Review of: "Network Neuroscience and Translational Medicine for Understanding Mental Health: The example of Post-traumatic Stress Disorder"

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Potential competing interests: No potential competing interests to declare.

The article discusses how translational network neuroscience and network models can improve our understanding of mental illness, specifically post-traumatic stress disorder (PTSD). The author argues that a network approach, which considers the synchronised activation of multiple brain regions involved in mental pathology, should replace traditional case control methods in research. The author emphasises the heterogeneity of mental illness and the need for detailed measures of symptom expression and intensity. Network neuroscience has identified important functional networks, such as the salience network and the central executive network, that may contribute to psychopathology. The article underscores the importance of using comprehensive symptom measures, longitudinal studies, and intervention research to better grasp the complex relationships between brain function and symptom expression in mental disorders.

While I agree with the main argument, I believe it could be better developed. The author's discussion jumps between different levels of explanation, creating confusion. Additionally, the article lacks novel ideas that haven't already been addressed in broader reviews and opinion pieces.

The term "networks" can encompass various phenomena involving interacting elements, such as biological networks (e.g. gene expression networks), statistical networks (e.g. correlations between neural time series), and abstract networks (e.g. social interaction networks). Networks serve as descriptions rather than explanations, as they don't have inherent connections beyond their basic property of having interacting elements.

The author echoes important points from the network psychometric literature (Borsboom 2017, Jones & Robinaugh 2021) to support the argument that a network approach can help understand the complex presentation of PTSD. The author also contends that network accounts of brain function provide better insights than focusing on localised effects in specific groups of patients. The dominance of network approaches in the neuroimaging literature supports this view. However, it remains unclear how describing both symptoms and brains as networks and integrating them would be beneficial, a problem that has been discussed elsewhere (Blanken et al. 2021). Furthermore, the specific contribution of this approach to PTSD is not evident in the review.

There seems to be confusion regarding different approaches in the introduction. While the author argues for favouring dimensional approaches over case-control approaches, this doesn't necessarily follow from the application of network methods. The network psychometric approach can be used to study symptom networks within traditional diagnostic

categories, and structural and functional brain networks can also be compared between cases and controls, e.g. Fried et al. 2020 for depression. Although the network approach aligns with a transdiagnostic perspective, one doesn't imply the other.

In my opinion, the article would be more appealing if it focused on one level of explanation at a time, such as brain networks or psychometric networks, and highlighted the specific benefits of each approach for studying PTSD. As it stands, I think that the review only adds confusion to the literature.

Minor comments:

Figure 1: The figure should be provided in higher resolution for improved readability.

"Network neuroscience has attempted to illuminate these difficulties as the memory systems involved have been linked to the executive networks' control of salience network functions." This sentence is unclear.

"... examine the cascade of symptoms from exposure to initial symptoms to later symptoms and how these may be related to brain function."

References:

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