural abilities to reduce symptomatic strain. This finding would be in line with studies demonstrating the impact of the level of structural integration on treatment outcome (Koelen et al., 2012). Again, it would be of great interest to compare these results in patients with different levels of structural integration to see if these results hold in both structurally less impaired and more impaired patients. According to psychoanalytic theory, one would expect that inner psychic conflicts would be more salient in patients with higher levels of structural integration.

Strengths and limitations

A particular strength of the study is its naturalistic sample, with a great range of symptom severity and levels of structural impairment. Symptoms were assessed before the treatment-seeking individuals had their first contact with a psychotherapist. Furthermore, our analyses were stable and robust, allowing reliable interpretation of the results. Most important, this is the first study to investigate the associations between psychodynamic constructs and psychopathology using network analysis.

However, despite the strengths of the study, several methodological issues need to be addressed. First, a significant limitation of the study is the cross-sectional nature of the analysed data, meaning that causality cannot be assumed. However, cross-sectional networks still hold essential insights into the interrelationships between symptoms or constructs, which can be used to generate hypotheses about the causal dynamics (Von Klipstein et al., 2021). Future research, however, should entail longitudinal data to draw causal inferences.

Another significant limitation is that our calculations were limited to investigating only depression and somatization as psychopathology, because no other validated questionnaires to assess mental disorders were included in the routine diagnostics. Future research is essential for

expanding our findings by including a greater variety of psychiatric disorders.

Similarly, also for the psychodynamic constructs, some differentiated information is missing because only global values were included in the network. This way, our interpretations are limited to the broader constructs. A fine-grained understanding of the interrelationships of, for example, specific intrapsychic conflicts or specific interpersonal relations patterns with psychopathology is not possible. However, we decided to use global scores in this study (i) to explore the relationships among the broader constructs in order to generate hypotheses regarding how psychodynamic constructs are related to psychopathology and (ii) to reduce the number of nodes in the network because calculating on subscale or item level would have resulted in too many parameters (concerning our sample size) and, therefore, in an unstable network. Analysing the data on subscale level would be interesting for future research, given the complex relations within the psychodynamic constructs (Cierpka et al., 2007).

Further, the included questionnaires had different scoring and scaling properties and differed in their variability, which could have affected the network metrics. The active mode of conflict coping had the lowest variance ($SD = 0.39$) of all included variables, which may have contributed to its low strength centrality and its marginal statistical relationships to the other included constructs (Fried et al., 2018; Terluin et al., 2016). Moreover, the included constructs are assumed to differ in their time stability, with psychodynamic constructs being more time-stable than psychiatric symptoms (Grande et al., 2000). We also relied solely on self-report questionnaires, which may have resulted in a possible self-report bias. Especially for the assessment of psychodynamic constructs, self-report measures are critical, as they aim to examine (partly) unconscious processes. These are conceptualized to be nondeclarative and cannot be verbalized. Nevertheless, all self-report questionnaires used in this study are psychometrically valid and reliable instruments. However, future research may include OPD interview data of trained clinicians.

Finally, the network model is a between-subject model—no within-subject inferences can be drawn (Fried et al., 2017).

CONCLUSION

This study explored the link between psychodynamic constructs and psychopathology in a naturalistic sample of $N = 341$ adults registering for psychodynamic outpatient psychotherapy. The results of this study support the

notion that psychodynamic constructs and psychopathology are independent but related domains. A key finding of this explorative study is the crucial role of personality functioning, as assessed by a self-report measure of the level of structural integration as operationalized by the OPD. Structural integration was the most central node within the network and was found to bridge psychodynamic constructs and psychopathology. The active mode of conflict coping was located in the network's periphery and formed its own cluster. It was negatively associated with the passive mode of conflict coping, highlighting the difference between the two ways of dealing with inner psychic conflicts. Future research is needed to replicate the results in a larger sample using subscale levels and a greater variety of psychiatric diseases. Longitudinal studies may clarify causality.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

ETHICS STATEMENT

The authors declare that the research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. Written informed consent was obtained from all participants. All data were collected as part of routine diagnostic procedures. All patients consented to the scientific analysis of the data. Participation was voluntary. No identifying information about any participant is included in this article.

DATA AVAILABILITY STATEMENT

The analytic code for all network analyses performed in this study is available along with all network matrices in the Supporting Information. These matrices can be used to assess our analyses. The data supporting this study's findings are available from the corresponding author upon reasonable request.

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