COMMENTARY

IJEDO
Italian Journal of Eating Disorders and Obesity

The network analysis in patients with anorexia nervosa treated with intensive enhanced cognitive behavior therapy: reflections on the research data

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Key words

Network analysis
Mental disorders
Anorexia nervosa
Eating disorders
Cognitive behavior therapy
Treatment
Outcome
Psychopathology

Abstract

The network theory conceptualizes mental disorders as causally connected symptom systems rather than as effects of a superordinate and unknowable illness, otherwise called latent. Network analysis, a statistical technique designed to identify network structures among psychiatric symptoms from empirical data, has been widely used in eating disorders. Three of these studies have been conducted on patients with anorexia nervosa treated with intensive enhanced cognitive behavior therapy (CBT-E). The first study found that the network structures in adult and adolescent patients with anorexia nervosa are similar and share overvaluation of shape and weight as the core feature of anorexia nervosa psychopathology, supporting the cognitive behavioral theory. The second study found that intensive CBT-E reduces the psychopathology network connectivity over time in patients with anorexia nervosa, confirming the effectiveness of CBT-E in improving eating-disorder psychopathology. In contrast, the third study, including in the networks not only the clinical features of the eating disorder psychopathology but also those of the general psychopathology, found that the structure of the network of patients with anorexia nervosa remains unchanged mainly after intensive CBT-E. These findings stimulate a rethinking of the current viewing of the eating-disorder psychopathology and the potential reasons for the partial efficacy of actual therapeutic interventions for patients with anorexia nervosa, which seem not effective enough to break the bonds between specific and nonspecific eating disorder features.

Network theory has proposed a different way of conceptualizing the psychopathology of mental disorders and has increasingly attracted the interest of researchers, theorists, and clinicians in the last ten years. The theory has the potential to provide a new way of thinking about mental disorders that does justice to their complex nature. Indeed, in the network model, mental disorders are conceptualized as causally connected symptom systems rather than as effects of a superordinate and unknowable illness, otherwise called latent (Borsboom, 2017). The network model has the philosophical advantage of abandoning the unrealistic belief that the symptoms of a single disorder share unique underlying "causes." At the same time, it also avoids the relativistic view of mental disorders as simply labels of an arbitrary set of symptoms, considering them as systems rather than entities.

This new conceptualization of mental disorders is known as the network approach to psychopathology because it considers the interactions between symptoms as a 'network,' in which the symptoms are nodes and the causal interactions between symptoms are connections between nodes (Borsboom & Cramer, 2013).

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Received: 16 January 2023; **Accepted:** 23 January 2023; **Published online:** 25 January 2023. **doi:** 10.32044/ijedo.2023.01

Methodological research within this approach has focused on developing statistical techniques designed to identify network structures among psychiatric symptoms from empirical data. Network analysis is the alternative statistical method to inferential statistics methods, which allows the graphical and quantitative modeling of associations between constructs to identify both specific relationships between clinical features and central symptoms (i.e., symptoms that are highly connected with other symptoms in the network) (Epskamp, Borsboom, & Fried, 2018).

Among its various applications in the description of mental disorders, network analysis has also been widely used in the field of eating disorders (Monteleone & Cascino, 2021). These studies have allowed us to reflect on psychopathology and treatment with a new perspective, not anchored to the diagnostic rigidities of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013). Three of these studies have been conducted at the Department of Eating and Weight Disorders of Villa Garda Hospital on patients with anorexia nervosa treated with intensive enhanced cognitive behavior therapy (CBT-E) delivered in a residential setting. The three studies have distinctive characteristics that deserve further comments.

The first study used the network analysis to investigate potential differences in the baseline eating disorder psychopathology between 724 adults and 547 adolescents with anorexia nervosa consecutively admitted at the Villa Garda Hospital (Calugi, Sartirana, Misconel, Boglioli, & Dalle Grave, 2020). The main findings indicate that some symptoms, particularly desiring weight loss and shape and weight preoccupation and overvaluation, were central nodes with strong connections to all the other eating disorder variables in both adult and adolescent networks. The second finding was that the two networks displayed similar general structures, with nodes reflecting eating behaviors and body image concerns forming distinct, closed, but connected clusters. The last finding was that some eating disorder behaviors, particularly laxative misuse and excessive exercise, had a peripheral role in adult and adolescent psychopathology.

The second study compared eating disorder psychopathology networks in 214 patients with anorexia nervosa evaluated before and after intensive CBT-E (Calugi, Dametti, Chimini, Dalle Grave, & Dalle Grave, 2021). The patients achieved a significant increase in body mass index (BMI) and improvement in eating-disorder psychopathology. The results showed the network becomes less densely connected, both in terms of global strength and connection strengths at the end of treatment, indicating a treatment-induced psychopathology improvement (i.e., a reduced probability of symptom activation). In addition, at baseline, fearing weight gain and dietary rules were the symptoms that showed strong direct connections with other symptoms. On the other end, at the end of treatment, dietary restraint, food preoccupation, feelings of fatness, and discomfort seeing the body displayed strong direct connections with other symptoms.

The third study, expanding the work of the second one, compared the 214 patients with anorexia nervosa before and after intensive CBT-E, including in the networks not only the clinical features of the eating disorder psychopathology, but also those of the general psychopathology (Calugi, Dametti, Dalle Grave, & Dalle Grave, 2022). The first finding was that the nodes of eating-disorders and general psychopathology had centrality indexes relatively similar to many other network symptoms. This observation indicates that all nodes have a potential role in maintaining psychopathology in patients with anorexia nervosa. The second finding was that comparing the pre- and post-treatment networks showed no significant differences in global and connection strengths. These data indicate that the structure of the network of patients with anorexia nervosa remains unchanged mainly after intensive CBT-E.

Conclusions

The results of these three studies further support the validity of the cognitive-behavioral theory of eating disorders. In particular, they confirm the central role of overvaluation of shape and weight and other clinical features linked to the preoccupations with thoughts about shape and weight in the psychopathology of eating disorders. Moreover, the absence of differences between adults and adolescents in the structure of the eating-disorder psychopathology network confirms the clinical observation that eating disorder psychopathology is characterized by interacting clinical features independent of the subjects' age. These findings support the use of similar strategies and procedures to address the eating disorder psychopathology in adults and adolescents with anorexia nervosa (Dalle Grave, Conti, & Calugi, 2020; Dalle Grave, Sartirana, Sermattei, & Calugi, 2021).

The evaluation of the patients with anorexia nervosa before and after intensive CBT-E provides further food for thought. When only the specific clinical features of the eating disorder are investigated, a significant reduction in the

strength of the connections is observed, confirming the effectiveness of intensive CBT-E in reducing eating-disorder psychopathology. In contrast, when the network includes nonspecific clinical expressions of the eating disorder, no differences in connection strengths between pretreatment and posttreatment networks are found in the same patients. This latter finding indicates that the psychopathology network structure of patients with anorexia nervosa remains largely unmodified after intensive CBT-E.

The three network studies reviewed in this article open new scenarios of research and intervention for anorexia nervosa. They stimulate a complete rethinking of the current viewing of the eating-disorder psychopathology that seems characterized by a network system of causally connected symptoms rather than a specific latent entity of an arbitrary set of symptoms. They also suggest that a potential reason for the partial efficacy of actual therapeutic interventions for anorexia nervosa is they are not effective enough in breaking the bonds between specific and nonspecific eating disorder features. Future research should confirm this hypothesis by integrating additional strategies and procedures designed to target these bonds into available treatments.

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