Network analysis in psychoneurological symptoms: a demonstration of methodology analysis and recommendations for good practice

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The original project, conducted by a psychology research team at the University of Liège, aimed to identify the most influential symptom within the clusters of psychoneurological symptoms to optimize intervention strategies and improve overall patient outcomes. An initial study was conducted in patients with breast cancer [1], followed by a second study involving patients with breast and gastrointestinal cancers (study protocol published [2]; manuscript currently under review [3]).

The objective of this poster is to present the methodological and mathematical foundations of the network analyses performed on psychoneurological symptoms in cancer populations. We compare different approaches to identify the most influential symptoms within a network, including expected influence (one-step and two-step measures [4]) and traditional centrality indices such as degree, strength, closeness, and betweenness. The former accounts for networks with both positive and negative edges, and also allows to measure both immediate and indirect effect of a particular node, whereas the latter may cancel out negative edges.

Particular attention is paid to methodological challenges associated with network analysis, including the limited sample size or unbalanced cohorts and overlap of symptoms. We discuss tools to address these issues, such as stability assessment using the correlation stability coefficient and the evaluation of redundant nodes through goldbricker analysis [*Networktools* R package].

Finally, we illustrate these methods using data from two cohorts of patients with cancer and provide practical recommendations for the conduct, interpretation, and reporting of network analyses in psychoneurological symptom research. Assessing of multivariate normality and reporting of bootstrapped confidence intervals for edge-weights and centrality indices, for instance, are to be addressed to enhance the robustness and reproducibility of network analysis research.

References:

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