Exploring the Hidden Dynamics in Health-related Quality of Life

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Aims

Health-related quality of Life (HRQoL) is a dynamic construct. Experience sampling methods (ESM) are becoming increasingly popular to capture within-person fluctuations in HRQoL. An emerging approach to analyze such momentary data is network analysis. The aim of this study was to explore the use of network analysis for investigating the within-person dynamics in HRQoL over time.

Methods

We analyzed ESM data of 30 patients with coronary artery disease (CAD), who were scheduled for cardiac intervention. Using an iPod, patients completed eight HRQoL items representing four scales (i.e., positive mood, negative mood, CAD symptoms, and physical state) nine times a day with random intervals for seven consecutive days. ESM data were analyzed at group-level to estimate the average dynamical relationships, and at patient-level to estimate within-person dynamical relationships. Network analysis was performed to analyze these patterns in dynamical relationships.

Results

Group-level analysis showed that, on average, 'tiredness' and 'anxiousness' were the most central items in patients' HRQoL, indicating that those moods/symptoms are more likely to trigger other symptoms in the network. Patient-level analysis showed that patients differ in the patterns of dynamical relationships among items. To illustrate, in figure 1 the dynamical relationships of two patients with contrasting levels network connectivity are visualized. High network connectivity means that moods and symptoms strongly influence each other; a change in one mood/symptom is likely to change the overall HRQoL.

Conclusion

This study is one of the first to apply network analysis for the analysis of momentary data of HRQoL. Network models are a meaningful representation of HRQoL dynamics, it may reveal which HRQoL items are most central and well connected to other items for specific patients/groups of patients. This information will help deepening our insight into experienced HRQoL and provide targets for personalized treatment strategies.
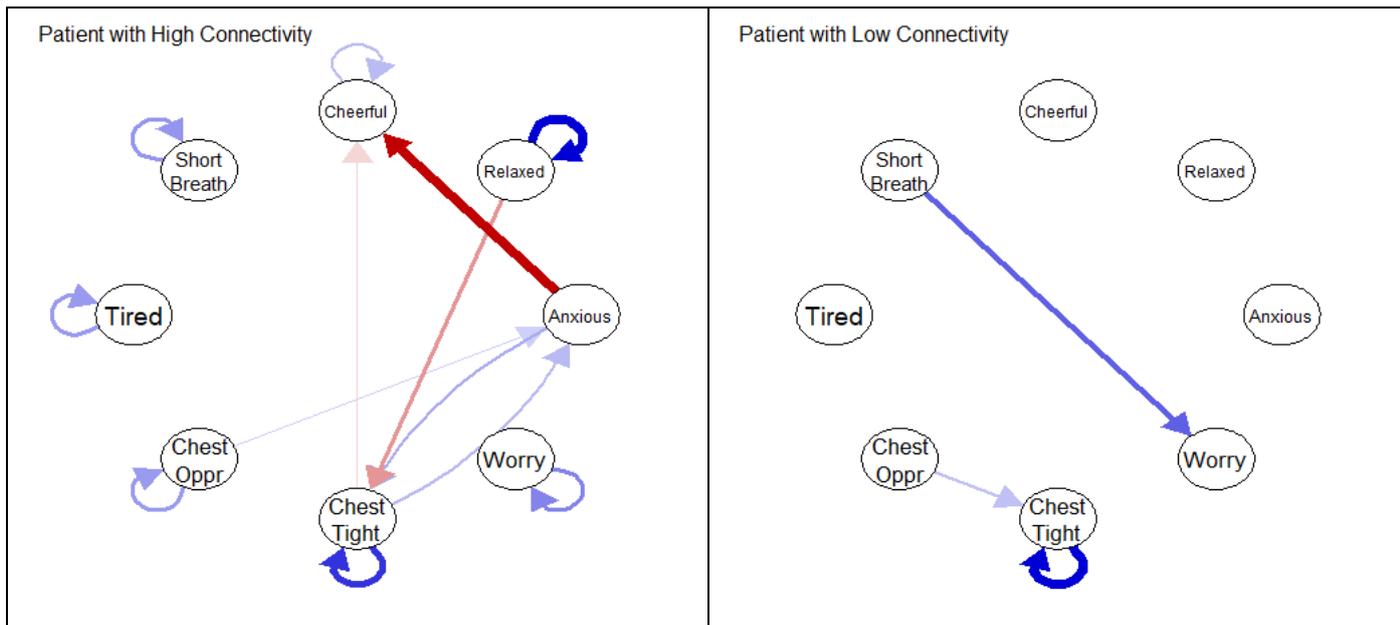
Figure 1. Two patient networks with contrasting levels of network connectivity. *Left* network = Patient network with high network connectivity. *Right* network = Patient network with low network connectivity. Circles (nodes) represents HRQoL items, arrows (edges) indicate a dynamical relationship between items. Blue edges correspond to positive associations, red edges correspond to negative associations. Edge thickness and saturation represent the strength of the relationship. Networks are estimated using the graphicalVAR package for R.