Supplementary Materials for:

What are 'good' depression symptoms? Comparing the centrality of DSM and non-DSM symptoms of depression in a network analysis

Eiko I. Fried[1*]

Sacha Epskamp[2]

Randolph M. Nesse[3]

Francis Tuerlinckx[1]

Denny Borsboom[2]

[1]Faculty of Psychology and Educational Sciences, University of Leuven, Leuven, Belgium;

[2]Department of Psychology, University of Amsterdam, Amsterdam, The Netherlands;

[3]School of Life Sciences, Arizona State University, Tempe, USA.

* Eiko Fried, University of Leuven, Faculty of Psychology and Educational Sciences, Research Group of Quantitative Psychology and Individual Differences, Tiensestraat 102, 3000 Leuven, Belgium. Eiko.Fried@gmail.com.

1. Comparison of betweenness, closeness, and node strength centrality

In the main report, we focus on node strength centrality. Supplementary Figures S1 and S2 show the betweenness (B), closeness (C), and node strength (N) centrality plots for the 15-item DSM network (Fig. 1 in the main report) and the 28-item IDS-C network (Fig. 2 in the main report), respectively. The indices were substantially related. For the 15-item DSM networks, correlations were 0.66 (B~C), 0.56 (B~N), and 0.64 (C~N); for the 28-item full network, they were 0.69 (B~C), 0.66 (B~N), and 0.77 (C~N).

2. Bootstrap sampling procedure

To examine the possibility that the particular symptoms included in the IDS-C—or the specific number of nodes in the network—biased the centrality estimates, we used a bootstrap sampling procedure similar to the one described by Costenbader and Valente (Costenbader and Valente, 2003), implemented in the *R*-package *bootnet* (Epskamp, 2015). We randomly sampled a network consisting of 27 symptoms 2,000 times, and repeated this procedures for all network sizes between 26 and 2 symptoms. We then estimated the average node strength of each symptom for each network size; this procedure allows for insights on how robust the results are to excluding symptoms from the network. We also correlated the centrality estimates obtained from the full 28-symptom network with the results obtained from the bootstrap sampling procedure described above.

The bootstrap procedure visualized in Fig. S3 revealed that the order of the node strength estimates of the 28 IDS-C symptoms was robust regarding the size of the network. As expected, node strength decreased with decreasing network size, but the order of symptoms remained stable. The symptoms *var* and *qua* were confirmed as robust centrality outliers in the bootstrap analyses—they represent the bottom two symptoms in Fig. S3.

A different way to test for robustness is to examine the correlation between the node strength estimates of the symptoms in final global network (Fig. 2 in the main document) and the node strength estimates of the symptoms in the bootstrapped networks (Fig. S3) for each sampling level; results are presented in Fig. S4. On average, the correlation was above .95 when 25% of the nodes were dropped from the network, above .90 when half of the nodes were excluded, and still above .75 even when dropping 75% of the nodes. In sum, node strength estimates were very robust, and neither the particular symptoms included in the IDS-C, nor the specific number of nodes in the network, seemed to bias the centrality estimates.

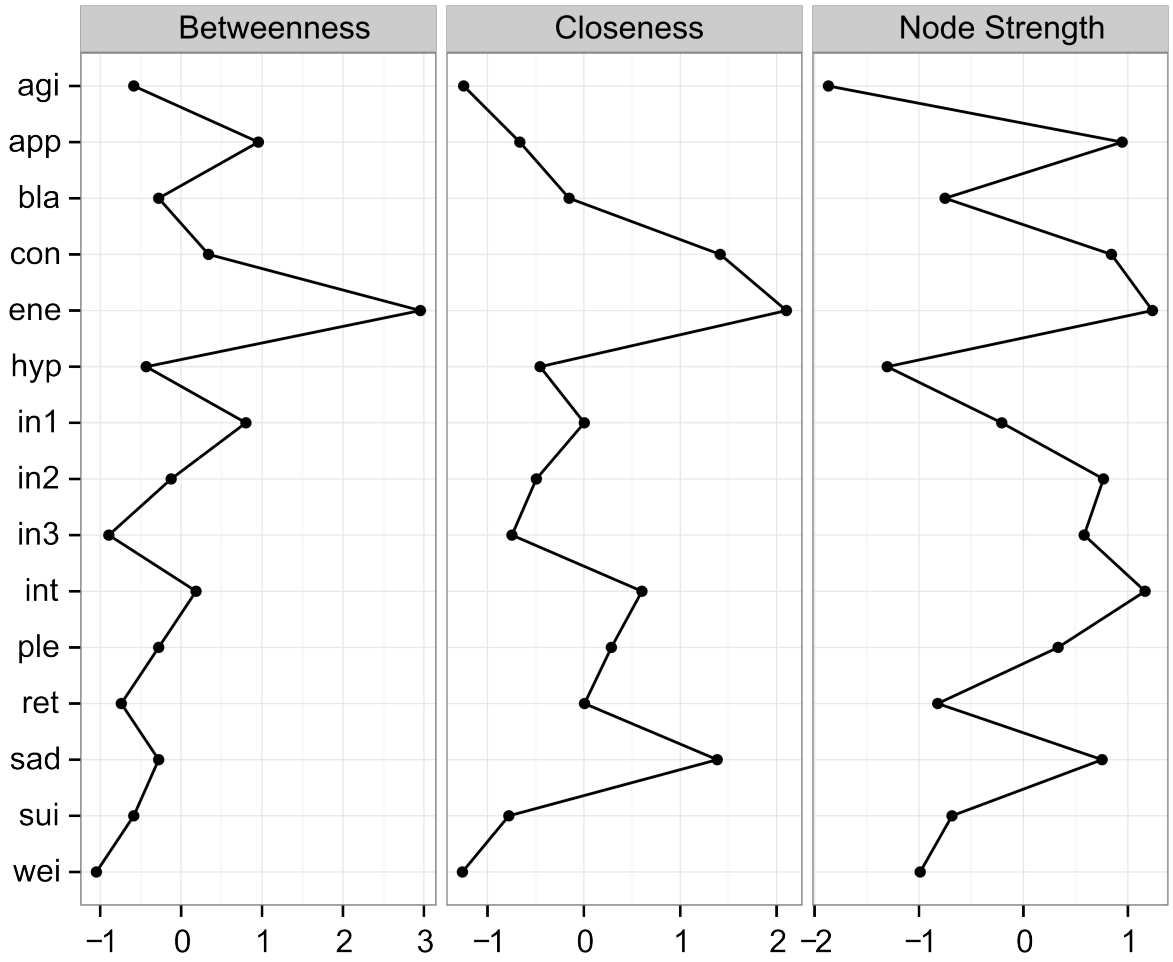

Fig. S1. Betweenness centrality, closeness centrality, and node strength centrality of the 15-item DSM depression symptoms network (Fig. 1 in the main report). For symptom shortcodes, see Table S1 at the bottom of the supplementary materials.

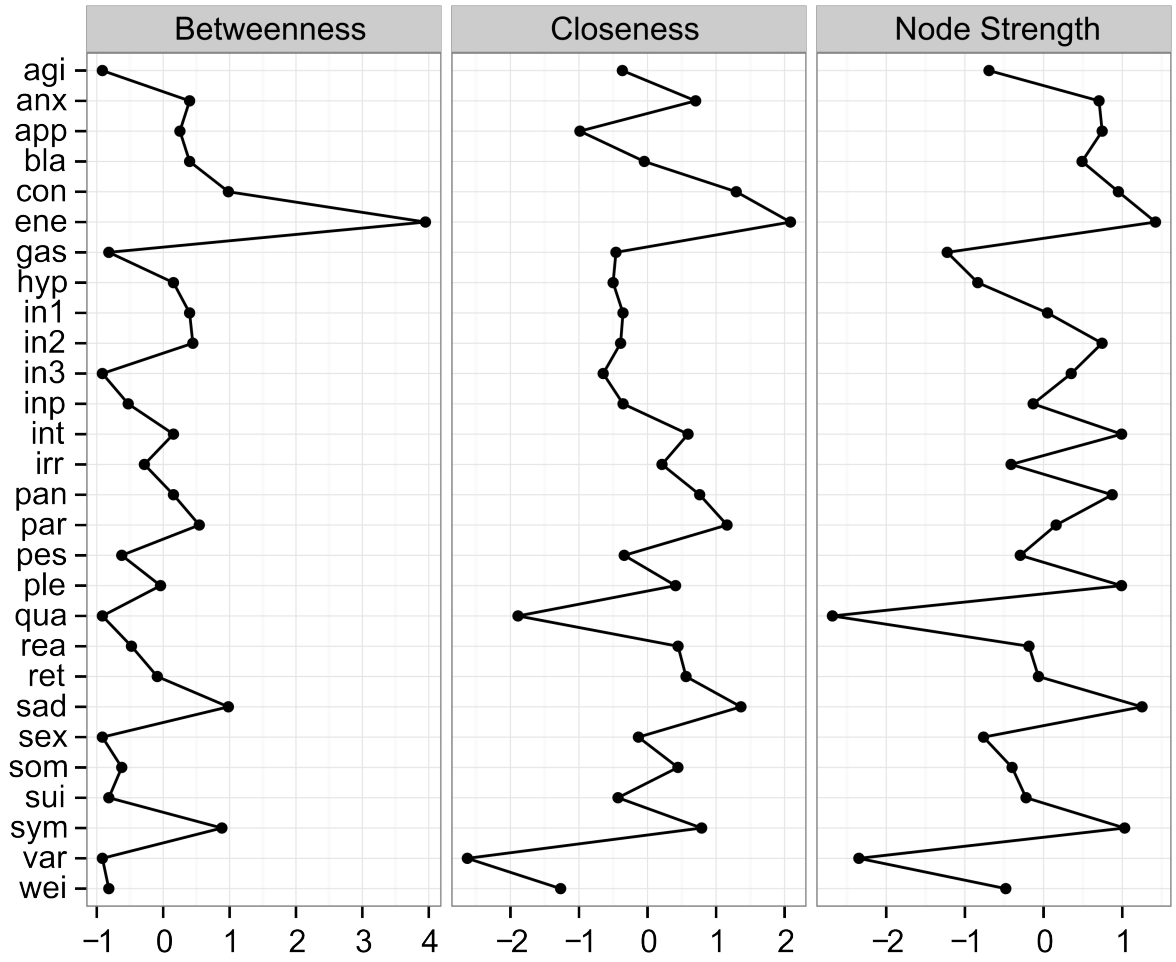

Fig. S2. Betweenness centrality, closeness centrality, and node strength centrality of the 28-item depression symptoms network (Fig. 2 in the main report). For symptom shortcodes, see Table S1 at the bottom of the supplementary materials.

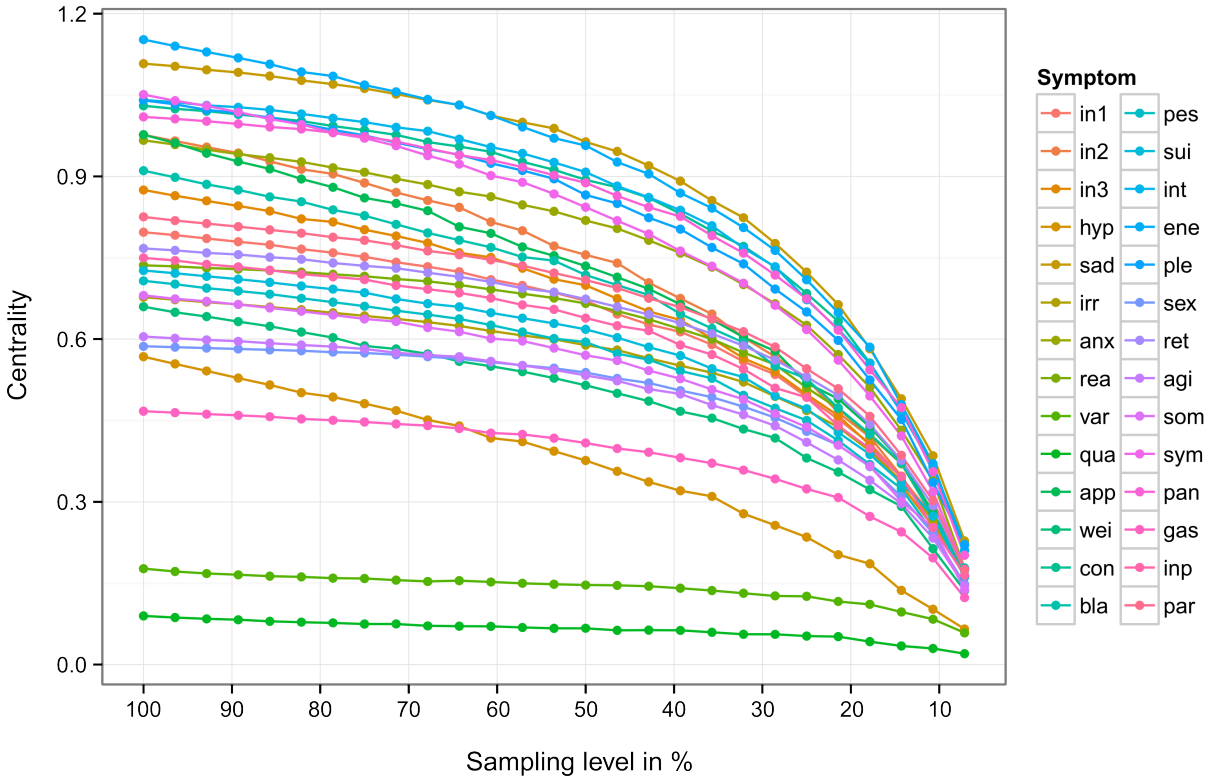

Fig. S3. Results of robustness analysis: node strength centrality estimates of the 28 IDS-C depression symptoms obtained by the bootstrap sampling procedure. Sampling level in % on the x-axis reflects the number of symptoms present in the network; each network size between 27 symptoms and 2 symptoms was drawn 2,000 times. Parallel symptom lines imply a large stability of the centrality estimates. For symptom shortcodes, see Table S1 at the bottom of the supplementary materials.

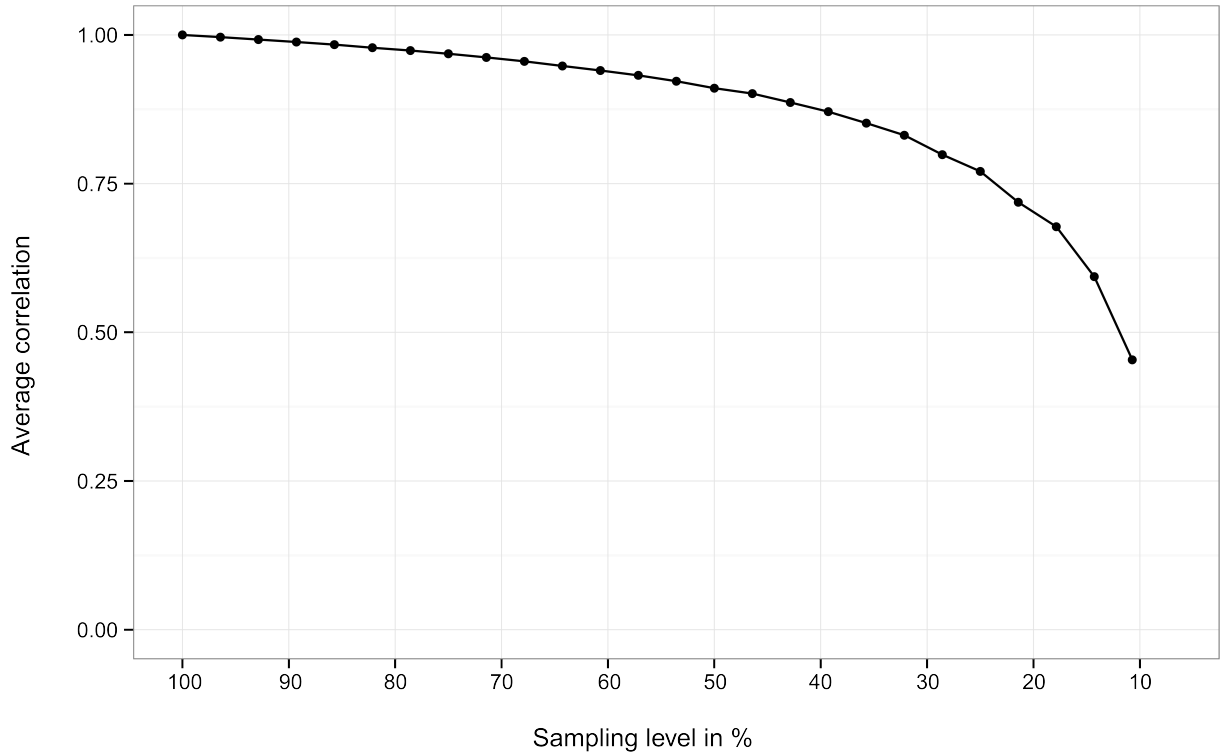

Fig. S4. Average correlation of the node strength centrality estimates obtained from the full 28-symptom network (Fig. 2 in the main report) with the results obtained from the bootstrap sampling procedure described above. Sampling level in % on the x-axis reflects the number of symptoms present in the network; each network size was drawn 2,000 times.

Table S1. IDS-C depression symptoms

#	IDS-C symptoms	Short-code	DSM-5 symptoms	Disaggregated symptoms
1	Early insomnia	In1	x	x
2	Mid insomnia	In2	x	x
3	Late insomnia	In3	x	x
4	Hypersomnia	Hyp	x	x
5	Sadness	Sad	x	
6	Irritability	Irr		
7	Anxious / tense	Anx		
8	Mood reactivity	Rea		
9	Diurnal variation	Var		
10	Mood quality	Qua		
11	Appetite change	App	x	x
12	Weight change	Wei	x	x
13	Concentration / decisions	Con	x	
14	Self-blame / worthless	Bla	x	
15	Pessimism	Pes		
16	Suicidal ideation	Sui	x	
17	Interest loss	Int	x	x
18	Energy loss	Ene	x	
19	Pleasure loss	Ple	x	x
20	Loss of sexual interest	Sex		
21	Psychomotor retardation	Ret	x	x
22	Psychomotor agitation	Agi	x	x
23	Somatic complaints	Som		
24	Sympathetic arousal	Sym		
25	Panic / phobia	Pan		
26	Gastrointestinal problems	Gas		
27	Interpersonal sensitivity	Inp		
28	Paralysis	Par		

References

Costenbader, E., Valente, T.W., 2003. The stability of centrality measures when networks are sampled. Soc. Networks 25, 283–307. doi:10.1016/S0378-8733(03)00012-1

Epskamp, S., 2015. bootnet: Bootstrap methods for various network estimation routines.