Network Characteristics of Remitters and Non-Remitters to Psychotherapy in a Heterogeneous sample of Patients with Internalising Disorders.

Peter Weller[1], Kevin Hilbert[2], The KODAP Consortium, and Ulrike Lüken[1].

[1] Department of Psychology, Humboldt-Universität zu Berlin
[2] Department of Psychology, Health and Medical University Erfurt

BACKGROUND

- **Internalising disorders** are amongst the most prevalent mental health issues affecting society[1]. This burden is exacerbated by the low **patient remission rate** to treatments such as **CBT**[2]. Elucidating factors that signal patient profiles that are more or less suited to a specific line of treatment is therefore essential for **optimising** and **personalising treatments**.
- **Psychological networks**[3], can be used to model patient data such as symptom measures or questionnaire responses at the systems level rather than at the level of individual variables in isolation, revealing the complex interactions and inter-dependencies amongst variables in a system.
- Aim: to model and compare the **network properties** in terms of **edge strength** and **node centrality** for **remitters** and **non-remitters** to psychotherapy.

METHODS & RESULTS

SAMPLE

- Patients from university outpatient clinics from numerous locations across Germany as part of the **KODAP** Network[4] - a nationwide initiative centralising the collection of patient and their treatment related information.
- 1440 Patients with Anxiety disorders or Mood disorders included in the sample.

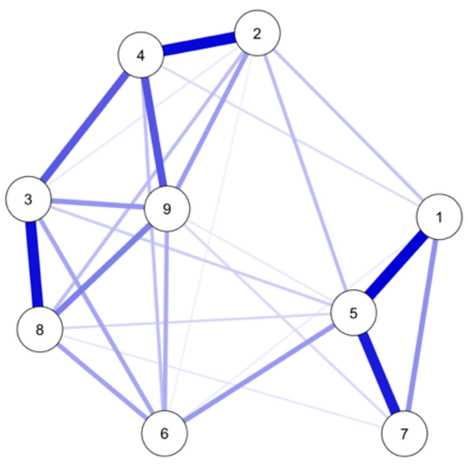
Patient Characteristics

Age		**Sick leave**	
Mean (SD)	37.2 (13.7)	Able to work	773 (77%)
Median	33.0	Disability pension	13 (1.3%)
Min, Max	18.0, 80.0	Old age pension	41 (4.1%)
Sex		Other	29 (2.9%)
Female	674 (61%)	Unable to work (on sick leave)	154 (15%)
Male	429 (39%)	**Previous treatment**	
Marital Status		Inpatient psychotherapy	91 (9.6%)
Divorced	79 (7.4%)	No previous treatment	506 (53%)
Married	269 (25%)	Outpatient and inpatient psychotherapy	94 (9.9%)
Other	132 (12%)	Outpatient psychotherapy	243 (26%)
Separated	31 (2.9%)	Yes (exact information not available)	18 (1.9%)
Single	541 (51%)	**Diagnosis**	
Widowed	13 (1.2%)	Anxiety disorder	600 (54%)
Currently in a relationship	551 (53%)	Mood disorder	504 (46%)
Highest educational level		**Global severity score**	
No school leaving certificate	9 (0.9%)	Mean (SD)	0.9 (0.6)
Other	15 (1.5%)	Median	0.8
Secondary school (Gymnasium)	615 (60%)	Min, Max	0.0, 3.4
Secondary school (Hauptschule)	117 (11%)		
Secondary school (Realschule)	255 (25%)		
Still a student	10 (1.0%)		
Highest professional qualification			
Apprenticeship or vocational training	366 (36%)		
No training qualification	58 (5.7%)		
Other	186 (18%)		
Still in training or studying	151 (15%)		
University or technical college degree	261 (26%)		

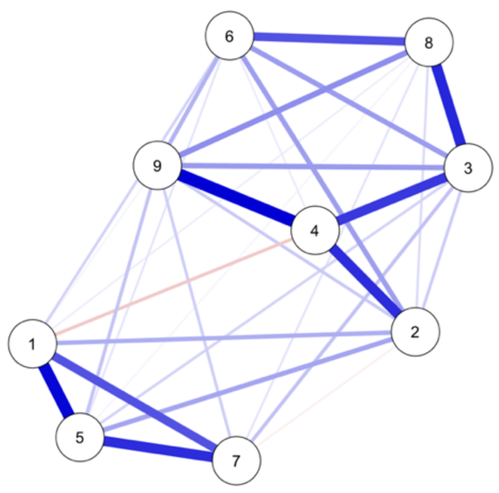
- Remission defined as those patients who complete psychotherapy with one less and no new diagnosis.

SYMPTOM NETWORKS

Remitters



Non-remitters

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[1] "somatization"                [6] "hostility"
[2] "obsession_compulsion"        [7] "phobic_anxiety"
[3] "interpersonal_sensitivity"   [8] "paranoid_ideation"
[4] "depression"                  [9] "psychoticism"
[5] "anxiety"
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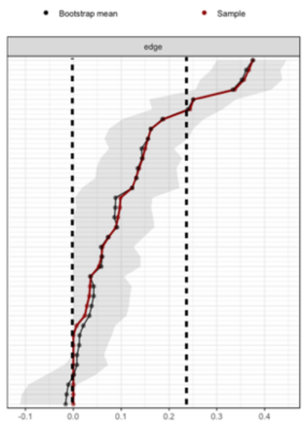
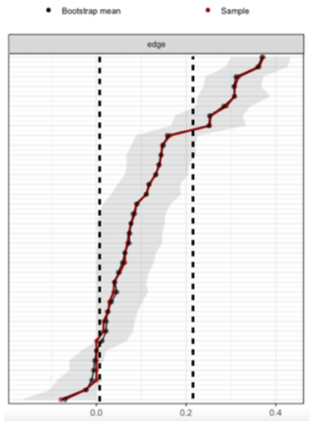
Remitters | **Non-remitters**

EDGE WEIGHT ACCURACY

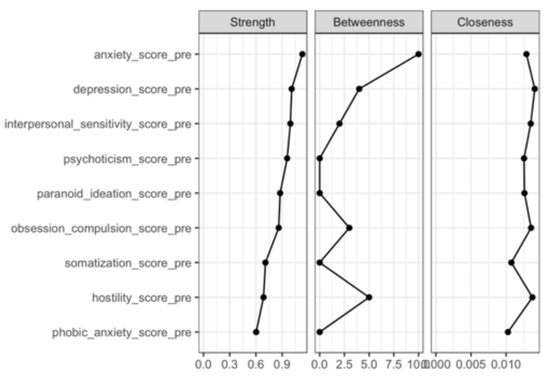


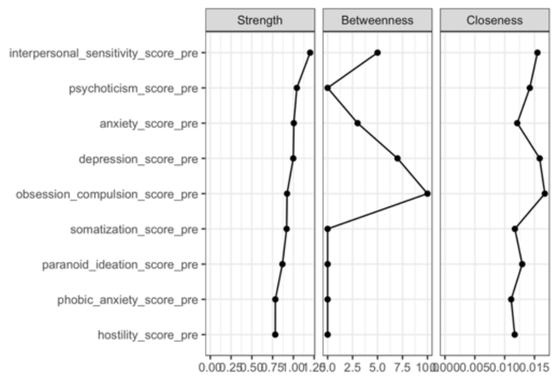
Edges are estimated with **LASSO regularisation** resulting in sparse networks. Resulting edge weights show the **Conditional association** - statistical association between two variables that persists when taking into account other variables that may explain the association.



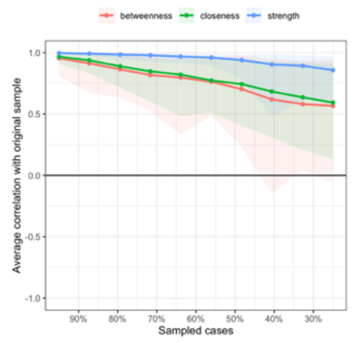
Non overlapping confidence intervals suggests robust differences in edge weights within each network

NODE CENTRALITY



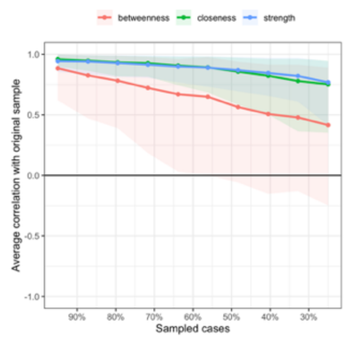


CENTRALITY STABILITY



Strength: 0.67
Betweenness: 0.20
Closeness: 0.12

The **CS-coefficient**, quantifies the maximum proportion of cases that can be dropped to retain, with 95 % certainty, a correlation with the original centrality of higher than 0.7.



Strength: 0.52
Betweenness: 0.44
Closeness: 0.05

High node stability for the strength centrality measure with higher stability in remitters.

NETWORK COMPARISON TEST

Global Strength test: $p < .04$. **Network Structure test: $p = .51$**

	Closeness	Betweenness	Strength
Obsessive Compulsive Score	0.03*	0.07	0.33
Hostility Score	0.3	0.03*	0.16
Phobic Anxiety Score	0.51	0.98	0.03*

Global strength test: Tests the null hypothesis that the overall level of connectivity is the same across the two populations.
Invariant Network Structure Omnibus test: evaluates the null hypothesis that all edges are equal.

DISCUSSION

- We found that pre-treatment symptom networks were robust and scored highly on measures of stability for both groups. Significant differences between remitters and non-remitters were found in measures of node centrality for **obsessive-compulsive**, **hostility** and **phobic-anxiety** symptoms.
- Our results show that a network models reveal insights into pre-treatment differences between remitters and non-remitters and suggest that extending the approach to the development of **personalised ideographic network**[5] models may be a fruitful next step.

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The authors declare no conflict of interest.

Contact: wellerpe@hu-berlin.de