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Dream experiences and psychological distress: A network analysis of pathological worry, depression, anxiety, and stress

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Abstract

Dreaming has long been implicated in emotional processing, yet the complex relationships between specific dream experiences and different dimensions of psychological distress remain insufficiently understood. This study explored the network relationships between dream-related experiences, pathological worry, and symptoms of depression, anxiety, and stress using a network analytic approach. A community sample of 389 adults (*M* = 24.24, *SD* = 7.45) completed the Mannheim Dream questionnaire, the Penn State-Worry Questionnaire, and the Depression Anxiety Stress Scale-21. A Gaussian graphical model was estimated to examine conditional associations between nine variables, and centrality and stability indices were evaluated. The resulting network showed a relatively dense structure, with depression, anxiety, and stress forming a strongly interconnected cluster, and stress emerging as highly central node. Pathological worry was most strongly associated with stress. Within the dream-related domain, recall was strongly associated with telling dreams and moderately with dream emotional intensity, which in turn was associated with the impact of dreams on daytime mood. Cross-domain associations revealed that negative dream emotional tone was negatively associated with depressive symptoms and pathological worry, whereas the perceived impact of dreams on daytime mood was positively associated with anxiety. Centrality analyses revealed that dream emotional tone and stress were the most central and influential nodes in the network, showing opposite pattern of expected influence. Stability analyses suggested acceptable reliability of estimated network, although some edges should be considered with caution. These findings suggest that dream experiences are embedded with a broader system of emotional functioning, with specific dream dimensions, particularly emotional tone, closely linked to psychological distress. Future research should further explore the role of dream-related emotional processes in waking distress.

Background

There is a long-standing conceptual thread connecting ancient Greece reflections, earlier psychoanalysis, and contemporary research on dreams and emotional processes. As early as the 2nd century CE, Artemidorus of Daldis [1] provided a systematic account of dream interpretation in “Oneirocritica”, emphasizing links between dream content, waking life, and emotional experiences. Centuries later, Sigmund Freud’s “The Interpretation of Dreams” [2] represented an important historical milestone by framing dreams as psychologically meaningful phenomena rather than random by-products of sleep. Freud emphasized that dream content is systematically related to inner mental processes and emotional life, contributing to the idea that dreams may offer indirect insight into underlying psychological states. Later, Wilfred Bion [3] postulated that dreaming represents a continuous symbolic process that is fundamental to mental functioning, operating both during sleep and wakefulness. For Bion, “dreaming” consists in processing emotional experiences so as to render them thinkable. In this sense, dreaming is conceived as a continuous function of the mind, characterized by a correspondence between the emotional states evoked in dreams and the affective experiences of waking life.

Although the universality of some of classic psychoanalytic theoretical assumptions, such as the wish-fulfilment model, has been questioned by subsequent research, his work played a foundational role in establishing dreams as a legitimate focus of scientific inquiry into emotion and mental functioning.

However, despite the longstanding recognition of dreams as psychologically meaningful phenomena, the empirical relationship between dreaming and waking emotional functioning remains debated. In particular, the extent to which dream experiences shape next-day emotional reactivity, and conversely, how waking emotional states influence dream content, is still not fully clarified [4]. One influential contemporary framework, the continuity hypothesis of dreaming, proposes that dream content reflects salient experiences of waking life [5]. Empirical support for this hypothesis has been reported in emotionally charged contexts, including exposure to potentially traumatic events such as the COVID-19 pandemic [6, 7]. Nonetheless, the broad interpretation of the continuity hypothesis has highlighted the need to identify the specific mechanisms through which waking experiences are integrated into dreams experiences. In line with this perspective, the “Twenty-four hour mind” model [8] conceptualizes mental activity as unfolding continuously across the sleep–wake cycle, with dreaming playing a central role in the reactivation and integration of emotionally salient material. During sleep, such experiences may be reactivated and integrated into existing memory networks, thereby contributing to affective regulation and emotional memory processing. Accordingly, dreams can be view as reflecting both the processing of recent experiences and the ongoing reorganization of emotional memory system and self. Recent evidence further support this view by showing associations between dream characteristics and subsequent emotional functioning. For example, Zhang and colleagues [9] found that the more positively toned dream reports were associated with more positive next-day emotional reactivity compared to the previous evening.

Nevertheless, the specific relationship between distinct dream characteristics and different dimensions of psychological stress, such as depression, anxiety, and stress, remains unclear. Moreover, previous studies have predominantly relied on traditional analytic approaches that conceptualize symptoms as manifestations of shared latent factors underlying psychopathology [10], potentially overlooking the complex interrelations between dream experiences and emotional distress.

From a cognitive psychology perspective, thinking constitutes a central process in human psychological functioning, enabling individuals to process, organize, and utilize information adaptively, and thereby playing a fundamental role in the regulation of behavior and emotions [11]. One of the primary characteristics of thought is its ability to mediate between stimulus and response, allowing for the delay of immediate activation of automatic behaviors in favor of more flexible and adaptive responses. This temporal interval between stimulus and response enables access to information stored in memory, recall past experiences, and integrate them with current situational demands. Through these processes, individuals can engage in high-order cognitive operations such as planning, forecasting, and the anticipation of future events, mentally evaluating different behavioral alternatives and their potential consequences. In this sense, thinking fulfills a crucial adaptive function by fostering decision-making, self-regulation, and effective adjustment to the environment [12]. Traditionally, thinking has been

conceived as a predominantly voluntary and intentional process, oriented toward problem-solving and goal attainment. However, psychological literature has extensively highlighted how thought can also take on automatic and dysfunctional forms [13]. When thinking becomes rigid, repetitive, and difficult to control, or persistently focused on negatively toned content, it loses its adaptive value and instead function as a risk factor for psychological well-being [14].

Within the framework of recurrent negative thinking, worry refers to a cognitive process characterized by highly repetitive thought and a marked capacity to pervasively occupy an individual's mental space [15]. Originally defined as predominantly future-oriented, difficult to control, and tendentially stable over time [16], worry had been extensively associated with anxiety-related psychopathology. However, when worry becomes persistent and inflexible, it interferes with adaptive emotional processing, promoting the maintenance and chronicity of negative affective states and resulting in pathological worry [17–19]. Pathological worry is conceived as a chain of repetitive and uncontrollable thoughts focused on potential future threats and negative outcomes, typically occurring in the absence of concrete planning or problem-solving [17, 18]. Importantly, it has been identified as a transdiagnostic factor shared across multiple mental disorders characterized by common underlying psychological processes [20].

Against this background, while the robust evidence documents associations between pathological worry and emotional distress, and a growing body of research links dream experiences to emotional states during wakefulness, these two domains have largely been examined in isolation. As a result, empirical evidence remains limited regarding how different dimensions of dreaming, such as dream recall, emotional intensity and tone, the tendency to share dreams, and their perceived impact on daytime mood [21], relate to psychological distress. Clarifying these relationships is crucial, as they may reflect shared and interacting mechanisms of emotional processing and regulation. Accordingly, methodological approaches capable of capturing the complex interdependencies among these variables, rather than treating them as isolated associations, are needed [22].

Therefore, the present study aimed to investigate the pattern of associations between dream experiences and psychological distress using a network analytic approach. Specifically, we sought to: (1) examine the network structure and interrelationships among dream-related variables, pathological worry, and symptoms of depression, anxiety, and stress; (2) identify the most central and influential nodes within the network using strength and expected influence as primary indices (with closeness and betweenness being considered for exploratory purposes); and (3) assess the stability and accuracy of the estimated network.

Methods

Participants and Procedure

A total of 429 individuals initially consented to participate in the cross-sectional study recruited via convenience sampling. Forty participants were excluded based on exclusion criteria with a final sample

of 389 participants with no missing or incomplete data (i.e., more than 5% of unanswered items). Participants were recruited via university mailing lists, social media platforms, and online blogs. Data were collected through an anonymous online survey. Informed consent was obtained electronically from participants who had to read and accept before accessing the survey. Before participating, they were informed about the general aims of the research and their rights, including the possibility of interrupting participation at any time. The survey took approximately 20 minutes. Inclusion criteria were being at least 18 years old and being fluent in the Italian language. Participation was voluntary, and no incentives were provided. The research was carried out in accordance with the 1964 Helsinki Declaration and its subsequent amendments. The privacy of the participants was ensured in accordance with the European Union General Data Protection Regulation 2016/679. The study has been approved by the Ethics Committee of the University of Catania (protocol n. Ierb-Edunict-2026.06.17/10).

Measures

The following instruments were administered:

The Mannheim Dream questionnaire (MADRE) [21]. The MADRE is a self-report instrument to measure the experience of dreaming and related phenomena. It comprises 20 items assessing both frequency and qualitative characteristics to assess multiple dimensions as follows: dream recall, emotional intensity, emotional tone, nightmares (current, childhood, distress, recurrence, and percentage of recurring nightmares), lucid dreaming, dream sharing, dream recording, dreams affecting daytime mood, creative dreams, problem-solving dreams, déjà vu experiences, attitudes toward dreams (e.g., meaningfulness and interest), reading about dreams, helpful dream-related literature, and age of first lucid dream. Each of the 20 items corresponds to a specific construct and is measured using ordinal frequency scales, bipolar ordinal scales, dichotomous responses, or Likert-point scales. In the present study, the Italian version of the MADRE showing excellent psychometric qualities, was used [23]. Based on other study methodology [24–26], for the aim of this study, we used the following scales: Dreams affecting daytime mood; Dreams recall; Emotional intensity; Emotional tone; Telling dreams.

The Penn State-Worry Questionnaire (PSWQ) [27]. The PSWQ is a self-report instrument to measure the pathological trait worry. It consists of 16 items rated on a 5-point Likert scale ranging from “Not at all" to "Very typical of me”. In the present study, we used the Italian version of the PSWQ [28], which has demonstrated excellent psychometric qualities. Internal consistency in our sample was excellent, with Cronbach’s α coefficients of 0.938.

The Depression Anxiety Stress Scales-21 (DASS-21) [29]. The DASS-21 is a self-report instrument to assess emotional distress. It is composed of 21 items, each rated on a 4-point Likert response format ranging from “never” (0) to “always” (3). The items are clustered into three subscales: depression (DASS-21 Depression), which assesses symptoms such as dysphoria, hopelessness, self-deprecation, and anhedonia; anxiety (DASS-21 Anxiety), which captures symptoms of autonomic arousal, skeletal muscle effects, and situational anxiety; stress (DASS-21 Stress), which assesses chronic nonspecific arousal,

including being agitated and difficulties in relaxing. Subscale scores can be obtained by summing the scores of the pertaining items. In the present study, we used the Italian version of the DASS-21 [30], which has demonstrated excellent psychometric qualities. Internal consistency in our sample was excellent, with Cronbach's α coefficients of 0.899 for the Depression subscale, 0.851 for Anxiety, and 0.864 for Stress.

Statistical analysis

Statistical analyses were conducted using R version 4.5.2 [31] and the R packages qgraph [32] and bootnet [33]. The network analysis included nine variables measuring dream-related experiences (i.e., dreams affecting daytime mood; dream recall; emotional intensity; emotional tone; telling dreams), pathological worry (PSWQ), depression (DASS-21 D), anxiety (DASS-21 A), and stress (DASS-21 S). Each variable was represented as a node and partial correlations between variables were represented as edges. Before the network estimation, all variables included were standardized (i.e., *z*-scores). The network structure was estimated using the graphical Least Absolute Shrinkage and Selection Operator (LASSO) with model selection based on the Extended Bayesian Information Criterion (EBICglasso) [34]. The hyperparameter γ was set to 0.5, balancing sensitivity and specificity in edge selection [33]. The network was displayed through the Fruchterman–Reingold algorithm [35]. Positions nodes such that more strongly connected variables are located closer together. Nodes were grouped and colored according to conceptual domains (i.e., dream related experiences, including dreams affecting daytime mood, dream recall, emotional intensity, emotional tone, and telling dreams; pathological worry; emotional distress, including depression, anxiety, and stress). To investigate the role of variables within the network, four centrality indices were calculated: node strength, closeness, betweenness, and expected influence [32]. Closeness and betweenness were considered only for exploratory purposes due to the known instability and the stronger required assumptions [36], whereas results were grounded primarily on strength and expected influence. Node strength indicates the sum of absolute edge weights connected to a node, reflecting its overall connectivity within the network. Expected influence extends this concept by considering the direction (positive or negative) of connections and providing information on the impact of a node on the network. Network accuracy and stability were assessed using nonparametric bootstrapping procedures available in R package bootnet [33]. Edge-weight accuracy was evaluated through 5,000 bootstrap samples and confidence intervals around estimated edges. The stability of centrality indices was assessed through a case-dropping bootstrap procedure with 1,000 iterations, aiming to estimate the correlation between centrality estimates in the network and those obtained after progressively removing increasing proportions of the sample. Stability was considered adequate given that the node strength correlation met the recommended thresholds [33].

Results

Characteristics of the sample

Table 1 shows characteristics of the study sample. Ages of participants ranged from 18 to 64 years (M = 24.24, SD = 7.45). Most of them were female (84.8%, n = 330) and had completed high school education (59.6%, n = 232). In terms of sleep quality, 26.8% of subjects reported a time > 30 minutes to fall asleep, and 38.5% usually need between 15 and 30 minutes to fall asleep. As far as the reported emotional status before sleep is concerned, 37.7% of subjects reported anxiety, and 16.6% reported sadness. The mean PSWQ score was 59.87, indicating a clinically significant level of pathological worry compared to normative data [28].

Table 1
Main sociodemographic and sleep-related (i.e. time to fall asleep and emotional status before sleep) characteristics of the studied sample

Characteristics	***n* (%)**	***M***	***SD***
Age (in years)		24.24	7.45
Gender			
Male	50 (12.9)		
Female	330 (84.8)		
Non binary	9 (2.3)		
Education			
Primary or middle school diploma	30 (7.7)		
High school diploma	232 (59.6)		
Graduate	127 (28.3)		
Time to fall asleep			
10–15 minutes	135 (34.7)		
15–30 minutes	150 (38.5)		
> 30 minutes	104 (26.8)		
Emotional status before sleep			
Relaxed	152 (39,2)		
Sad / melancholy	65 (16.6)		
Anxious / worried	135 (34.7)		
Frustrated	27 (7.0)		
Guilty / sense of guilt	7 (1.9)		
Other	3 (0.7)		

[Table 1 near here]

Network structure

The network structure is displayed in Fig. 1a. The network comprised nine nodes and thirty-six possible edges, of which 24 were non-zero. The mean edge weight was 0.15 and the network density was 0.67. Edge weights ranged from − 0.12, representing the association between dream emotional tone and pathological worry, to 0.47, representing the association between dream recall and telling dreams. Within the domain of emotional distress, the nodes of depression, anxiety, and stress were strongly interconnected. Specifically, the highest edge value was between anxiety and stress (r = 0.43), followed by the association between depression and stress (r = 0.33), and between depression and anxiety (r = 0.26). Pathological worry was connected to depression (r = 0.06), anxiety (r = 0.10), and stress (r = 0.35). Regarding the dream-related domain, dream recall was associated with both telling dreams (r = 0.47) and emotional intensity of dreams (r = 0.26). Emotional intensity of dreams was also associated with the impact of dreams on daytime mood (r = 0.18), whereas telling dreams showed an association with daytime mood (r = 0.19). Regarding associations between dream-related variables and emotional distress, results showed an association between dream emotional tone and depressive symptoms (r = -0.12) and between daytime mood impact and anxiety (r = 0.13). Finally, pathological worry was associated with emotional tone (r = -0.12) and the impact of dreams on daytime mood (r = -0.07). Descriptive statistics and values of all the edge weights are reported as Additional supplementary material (Table S1).

Centrality and predictability

Figure 1b shows the centrality indices of the variables within the network. Results indicated that the dream emotional tone and stress variables showed the highest values for both strength and expected influence. Results also showed high values of strength and expected influence for telling dreams, anxiety, dreams affecting daytime mood, and pathological worry. Interestingly, depression, as well as dreams emotional intensity and dream recall, showed the lowest values. For exploratory purposes, we also considered closeness and betweenness. Specifically, dream emotional tone and stress showed the highest closeness values for both closeness and betweenness centrality indices.

[Figure 1a near here]

[Figure 1b near here]

Network stability and accuracy

Figure 2 shows the plot of the correlation between the edge weights for the estimated network and the bootstrapped network. Results demonstrated an adequate average correlation, even after dropping up to 30% of the sample. Figure 3 shows the correlation between the strength centrality measure for the

estimated network and the bootstrapped network. Results indicated excellent stability, with approximately 75% of the sample could be dropped, retaining at least 0.70 with the original network estimates. Specifically, the correlation stability (CS) was 0.75 for both edge weights and strength centrality. Figure 4 shows the bootstrap results for the edge weights in the estimated network. Results indicated that many edges of the network had confidence intervals that did not include zero, pointing out robust associations. Nonetheless, other edges showed wider intervals (i.e., including zero) and required caution in interpreting them due to lower stability.

[Figure 2 near here]

[Figure 3 near here]

[Figure 4 near here]

Discussion

The present study aimed to investigate the network structure linking dream experiences, pathological worry, and emotional distress. Findings of this study provide support for the view that dream-related variables are embedded within a broader system of emotional functioning rather than representing isolated or epiphenomenal experiences.

First, our findings revealed a strongly interconnected cluster among depression, anxiety, and stress, with the highest value emerging between anxiety and stress. This is consistent with the theoretical framework underlying the DASS-21, which conceptualizes these dimensions as partially overlapping yet distinguishable components of psychological distress [29, 30]. Converging evidence from network-based studies further supports this configuration, including recent findings in bereaved individuals showing a cluster of depression, anxiety, and stress [37]. From a broader theoretical perspective, this structure aligns with transdiagnostic models, which emphasize shared processes such as heightened negative affectivity and emotion dysregulation [38].

Within this network, pathological worry showed its strongest association with stress, with weaker but still meaningful links to depression and anxiety. This pattern is coherent with a view of worry as a cognitive process characterized by chronic mental activation and anticipatory threat processing [17]. In this light, worry may contribute to maintaining or amplifying a state of chronic activation and thus fostering emotional dysregulation [18]. The particularly strong link with stress rather than with anxiety alone may reflect the role of worry in sustaining prolonged tension and arousal, which are the core features of stress responses, as opposed to the more episodic and apprehensive nature typically associated with anxiety [39].

A coherent pattern of associations also emerged within the dream-related domain. Specifically, dream recall was strongly associated with the tendency to tell dreams, and moderately associated with emotional intensity, which in turn was associated with the perceived impact of dreams on daytime

mood. These findings appear to be coherent with the view that individuals who recall dreams tend to be more likely to reflect on and share with others [21]. These findings are consistent with classical theories of dreaming, which describe this mental process as a symbolic function of the mind devoted to the unconscious retrieval of experience and the re-elaboration of contents that are otherwise unthinkable and not amenable to processing. Within these theoretical models [2, 3], dreaming and waking narration are conceived as processes through which symbols are generated in order to represent emotional experiences and situate them within present experience. Moreover, this pattern may also be interpreted as reflecting a graded process in which increased access to dream content is accompanied by heightened emotional activation, thereby increasing the likelihood that dream experiences are perceived as influencing waking mood. However, cross-sectional data used in the current study did not allow us to conclude specific causal pathways.

With regard to cross-domain relationships, dream emotional tone was negatively associated with both depressive symptoms and pathological worry, whereas the impact of dreams on daytime mood was positively associated with anxiety. These findings are consistent with the continuity hypothesis of dreaming [5], which posits that dream content reflects waking-life experiences, emotional states, and worries. Individuals with high levels of pathological worry, persistent cognitive hypervigilance may extend into sleep, influencing both sleep quality and dream architecture, which may manifest as negatively toned dream content and distressing scenarios [40, 41]. On the basis of the present study's findings, although limited by cross-sectional design, it is possible to hypothesize the presence of a reciprocal dynamic linking daytime and nocturnal processes. Specifically, pathological worry, potentially compounded by depressive symptomatology, may contribute to a more negative emotional tone of dreams, which in turn may exacerbate next-day emotional sequelae, particularly anxiety. Such a process could create a self-reinforcing loop in which altered dream experiences and waking emotional distress mutually influence and sustain each other over time. Longitudinal and experimental studies will be necessary to test this hypothesis and clarify the directionality of these associations.

At the same time, our findings extend this perspective by indicating specific dimensions of dreaming that are differentially related to emotional states and psychological distress. In line with the "Twenty-four hour mind" model [8], dreaming may contribute to the integration and regulation of emotionally salient experiences. Within this framework, the second aim of this study was to identify the most central and influential nodes in the network. Our findings indicated that dream emotional tone and stress emerged as the most central and influential nodes; however, the expected influence index revealed opposite roles. Specifically, dream emotional tone showed a negative expected influence, whereas stress showed a positive one. From a network perspective, stress may function as an activation node, amplifying distress across the system. In contrast, dream emotional tone may exert a deactivation role, such that more positive dream affect could attenuate overall levels of distress. Rather than constituting strictly "protective" or "risk" factors, these findings suggest the presence of a dynamic balance within the system, in which processes related to waking emotional states and dream experiences differentially contribute to the regulation of distress.

Another relevant finding of this study concerns the relatively low centrality of depression and other dream-related variables, such as dream recall, which appear to function as more peripheral elements rather than a primary hub. This interpretation is consistent with previous network studies in psychopathology indicating that certain symptoms may occupy more central positions, while others play secondary roles within the systems [36].

The last aim was to assess the stability and accuracy of the estimated network. Stability analyses indicated an overall satisfactory level of robustness, as reflected by adequate correlation stability coefficients. Nonetheless, some edges were characterized by wider confidence intervals and should therefore be interpreted with caution. Taken together, these findings support the view that dreams are not merely reflections of waking distress, but may be embedded within processes of emotional. More specifically, dream emotional tone appears to represent a key node in the organization of emotional processing during sleep.

Several limitations of the present study should be acknowledged. First, the cross-sectional design does not allow for any causal relationships among the variables. Longitudinal design are needed to clarify the directionality of the observed associations, particularly between dream experiences and emotional distress. Second, the use of convenience sampling may limit the generalizability of the findings. Third, reliance on self-report measures may introduce biases related to memory and subjective interpretation, particularly in the assessment of dream-related variables, which inherently depend on retrospective recall.

Conclusion

Overall, findings of this study suggest that dream experiences are integrated components of a dynamic system of emotional functioning, in which specific dimensions, particularly, dream emotional tone, may act as bridging mechanism capable of modulating psychological distress, either by amplifying or attenuating it, depending on their qualitative features.

The present study also offers several clinical implications that contribute to the ongoing debate regarding the usefulness of dream dialogue and interpretation in psychological and psychotherapeutic settings. The continuity between the symbolic process of dreaming and waking narrative activity suggests that dream interpretation should not be regarded solely as an introspective process aimed at accessing unconscious and previously unrepresentable experiences—a cornerstone of the psychodynamic therapeutic model—but rather as a form of scaffolding that facilitates the emergence and enhancement of the re-elaboration of present experiences and emotions. Dream investigation may therefore be conceptualized as a clinical intervention capable of providing both diagnostic insights and therapeutic guidance in the treatment of psychopathological conditions, as evidenced by the strong association between psychopathology and dream processes observed in the findings of our study.

Declarations

Ethics approval and consent to participate

The research was carried out in accordance with the 1964 Helsinki Declaration and its subsequent amendments. The privacy of the participants was ensured in accordance with the European Union General Data Protection Regulation 2016/679. The study has been approved by the Ethics Committee of the University of Catania (protocol n. Ierb-Edunict-2026.06.17/10)

Consent to publication:

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Competing interests

The authors declare no conflict of interest.

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Author Contribution

Conceptualization, A.S.; methodology, V.L., A.S.; formal analysis, V.L., A.S.; investigation, P.S.; data curation, V.L., P.S., A.S.; writing—original draft preparation, V.L., A.S.; writing—review and editing, V.L., R.D.P., C.F., Ch.F., A.M., M.C.Q., A.S. supervision, V.L. M.C.Q., A.S.; project administration, A.S. All authors read and approved the final manuscript.

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Data Availability

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request

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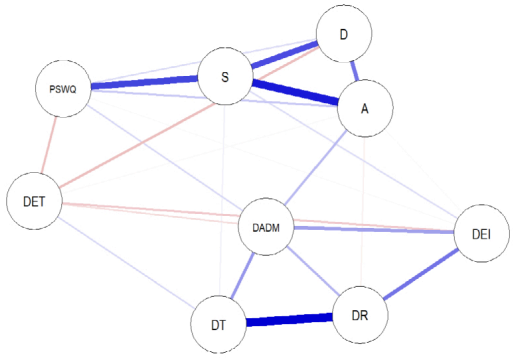
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Figures

Figure 1

a)



b)

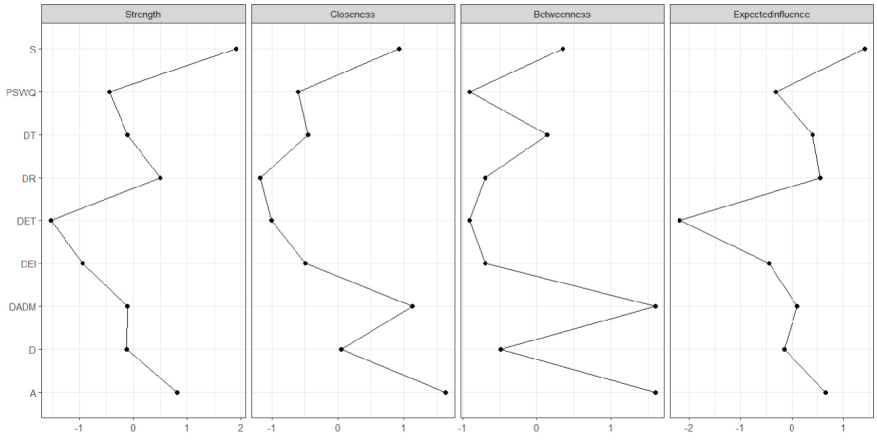


Figure 1

a) Network of dream related experiences, pathological worry, depression, anxiety, and stress. Each node indicates a variable, and each edge represents a significant association between two nodes. Edge thickness represents the magnitude of the association, in which thicker lines denote stronger associations. Blue lines indicate positive association while red lines denote negative association. **b)** Centrality indices of the variables within the network. Centrality indices of node strength expected

influence, closeness, and betweenness are shown as standardized z-scores. Abbreviations: DADM, dreams affecting daytime mood; DR, dreams recall; DEI, emotional intensity; DET, emotional tone; DT, telling dreams; PSWQ, pathological worry; D, depression; A, anxiety; S, stress.

Figure 2.

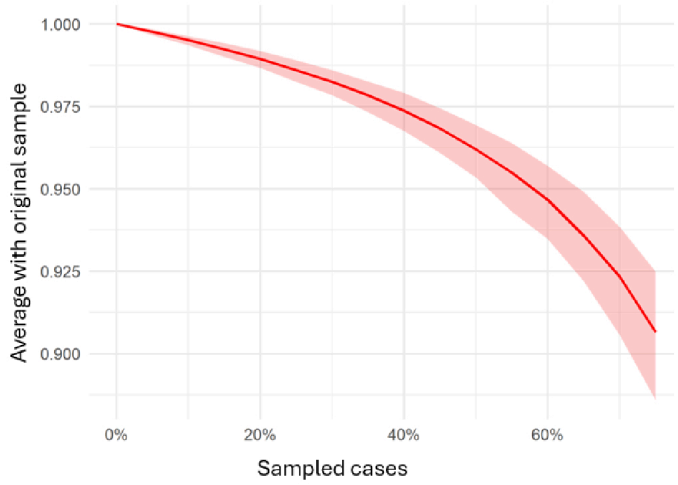


Figure 2

The plot shows the correlation between the edge weights for estimated network and the bootstrapped network. The red line indicates the mean correlation and the area around the line indicates the 2.5th till the 97.5th quantile.

Figure 3.

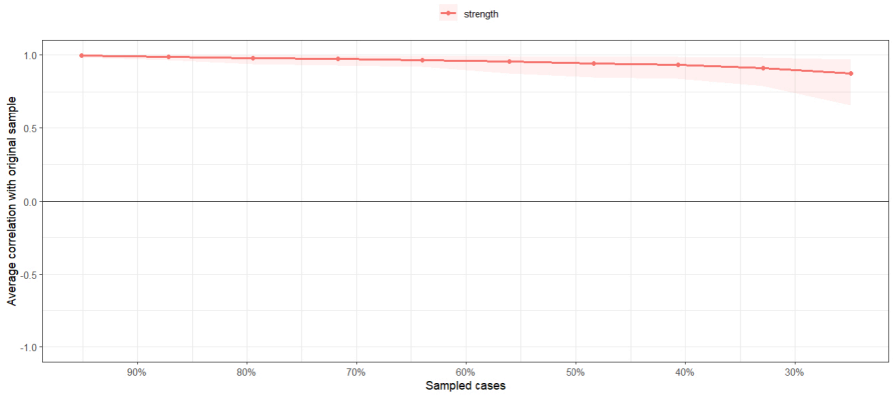


Figure 3

The plot shows the average correlation between the strength centrality measure for the estimated network and the bootstrapped network. The lines indicate the mean correlation between centrality measures and the area around the indicates the 2.5th till the 97.5th quantile.

Figure 4.

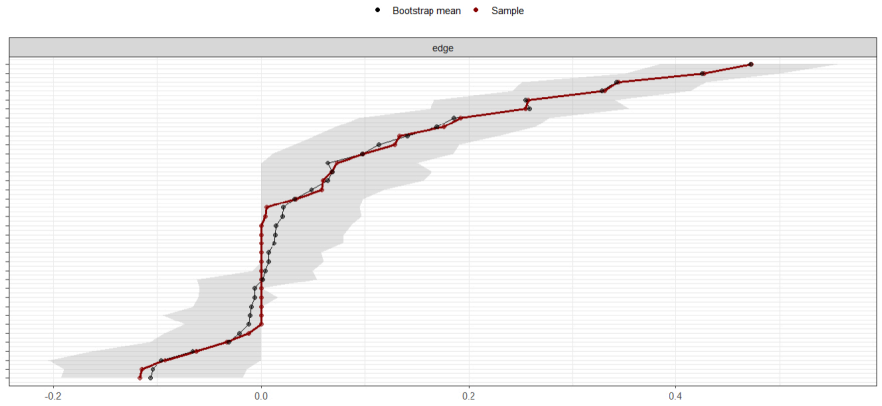


Figure 4

Bootstrap results (1,000 samples) for the edge weights in the estimated network. The plot displays the bootstrapped mean and the 95% confidence intervals for each edge. Edges whose confidence intervals do not include zero can be considered more stable and robust, while wider intervals crossing zero suggest less reliable associations.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table1.docx
- Additionalsupplementarymaterial.docx