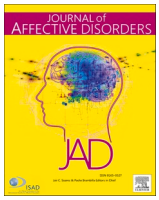
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Research paper



Selfhood under stress: Network differences in trauma-related disorders and self-conscious emotions

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ABSTRACT

Background: Disturbances in self-organization (DSO), self-conscious emotions such as shame and guilt, and internalizing symptoms are increasingly recognized as fundamental components of trauma-related psychopathology. However, little is known about how these domains interrelate across individuals with different levels of clinical need. This exploratory study used network analysis to examine the structure of PTSD, DSO, shame, guilt, anxiety, and depression in clinical and non-clinical groups.

Methods: A community sample and an out-patient clinical sample completed the International Trauma Questionnaire (ITQ), the Personal Feelings Questionnaire-2 (PFQ-2), the GAD-7, and the PHQ-9. Regularized partial correlation networks were estimated separately for the two groups. Centrality, bridge strength, and community detection indices were compared to identify convergent and divergent patterns.

Results: Across both groups, DSO emerged as a central and extensively connected node, indicating a core role of self-related disturbances in the broader network architecture. Anxiety and depression formed a coherent internalizing cluster, while guilt showed a stable association with depressive symptoms in both networks. Distinct patterns also emerged: in the clinical group, stronger edges linked shame, DSO, and depression, whereas guilt displayed a clearer connection with PTSD and anxiety-related nodes. These differences suggest greater embedding of self-conscious emotions within psychopathological processes under conditions of elevated distress.

Conclusions: Findings highlight the pivotal role of self-organization difficulties within trauma-related psychopathology and reveal both shared and group-specific pathways linking shame, guilt, and internalizing symptoms. These results underscore the relevance of considering self-related disturbances not only in PTSD-focused formulations but also across broader clinical constellations. Implications for future research and therapeutic approaches are discussed.

1. Introduction

The effect of psychological trauma exposure is associated with a broad spectrum of mental health outcomes, including persistent fear-based reactions, Post-Traumatic Stress Disorder (PTSD), Disturbances in Self-Organization (DSO), anxiety, depression, and significant functional impairment (Nomamiukor et al., 2024). The clinical heterogeneity of trauma-related outcomes suggests that multiple psychological processes contribute to the development of symptoms, making it necessary to identify transversal mechanisms that shape different trajectories of distress (Oasi et al., 2025). Within this framework, the growing body of empirical evidence indicates that traumatic experiences are understood not only as linked to pervasive fear and threat to physical integrity, but also to negative self-conscious emotions such as

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guilt and shame (Aprigio et al., 2025; Kip et al., 2022). Several studies have shown that these emotions, considered both as states and traits, can occur within feelings of helplessness in the face of stressful experiences, thereby contributing to heightened traumatic symptomatology (Erb et al., 2023; Cândea and Szentagotai-Tătar, 2018). Emerging findings suggest differential associations, with guilt appearing to be more strongly related to PTSD symptoms, whereas shame is more closely related to DSO, with these patterns being particularly salient among young adults (Cavalera et al., 2023).

Despite their relevance, the role of self-conscious emotions has not been fully integrated into broader models of trauma-related psychopathology. In particular, it remains unclear how guilt and shame interact with key symptom domains, such as anxiety and depression, which are among the most prevalent and clinically impactful consequences of traumatic exposure, and whether their interrelations differ across populations with different clinical needs (Oasi et al., 2025). These internalizing symptoms are frequently implicated in the transition from subclinical distress to clinically significant impairment, making their examination crucial for understanding the broader architecture of trauma-related psychopathology (Liu et al., 2025). It is therefore crucial to examine not only the relationships between guilt, shame, and trauma-related symptoms such as PTSD and DSO, but also how these variables interact with anxiety and depression severity, contributing to the complexity and overall burden of common mental health symptoms (Hyland et al., 2023; Krupnik, 2020). Clarifying these relationships may have direct treatment implications, as guilt- and shame-focused interventions, compassion-based approaches, and emotion regulation strategies are progressively being incorporated into trauma therapies.

The present study is part of a larger research project, based on the dataset previously described in Oasi et al. (2025). However, the current work has a distinct focus, as it applies network analyses to a broader set of variables in order to deepen our understanding of how negative self-conscious emotions interconnect with trauma-related and common mental health symptoms. While previous research has been primarily used variable-centered approaches, which do not capture how these elements are jointly organized within a broader system, network analysis models symptoms as a system of mutually interacting components. This approach allows not only the identification of central nodes and bridge symptoms, but also the examination of how specific emotional processes are differentially embedded within the broader psychopathological system and how these configurations may vary across levels of clinical severity. Therefore, the present exploratory study aims to investigate the network structure of trauma related disorders (PTSD and DSO), negative self-conscious emotions (shame and guilt), and common mental symptoms (anxiety and depression). Within this broader aim the following objectives were pursued: a) testing for any differences in terms of severity and interrelations between the target variables across clinical and control participants; b) describing the differential role of the target variables within the modelled networks; c) identifying bridge symptoms and patterns in how the variables group together in communities and influence each other across communities.

2. Materials and methods

2.1. Participants and procedure

A total of 154 young adults (aged 18–36, M = 25.9, SD = 4.84; F = 84) were recruited. Of these, 77 were outpatients from two mental health centers in northern Italy: the Verona Academic Hospital Trust and the Azienda Socio-Sanitaria Territoriale Rhodense in Garbagnate Milanese. Referring psychiatrists selected these patients. Inclusion criteria for outpatients were being aged 18–36 and currently receiving mental health treatment. The remaining 80 participants were healthy controls from northern Italy, recruited via snowball sampling. Control participants were eligible if they had never received mental health care and could be matched to outpatients by age and gender.

A power analysis for network models was conducted to estimate the minimum required sample size, following recommendations for psychological network estimation (Epskamp et al., 2018). The analysis indicated that the available sample was adequate for detecting medium-sized edges with a power of approximately 0.80.

2.2. Ethical consideration

Participation was voluntary and anonymous. Data collection occurred between April 2022 and September 2024, and all participants provided written informed consent prior to assessment. Ethical approval was granted by the Ethical Committees of the coordinating centre (Università Cattolica di Milano) and the other recruiting centres.

2.3. Instruments

2.3.1. ICD-11 PTSD and DSO

The International Trauma Questionnaire (ITQ; Cloitre et al., 2018) was used to assess ICD-11 symptoms of PTSD and DSO. The ITQ is a self-report instrument that captures all diagnostic requirements for both conditions. Respondents first identify their index traumatic event and indicate when it occurred. They are then instructed to answer all questions in relation to this event. There are six items measuring PTSD symptoms across the clusters of 'Re-experiencing in the here and now' (Re), 'Avoidance' (Av) and 'Sense of Threat' (SoT). The DSO symptoms are answered in terms of how the respondent typically feels, thinks about oneself and relates to others. The PTSD and DSO subscales have a possible range of scores of 0–8. Three items measure functional impairment associated with these symptoms. Multiple studies with general population samples have shown that the ITQ scores possess satisfactory reliability and validity (see Redican et al., 2021 for review). Sample-specific reliability assessed using McDonald's Omega (ω) was 0.865 for the patient group, while it was 0.824 for the control group regarding PTSD, while values for DSO were 0.798 and 0.749, respectively.

2.3.2. PFQ-2 shame and guilt proneness

The Personal Feelings Questionnaire-2 (PFQ-2; Di Sarno et al., 2022; Harder and Greenwald, 1999) is a 22-item self-report measure assessing proneness to shame (e.g., *embarrassment*, *feeling ridiculous*) and proneness to maladaptive guilt (e.g., *regret*, *intense guilt*) (Vigfusdottir et al., 2024). Participants rate how frequently they experience each feeling on a five-point Likert scale ranging from 0 ("Never") to 4 ("Continuously or almost continuously"). This focus is conceptually distinct from the stable cognitive-evaluative beliefs (e.g., negative self-concept) measured by the ITQ, providing a more granular view of the interplay between affective activation and self-structural organization. The measure has a two-factor structure, with six items loading on the maladaptive guilt-proneness factor and ten on the shame-proneness factor; the remaining six items function as fillers and are not included in scoring. Higher scores indicate a greater disposition toward the corresponding emotional tendency. The PFQ-2 has demonstrated good psychometric properties across clinical and non-clinical populations. Sample-specific reliability, assessed using McDonald's Omega (ω), was 0.802 for the patient group and 0.843 for the control group regarding guilt, while values for shame were 0.853 and 0.919, respectively.

2.3.3. GAD-7 anxiety

The Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006) is a widely used 7-item self-report questionnaire assessing symptoms of generalized anxiety over the past two weeks. Items are rated on a four-point scale from 0 ("Not at all") to 3 ("Nearly every day"), yielding a total score ranging from 0 to 21. Higher scores reflect greater anxiety severity. The GAD-7 has demonstrated excellent internal consistency, construct validity, and sensitivity in both community and clinical samples. Sample-specific reliability assessed using McDonald's Omega (ω)

was 0.885 for the patient group, while it was 0.867 for the control group.

2.3.4. PHQ-9 depression

The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) is a 9-item self-report measure of depressive symptom severity over the past two weeks. Responses are provided on a four-point scale from 0 ("Not at all") to 3 ("Nearly every day"), producing a total score between 0 and 27. The PHQ-9 assesses core symptoms such as anhedonia, depressed mood, sleep problems, fatigue, and concentration difficulties. Higher scores indicate greater depressive severity. The instrument has shown robust reliability and validity across diverse clinical and non-clinical populations. Sample-specific reliability assessed using McDonald's Omega (ω) was 0.828 for the patient group, while it was 0.659 for the control group.

2.4. Data analysis

2.4.1. Data preparation and group differences

Prior to any other analysis, a listwise elimination of cases with missing values was carried out to estimate the model on a complete-information sample (Fritz et al., 2018). Additionally, all variables underwent a nonparanormal transformation to offset violations of the assumption of normality via the "huge" R package (Jiang et al., 2022). Because the assumptions of normality and equality of error variances were not met for most variables (Table S1), any differences in age or psychometric measures between the clinical and control groups were tested by means of a Mann-Whitney test, while differences in gender were tested with a chi-squared test. These group comparisons were conducted on SPSS v.30 (IBM Corp., NY, USA).

2.4.2. Network estimation

The network structure for the total sample was estimated using a Gaussian Graphical Model, representing variables as nodes and their conditional dependencies as edges connecting the nodes. Edges therefore correspond to the partial correlation between two variables after controlling for all other variables (Hevey, 2018). To avoid the risk of false positive interrelations, the graphical Least Absolute Shrinkage and Selection Operator (glasso) was applied as a regularization method, which sets weak edges to zero and increases the sparsity of the network. The selection of the tuning parameter (λ) of the glasso, i.e. the parameter which determines the extent to which the regularization will be applied, was operated through the Extended Bayesian Information Criterion (EBIC), whereby a hyperparameter γ is set so that higher values favour the choice of a sparser final model. The standard value of 0.5 was selected (Epskamp and Fried, 2024). The computation and visualization of the model were performed with the "bootnet" and "qgraph" packages respectively (Epskamp et al., 2011; Epskamp and Fried, 2024).

2.4.3. Group comparison

To test any difference in network structure between the clinical and control groups, a network comparison test (NCT) with 5000 iterations was executed via the package of the same name (Van Borkulo et al., 2016). The NCT contrasts the interrelation differences between two target networks against the differences obtained for randomly permuted network pairs, serving as a network structure invariance test (Fritz et al., 2018; Van Borkulo et al., 2016). To further explore and visualize any significant differences, because of the limited sample size for each group, the Fused Graphical Lasso (FGL) was chosen to estimate two separate networks. This method extends the glasso by adding a second tuning parameter which regulates the similarity between elements of the two jointly estimated networks. This improves parsimony, setting as equal across networks elements which do not largely differ without compromising model fit (Costantini et al., 2019). As for the estimation of the total network, the EBIC was used for the selection of the two tuning parameters of the FGL. The stability of the edges estimated by the FGL was assessed by calculating edge bootstrap intervals with 1000 resamples. FGL network and edge stability estimation were conducted with the "EstimateGroupNetwork" package (Costantini et al., 2025).

2.4.4. Centrality

The centrality of each node was estimated for the total sample, and for the clinical, and control groups in terms of: strength, which is the absolute sum of all edges connected to a node; closeness, which is the inverse of the distance between a node and all other nodes in the network; and betweenness, which is the number of paths between any pair of nodes having a given node as an intermediate link (Epskamp et al., 2018; Hevey, 2018). The stability of centrality indices was evaluated on the total sample with a case-dropping bootstrapping procedure with 5000 resamples. Because the subgroup networks were estimated jointly using the Fused Graphical Lasso, which shares information across groups, the stability of the centrality indices was assessed on the total sample as a pragmatic approximation (Costantini et al., 2019). This procedure estimates the proportion of cases that can be excluded such that the correlation between the original and re-estimated centrality indices keep a correlation of at least 0.70. The quantity thus obtained is the Correlation Stability coefficient, whose value is conventionally established to be good if it is equal or above 0.50 and acceptable if it is equal or above 0.25. Below this threshold the centrality index is unreliable and should not be interpreted (Costantini et al., 2019; Epskamp et al., 2018; Hevey, 2018). For this purpose, we utilized the "bootnet" package (Epskamp and Fried, 2024).

2.4.5. Bridge nodes and communities

Based on the psychometric measures employed we expected variables to covary strongly along the following pairs: a) posttraumatic and self-disorganization symptoms; b) guilt and shame; c) anxiety and depression. To identify the nodes involved in connecting these three groups the "bridge" function of the "network tools" package was run on the total, clinical, and control groups (Jones, 2017). The one-step and two-step bridge expected influence were computed. They correspond to the algebraic sum of all edges connecting a node to other nodes outside of its specified community directly (one-step) or with the mediation of one intermediate node (two-step). Node redundancy was also tested in the total sample with the "goldbricker" function from the same package, implementing Meng, Rosenthal, and Rubin's method (Meng et al., 1992). This was done to assess the risk of substantial overlap between the shame and DSO nodes. This test detects pairs of nodes with a low proportion of significantly different correlations. Following conventional criteria, a proportion of less than 25% of different correlations can be a sign of topological overlap (Jones, 2017). Finally, communities emerging from the structure of the estimated networks were also explored by means of a spinglass algorithm using the "spinglass_cluster" function of the "igraph" package (Csárdi et al., 2006). All above-mentioned analyses except group comparisons were performed on R (v. 4.5.1) via R Studio (v. 2025.09.1).

3. Results

No differences in age and gender between the two groups were detected, while participants in the clinical groups scored significantly higher than controls on all other measured variables (Table 1). As expected, outpatients showed higher levels of trauma-related symptoms. Within the clinical group, 31 patients met diagnostic criteria for PTSD according to the ITQ algorithm, and 19 of these also met criteria for CPTSD.

The model estimated from the total sample shows dense interconnections with no zero edges (Fig. S1). The Network Comparison Test (NCT) indicated a significant difference in global network structure between the clinical and community groups ($M = 0.398$, $p = 0.029$), and a non-significant difference in global network strength ($S = 0.118$, $p = 0.379$). These data indicate that nodes are equally strongly connected on average across groups, while the pattern of the connections differs. The

Table 1
Differences between groups.

	Outpatients		Matched Controls			
	Mean	SD	Mean	SD	U	p
GAD_anx	10.104	5.430	6.351	4.307	−4.569	<0.001
PHQ_dep	11.190	5.582	6.580	3.383	−5.850	<0.001
ITQ_PTSD	11.600	6.485	6.510	4.879	−4.866	<0.001
ITQ_DSO	11.000	5.446	6.430	4.171	−5.285	<0.001
PFQ_guilt	11.857	5.878	8.205	5.206	−3.726	<0.001
PFQ_shame	15.468	8.132	11.101	8.002	−3.527	<0.001
Age	25.900	4.849	25.960	4.903	0.051	0.959

GAD_anx = General anxiety disorder; ITQ_DSO = International Trauma Questionnaire, disturbances of self-organization; ITQ_PTSD = International Trauma Questionnaire, post-traumatic stress disorder; PFQ_guilt = Personal Feelings Questionnaire 2, guilt; PFQ_shame = Personal Feelings Questionnaire 2, shame; PHQ_dep = Patient Health Questionnaire, depression. U = standardized Mann-Whitney's U statistic.

most striking differences between the two groups are the absence of a direct edge between guilt and PTSD in the control groups, and the absence of an edge between anxiety and DSO in the clinical groups (Fig. 1).

The edges connecting shame and depression to DSO have a higher weight in the clinical group compared to the control group. Notably, in all models, but more evidently in the patient-based model, depression and anxiety are selectively connected: the former to DSO and the latter to PTSD (Figs. 1 and 2; Table 2). The bootstrap intervals of these edges are however partly overlapping, so these differences should be interpreted with caution (Fig. S2; Table S2).

The stability of centrality indices is acceptable for strength and closeness, which share a correlation stability coefficient of 0.359, but the stability falls below the recommended threshold for betweenness, with a coefficient value of 0.131 (see Fig. S3 for the central stability plot). Only strength and closeness will thus be interpreted further. With respect to these two indices, DSO displayed slightly higher centrality in all models, together with depression in the patient group (Fig. 2). DSO was also characterized by the highest bridge expected influence in the clinical and control group, suggesting broader connections across the network especially relative to PTSD, which was included in the same specified community (Fig. S5). Despite this being consistent with the higher strength centrality of DSO, its possible bridging role should be considered with reservation and regarded as purely exploratory given the low stability of the betweenness coefficient, which limits the interpretability of potential bridge pathways. Community detection confirmed our assumption of three distinct communities in the total sample and for the controls, in which depression clustered with anxiety, DSO with PTSD, and shame with guilt. By contrast, in the clinical group only two communities were detected, the first one comprehending depression, anxiety, PTSD, and guilt, the second one formed by DSO and shame. In the total sample, shame and DSO did not have less than 25% of significantly different correlations with other nodes in the network, indicating no need for variable reduction and a likely separation of the two constructs.

4. Discussion

The exploratory present study aimed to investigate the network structure of trauma-related disorders (PTSD and DSO), negative self-conscious emotions (shame and guilt), and common mental symptoms (anxiety and depression). To our knowledge, this is one of the first studies to demonstrate through network analysis that DSO is not merely a comorbid feature, but functions as a primary coordinator of self-conscious emotions within trauma-related distress. This suggests a qualitative shift in how we conceptualize the systemic role of self-organization. The network perspective allowed for a system-level mapping that identifies how symptoms are organized and interconnected within a functional network rather than merely estimating their associations. By exploring the interplay among these domains, we sought to clarify whether their associations differ between individuals with varying levels of clinical need, to identify the most central and influential components within the networks, and to detect bridge symptoms that may contribute to the spread of psychopathology across symptom clusters. Consistently with the first aim, the two groups differed significantly on all variables of interest, with out-patients showing significantly higher levels of symptom severity and emotional distress. These findings confirm the clinical relevance of examining how these variables are more problematic within more vulnerable populations (Quiroga-Garza & Cavalera, 2024). Specifically, the more pervasive role of maladaptive emotions of shame and guilt is confirmed by a multitude of previous studies that have shown that these emotions are more intense and difficult to manage in clinical populations (Cândea and Szentagotai-

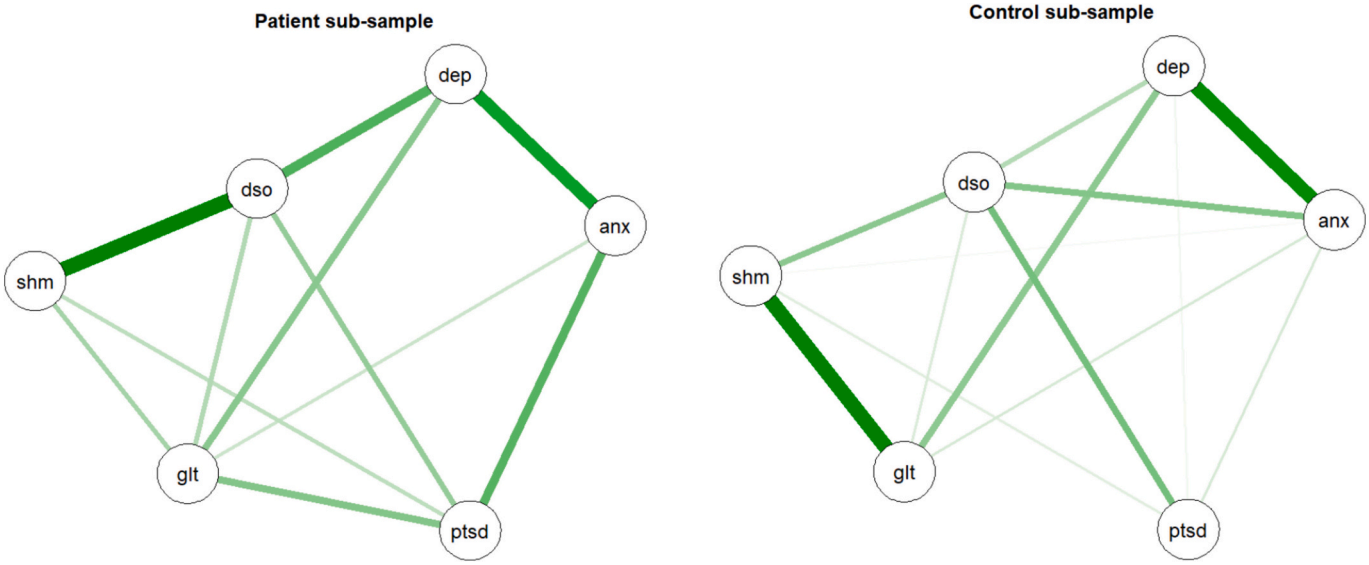


Fig. 1. Network structure for the clinical and control groups
Anx = anxiety; dep = depression; dso = disturbances of self-organization; glt = guilt; ptsd = post-traumatic stress disorder; shm = shame. Green lines indicate positive partial correlations. The thickness and opacity of the lines is proportional to the edge weight: thicker and darker lines represent stronger partial correlations. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

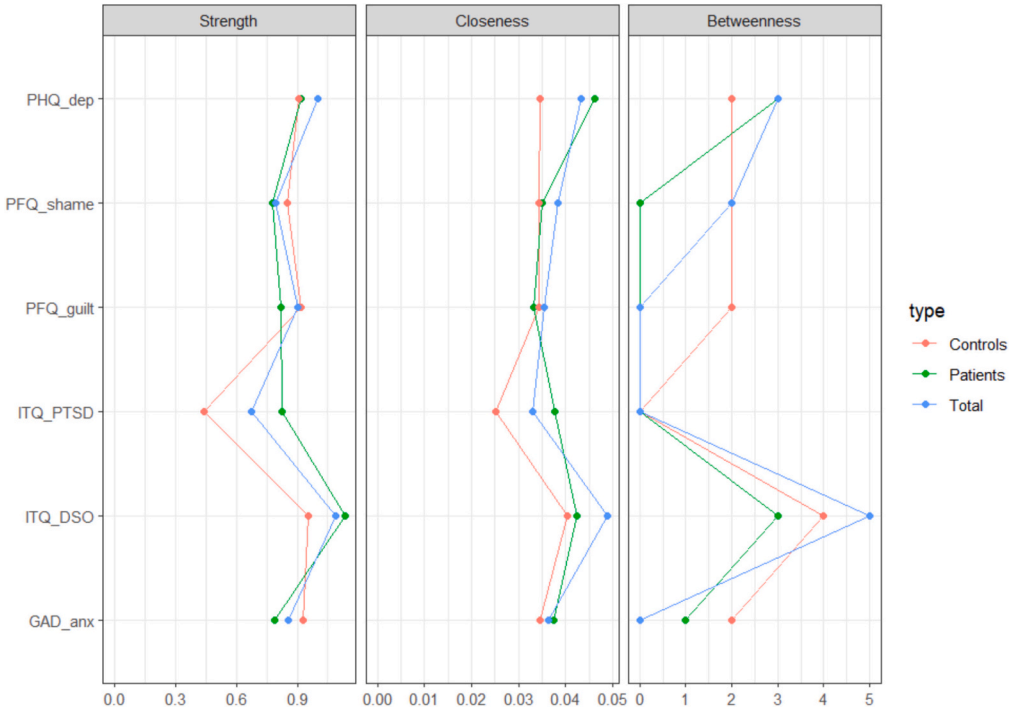


Fig. 2. Centrality plot
GAD_anx = General anxiety disorder; ITQ_DSO = International Trauma Questionnaire, disturbances of self-organization; ITQ_PTSD = International Trauma Questionnaire, post-traumatic stress disorder; PFQ_guilt = Personal Feelings Questionnaire 2, guilt; PFQ_shame = Personal Feelings Questionnaire 2, shame; PHQ_dep = Patient Health Questionnaire, depression.

Table 2
Partial correlation coefficients matrix.

	1. PHQ_dep		2. PHQ_anx		3. ITQ_PTSD		4. ITQ_DSO		5. PFQ_shame		6. PFQ_guilt	
	Clinical	Control	Clinical	Control	Clinical	Control	Clinical	Control	Clinical	Control	Clinical	Control
1.	/		0.398	0.509	0.000	0.029	0.310	0.146	0.000	0.000	0.210	0.221
2.	0.398	0.509	/		0.296	0.080	0.000	0.238	0.000	0.021	0.092	0.080
3.	0.000	0.029	0.296	0.080	/		0.188	0.269	0.120	0.061	0.220	0.000
4.	0.310	0.146	0.000	0.238	0.188	0.269	/		0.499	0.227	0.136	0.072
5.	0.000	0.000	0.000	0.021	0.120	0.061	0.499	0.227	/		0.160	0.543
6.	0.210	0.221	0.092	0.080	0.220	0.000	0.136	0.072	0.160	0.543	/	

GAD_anx = General anxiety disorder; ITQ_DSO = International Trauma Questionnaire, disturbances of self-organization; ITQ_PTSD = International Trauma Questionnaire, post-traumatic stress disorder; PFQ_guilt = Personal Feelings Questionnaire 2, guilt; PFQ_shame = Personal Feelings Questionnaire 2, shame; PHQ_dep = Patient Health Questionnaire, depression.

Tătar, 2018).

4.1. Shared patterns

Although these findings should be interpreted cautiously due to the exploratory nature of the bridge metrics, in both groups, DSO displayed a central role and tended to establish more diversified and widespread connections across the network, as suggested by the centrality and bridge metrics. This prominence of DSO across clinical and non-clinical participants suggests that difficulties related to self-organization occupy a structurally central position within the broader architecture of emotional and psychopathological functioning. However, given the heterogeneous nature of the clinical sample, this pattern should not be interpreted as specific evidence of complex PTSD mechanisms per se. Instead, it likely reflects broader disturbances in self-related functioning that may emerge under conditions of greater trauma-related symptom severity. Within this broader perspective, DSO centrality is consistent with theoretical accounts emphasizing the foundational role of the self in psychological development and as a cross cutting domain of mental functioning (Northoff, 2018; Schore, 2021). Conversely, the centrality of PTSD is not evident in the two groups. These findings support the view that re-experiencing, avoidance, and hyperarousal symptoms are comparatively more delimited, whereas disruptions in selfhood extend to a wider constellation of psychological difficulties (Maercker et al., 2022; Scalabrini et al., 2022). While the more stable strength centrality index is consistent with the proposed key role of DSO, the unreliability of betweenness centrality underlying mediation processes, does not allow us to exclude that PTSD symptoms may still have a farther-reaching effect via indirect pathways.

The centrality of DSO in both networks is consistent with Janet's perspective, which conceptualized stressful experiences as threatening the emergence of a unitary and continuous sense of self (Farina et al., 2019; Van der Hart and Dorahy, 2022). Contemporary theoretical models provide additional frameworks for interpreting the central role of disturbances in self-organization observed in the present networks. Neurophenomenological and hierarchical accounts of the self-conceptualize self-experience as emerging from multiple interacting levels, ranging from basic embodied and interoceptive processes to higher-order narrative, mental and relational dimensions (Qin et al., 2020). Within trauma-related psychopathology, disturbances in self-

organization have been described as a central component of Complex PTSD, while also reflecting broader alterations in self-related functioning associated with severe or chronic trauma exposure. Recent neurobiological evidence suggests that relational trauma, unlike non-relational stressful events, may specifically impair the transition from intero-exteroceptive processing to higher symbolic capacities, leading to pervasive alterations in baseline self-related functioning (Scalabrini et al., 2024). Consistently, relational trauma increases vulnerability to dissociative processes later in life. Within this framework, dissociation is not merely the result of unintegrated self-states or mental contents, but involves the functional reorganization of unintegrated self-states into enduring, parallel-distinct structures that coexist and operate simultaneously (Farina and Schimmenti, 2025). Converging perspectives from affective neuroscience and developmental trauma research further highlight how early relational experiences shape the neurobiological foundations of affect regulation and self-organization (Panksepp et al., 2017; Schore, 2021). From a more integrative perspective, selfhood has been conceptualized as an ongoing process of synthesis that organizes multiple domains of mental functioning into a coherent experience (Armanino and Furlani, 2023), and disruptions in this integrative capacity may extend across affective, bodily, and interpersonal domains (Farina and Meares, 2022).

Beyond the centrality of DSO, the networks also revealed convergence across groups. Anxiety and depression showed a strong and direct association in both networks. This stable linkage suggests that the anxious–depressive domain constitutes a coherent cluster across clinical and non-clinical participants, consistent with their well-established overlap and joint contribution to psychological distress (Nomamiukor et al., 2024).

Finally, proneness to guilt was also consistently connected to depression in both groups, indicating a robust association between this self-conscious emotion and internalizing distress. This pattern may reflect the tendency of guilt to co-occur with hyper-critical ruminative processes, which are central features of depressive symptomatology (Cândea and Szentagotai-Tătar, 2018). The presence of this direct linkage across both networks suggests that guilt may represent an emotional vulnerability factor for mood dysregulation regardless of symptom severity.

4.2. Distinctive patterns in the clinical group VS matched control group

When interpreting these differences, it should be noted that the clinical sample included individuals with varying trauma-related symptom profiles. Consistently, the Network Comparison Test (NCT) indicated a significant difference in network structure between the clinical and community groups, providing a statistical foundation for the divergent patterns identified in the network architecture. In the control group, shame and guilt appeared to be correlated with each other, while their connections with psychopathological symptoms are less pronounced than in the clinical group (Cavalera et al., 2023). Conversely, in the out-patient group, the pattern of edges linking shame and guilt to other nodes reveals a distinct configuration: shame shows stronger connections with DSO and depression, and guilt displays a more modest association with PTSD.

The first pattern, involving shame, DSO, and depression, highlights that in the clinical group difficulties in identity stability and self-organization occupy a central position and tend to align with negative self-evaluative experiences and lowered mood states. This configuration suggests that, under conditions of greater distress, shame becomes more closely embedded within the broader structure of disturbances in self-hood and depressive affect (Oasi et al., 2025). A potential concern in interpreting the strong connection between shame and DSO is content redundancy, particularly regarding the semantic proximity of "worthlessness" which is central to both constructs. However, from a clinical perspective, these may be viewed as a functional dyad rather than simple semantic overlap. While the ITQ assesses the endorsement of stable, cognitive-evaluative core beliefs (e.g., "I am a failure"), the PFQ-2 assesses the proneness to experiencing recurring affective states (e.g., how often one feels "small" or "worthless"). Furthermore, community detection in the control and total samples, identified two separate communities for shame as measured by the PFQ-2, which clustered with guilt, and DSO, which clustered with PTSD. Only in the clinical sample shame and DSO clustered together, showing a stronger correlation than with the other subscale of the respective instruments. Although this does not fully rule out the possibility of partial redundancy between the two constructs, the fact that this pattern emerged specifically in the clinical sample is itself informative. The convergence between shame and DSO suggests that their proximity is not a measurement artifact, but a clinically meaningful process. This finding indicates that as psychopathological severity increases, negative self-evaluative affect and identity disturbances become more tightly coupled, forming a tightly interconnected symptom constellation.

The network architecture suggests that shame may act as the affective process that maintains the negative self-concept that characterizes DSO. Distinguishing between this affective proneness and higher-order self-evaluation allows for a more nuanced understanding of how shame-related affect reinforces the structural disturbances in self-organization typical of CPTSD. The pattern between depressive symptoms and DSO is consistent with previous literature suggesting that when identities centered on worthlessness, or alienation are dominant, as in the case of DSO, the expectation is that mood-related disorders such as major depression will frequently co-occur (Beck and Bredemeier, 2016; Hyland et al., 2023). The pattern between DSO and depression should be viewed in continuity with the relationship between DSO and shame proneness which appears to function as an affective channel through which difficulties in self-organization become closely linked to negative mood states. This echoes evidence supporting the role of shame in shaping the relationship between traumatic experiences and disturbances in self-organization (Békés et al., 2023; Cavalera et al., 2023).

Another relevant aspect is the relationship between guilt, PTSD, and anxiety in the two groups. In the control group, there was only a modest relationship between PTSD and anxiety, which is consistent with the literature regarding the continuity between traumatic symptoms and anxious activation. By contrast, in the clinical group a new relationship between guilt proneness and PTSD emerged. Whereas in the non-clinical group guilt appears to remain a more contained emotional response, in clinical individuals it may become more broadly connected to trauma-related cognitions and contribute to heightened threat sensitivity and persistent worry. This could reflect a progressive broadening of the cognitive–emotional impact of guilt, whereby exaggerated responsibility feeds into hypervigilance, anticipatory anxiety, and difficulty disengaging from perceived threats (Cipriano et al., 2024; Kip et al., 2022). Importantly, in the clinical group this association also extended to anxiety-related nodes, suggesting that guilt proneness may operate as a vulnerability factor across multiple domains once symptom severity reaches clinical thresholds. Such a pattern is consistent with models proposing that, under conditions of chronic stress or psychopathology, guilt-prone individuals may shift from evaluative self-criticism to more pervasive harm-avoidant cognitive styles, thereby reinforcing both PTSD and anxiety symptoms (Fine et al., 2023).

The differential positioning of guilt and shame in the present networks is also consistent with theoretical models that conceptualize these emotions as qualitatively distinct forms of self-evaluation. Guilt is typically understood as an action-focused emotion linked to specific behaviors and grounded in a relatively preserved sense of agency and self-other differentiation (Lewis, 1971; Tangney et al., 2007). As such, even when associated with intense distress, guilt tends to remain embedded within a relatively coherent self-structure and may therefore become more closely associated with trauma-related appraisals involving responsibility, threat monitoring, and hypervigilance, which characterize PTSD and anxiety-related symptoms. In contrast, shame involves a more global and self-referential negative evaluation targeting

the self as a whole rather than discrete actions. While shame and guilt differences are consistent with existing theoretical models, the present network results extend prior work by showing how these emotions are differentially embedded within the broader symptom system. The network approach reveals their distinct functional roles within the system: guilt appears more directly linked to PTSD-related processes, whereas shame is more deeply integrated with self-organizational disturbances, suggesting different pathways of psychopathological organization. Developmental and psychodynamic accounts have long suggested that shame directly threatens self-coherence and identity continuity, particularly when rooted in early attachment experiences (Lewis, 1971; Schore, 2021). Relational disturbances may compromise the reflective and regulatory capacities necessary for a stable self-experience (Fonagy et al., 2023), while pervasive shame can become embedded within identity, contributing to structural self-disturbances (Kernberg, 2016). From this perspective, the stronger association between shame and disturbances in self-organization observed in the present networks may reflect the capacity of shame to destabilize fundamental processes of self-experience, affect regulation, and interpersonal functioning that characterize DSO.

These distinctive network configurations carry important clinical implications. Together, these findings suggest the potential for a more differentiated approach to treatment, in which intervention targets are informed by the specific configuration of self-conscious emotions and their connections with PTSD, DSO, anxiety, and depression. Specifically, the network results indicate that targeting shame may impact DSO and depression, while addressing guilt may influence PTSD and anxiety; accordingly, assessment should identify the most prominent symptoms in the clinical presentation, and interventions should be selected and sequenced to target these symptom and associated emotion profiles. Consequently, the stronger coupling of shame, DSO and depressive symptoms suggests that clinicians should not limit their assessment to overt symptoms such as depression; instead, it is crucial to conjointly evaluate the degree of impairment in DSO and shame-proneness. When elevations in DSO and shame-proneness are prominent, preliminary interventions targeting these domains may be warranted, as they may help reduce the underlying self-related and affective processes that contribute to the maintenance of depressive symptoms (Cavalcanti et al., 2023). In these clinical situations, before initiating protocols specifically focused on depressive symptoms, such as traditional CBT or trauma-focused protocols for depression (Chen et al., 2022; Hofmann et al., 2022; Rovaris et al., 2024), it may be strategically advantageous to also address the underlying DSO and shame-related processes to provide a more stable therapeutic foundation. Interventions targeting affect regulation and interpersonal functioning, such as Enhanced Skills in Affective and Interpersonal Regulation (ESTAIR; Karatzias et al., 2023) may be particularly relevant to target identity disturbance symptoms. Furthermore, Transference-Focused Psychotherapy (Kernberg et al., 2008) and Mentalization-Based Therapy (Bateman & Fonagy, 2016), can strengthen reflective capacities, stabilize identity organization, and improve interpersonal functioning, domains that overlap with the core features of DSO. Alongside these, compassion-focused interventions (Gilbert, 2014; Millard et al., 2023) may play a key role to help address pervasive shame and feelings of defectiveness.

Given their potential role within a shared pathway, clinicians should also avoid focusing exclusively on anxiety symptoms when assessing patients, and instead evaluate whether elevations in PTSD symptoms and guilt proneness are also present. When patients present with a prominent guilt–PTSD–anxiety pathway, the clinical priority may shift toward addressing trauma-related emotional factors. In these cases, our network structure suggests that addressing persistent guilt may be particularly strategic. By resolving guilt-related appraisals, clinicians may effectively weaken the link between PTSD and anxiety, preventing the further spread of distress across the symptom domains (Cloitre et al., 2020; Norman, 2022). Following this initial phase, treatment may be more effectively integrated with evidence-based trauma-focused and anxiety-reduction interventions, such as cognitive processing therapy, or other cognitive behavioral approaches, once guilt-related appraisals have been sufficiently addressed (Resick et al., 2024; Hofmann et al., 2025).

This study presents several strengths. Firstly, from a conceptual standpoint, the present study does not simply replicate known associations between trauma, self-disturbances, and self-conscious emotions. Rather, the network analysis approach maps how these elements are organized within a systemic framework, identifying DSO as a potential structural hub and differentiating the network embedding of shame and guilt. This system-level perspective may help clarify why similar symptoms can lead to different treatment needs. Additionally, the inclusion of both clinical and matched-control participants provided a unique opportunity to test the stability and distinctiveness of symptom patterns across groups, thereby strengthening the comparative interpretation of the network structures.

Several limitations should be acknowledged. First, the cross-sectional design prevents any inference regarding temporal priority or directionality among variables as network edges represent associations, not directional influences. Future research could benefit from longitudinal designs to examine how relationships among shame, guilt, DSO, PTSD, and internalizing symptoms evolve over time, particularly during or after therapeutic interventions. Second, although the sample included individuals with different levels of care-seeking, the generalizability of findings may be limited by the specific recruitment methods and sample characteristics. Third, all measures relied on self-report instruments, which may introduce shared-method variance and restrict the accurate assessment with which certain clinical phenomena, such as traumatic symptoms or shame proneness, are captured. Experimental or momentary assessment methods may also help clarify the dynamic interplay between self-conscious emotions and trauma responses in daily life. Furthermore, the network models were estimated on relatively modest sample sizes for subgroup comparisons, which may impact the stability of some edges or centrality indices. While the stability of strength and closeness was acceptable (CS = 0.359), the betweenness centrality showed limited stability (CS = 0.131), restricting reliable interpretation of bridge pathways. Accordingly, conclusions regarding mediation-like processes and cross-community influence should be considered exploratory. Future research with larger samples is essential to confirm the robustness and clinical significance of these network distinctions. Nevertheless, the power analysis indicated that the available sample size was adequate to detect medium-sized edges in the network, suggesting that the estimated relationships between nodes may be reasonably stable even if the interpretation of some centrality metrics should remain cautious. Finally, another limitation is that dissociative processes were not directly assessed in the present study. Given the theoretical overlap between disturbances in self-organization and dissociation, future research should integrate specific measures of dissociation to better clarify how these processes relate to DSO, PTSD, and internalizing symptoms within network models.

Future studies might also explore whether specific therapeutic components, such as emotion regulation training, compassion-focused approaches, or identity-focused interventions, moderate the central or bridge roles identified in the present networks. In this regard, interventions that explicitly target affective and interpersonal regulation, such as ESTAIR, as well as trauma-focused treatments like EMDR, may offer promising avenues for addressing both PTSD and DSO symptoms (Karatzias et al., 2023, Cavalera et al., 2026; Rovaris et al., 2024).

Overall, the findings underscore the centrality of disturbances in self-organization across both clinical and non-clinical groups (Hyland et al., 2025). Thanks to the network system-level perspective, this study highlights how disturbances in self-organization and negative self-conscious emotions may actively shape the configuration of trauma-related psychopathology, offering a more precise understanding of potential intervention targets. In the present sample, these patterns suggest that DSO may also reflect broader disturbances in self-related

functioning within trauma-related psychopathology rather than just representing a marker specific to Complex PTSD. Specifically, the accentuated links among shame, DSO, and depression in the clinical group point to the heightened vulnerability associated with disruptions in selfhood under conditions of greater distress. By revealing convergent and divergent patterns across groups, this study contributes to a more nuanced understanding of how self-conscious emotions situate within the broader architecture of trauma-related psychopathology and underscores that self-related difficulties deserve consideration not only in PTSD-oriented treatment but also in a wider range of clinical constellations.

CRediT authorship contribution statement

Cesare Cavalera: Writing – original draft, Formal analysis, Data curation, Conceptualization. **Fabio Carraturo:** Writing – original draft, Formal analysis, Data curation. **Stefania Cella:** Writing – original draft, Data curation. **Mark Shevlin:** Writing – review & editing. **Antonio Lasalvia:** Investigation. **Chiara Bonetto:** Investigation. **Doriana Cristofalo:** Investigation. **Giulia Marzocco:** Investigation. **Camilla Somma:** Investigation. **Marco Toscano:** Investigation. **Thanos Karatzias:** Writing – review & editing. **Osmano Oasi:** Conceptualization.

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Declaration of competing interest

All authors declare no competing interests.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2026.121824.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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