## Network analysis in psychiatric research

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## Dear Editor,

Volume 48 of this journal has presented a series of studies evaluating clinical test measurement models. Two of these investigations reported through exploratory factor analysis (EFA) the number of factors extracted to examine the structure of the test which consists of variables associated with the same factor, the common underlying trait of which allows correlation between such variables<sup>1,2</sup>. The EFA methodology is linked to the area of psychometrics that has driven the evaluation of latent variable models (not directly measurable), this has led to the development of new statistical models which are more robust such as the analysis of structural equations. This method is based on route analysis and multiple regression, which refers to a structural model that includes several relationships and effects between a set of variables to evaluate multiple clinical hypotheses beyond factorial analysis3.

Latent variable analyses have presented statistical similarity to correlation network models<sup>4</sup>. This network model incorporates not only zero-order relationships but also causal partial associations, which connect nodes (variables) and structure the dynamic model, which can include various clinical measures (psychological, psychiatric, neurological, biochemical, among others)<sup>5</sup>. Whose graphical representation makes it easy to interpret, the thicker the connection between variables, the greater the statistical relationship.

The network model is a multivariate analysis composed of multiple regularized nonlinear relationships (elimination of more spurious relationships using the LASSO estimator) after multivariate control of network elements. This favors the inclusion of variables of various nature that evaluate multiple aspects of mental health and their comorbid condition, as well as dynamic concurrency between their various etiological factors and modulators<sup>6,7</sup>. It is also possible to estimate the elements "bridge" (high rates of centrality) that refer to greater clinical involvement, this is of greater requirement in the current context to explain the functioning of various psychiatric and clinical phenomena that have arisen during the Covid -19 pandemic<sup>8,9,10</sup>. Those elements affect the interactions of the other components, i.e. a greater extent of this "bridge" element increases the likelihood of strengthening the other relationships, and vice versa, their decrease or a smaller extent may reduce the other connections and even cause a collapse throughout the network structure<sup>6,7</sup>.

Network analyses are paramount in the planning and personalized development of more effective treatment and psychotherapy programs in the context of Covid-19. Therefore, greater dissemination of network analysis is required to specify those more comorbid clinical measures that affect health conditions or diagnoses in the context of Covid-19<sup>11</sup>.

Also, it is possible to compare two network structures, before and after an intervention (pre and post-test) to examine the variation in the network functioning of the intervention group and determine the effect of treatment by reducing the connection of the most central symptoms of the network<sup>12</sup>. Estimating simultaneous networks based on other categorical, clinical, or sociodemographic variables is important for a greater understanding of the interactive concurrency of the components of various psychological phenomena in a specific group and determining the differential functioning of these networks<sup>6</sup>.

Network analysis has given rise to the exploratory graphic model, this method is an alternative to EFA, both allow to extract a structure from a set of variables according to a previous theoretical framework, to estimate a certain number of dimensions<sup>13</sup>.

The exploratory graphic model identifies a model with the most precise and parsimonious structure (elimination of more spurious relationships) and easily interpretable due to its graphical visualization, whose elements of each dimension have a specific color<sup>13</sup>, which refers to a great methodological contribution essential for future instrumental studies of this journal.

In conclusion, network analysis offers a valuable methodological and practical contribution in psychiatric research, the inclusive use of which provides a greater explanation of the etiological functioning of various mental health conditions and their relationship with Covid-19 that strengthens better comprehensive care and development of mental health interventions to psychiatric professionals given the results of their research.

## DECLARATION OF INTEREST

Authors confirm they have no conflict of interest.

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