Viewing HoNOS through symptom networks: a useful alternative to factor scores?

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The plan

• Intro to symptom network analysis
• Application of mild & moderate strength net analyses to HoNOS
• Some outcomes evaluation in a similar spirit
HoNOS psychometric structure
# One story

<table>
<thead>
<tr>
<th>HoNOS subscale</th>
<th>Items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal well-being</td>
<td>4</td>
<td>Cognitive problems</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Physical illness or disability problems</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Problems with activities of daily living</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Problems with occupation and activities</td>
</tr>
<tr>
<td>Emotional well-being</td>
<td>2</td>
<td>Non-accidental self-injury</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Problems with depressed mood</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Other mental and behavioural problems</td>
</tr>
<tr>
<td>Social well-being</td>
<td>3</td>
<td>Problem drinking or drug-taking</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Problems with relationships</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Problems with living conditions</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Problems with occupation and activities</td>
</tr>
<tr>
<td>Severe disturbance</td>
<td>1</td>
<td>Overactive, aggressive, disruptive or agitated behaviour</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Problems associated with hallucinations or delusions</td>
</tr>
</tbody>
</table>
Latent variable approach

Network approach (e.g., Borsboom & Cramer, 2013)
A spectrum of analysis strengths…

- Correlation (in a picture)
- Saturated partial correlation
- Sparse partial correlation
- Temporally-ordered causal net
- Theory-informed causal net
The data

- First and last HoNOS and HoNOS65+ ratings for 70,978 episodes of care since electronic records began (mostly since 2007)
- Anonymised data from Clinical Record Interactive Search (CRIS) system
- CRIS was approved as a dataset for secondary analysis by Oxfordshire Research Ethics Committee C, reference 08/H0606/71
Absolute polychoric correlations at time 1
Correlations on T1 data (polychoric)
Filter so $|r| > .2$, i.e., > 4% shared variance
Personal wellbeing

Overlaying the Speak et al structure
Overlaying the Speak et al structure
Severe disturbance

Overlaying the Speak et al structure
Emotional wellbeing

Overlaying the Speak et al structure
Moving a little beyond correlation: graphical lasso (Friedman et al., 2008) pre-post and by diagnostic group
All data (a) pre

(b) post
Non-Affective Psychosis (a) pre

(b) post
Affective Psychosis (a) pre

Affective Psychosis (b) post
Interim summary

- The magnitude of (partial) correlations between symptoms depends on diagnosis
- Correlations seem relatively constant over time
- Many quite weak
- Substantive reasons to analyse at item level, e.g., bio-psycho-social explanation for links and loops between symptoms
Moderators of outcomes
The plan

- Use T1 data to predict T2
- To illustrate, focus on deterioration,
  \[\text{Prob(clinical at T2 } \mid \text{ non-clinical at T1)}\]
  Assume ≥ 2 is clinical
- Using logistic regression (equiv. to a type of net)
- Focussing here on
  - Psychological problems (depression, hallucinations)
  - Interpersonal problem (relationships)
  - Social problem (living conditions)
Descriptives:
% of episodes showing new problem, by dx
New problems with depressed mood
New problems with hallucinations
New problems with relationships
New problems with living conditions

Coef (logit scale)

Liv Cond
Inpatient episode
Male
Rel
Drugs
Occup
ADL
Halluc
Agg
Dep
SI
Cog
Phys
Item 8: Other

A Phobias
B Anxiety and Panic
C Obsessive-Compulsive
D Mental Strain and Tension
E Dissociative or conversion
F Somatoform
G Eating - over/under
H Sleep Hypersomnia / Insomnia
I Sexual
J Other
Test case: sexual problems

• Sexual dysfunction known to be a side effect of antidepressants and antipsychotics – any evidence in our sample?

• Episodes selected if either
  – Sexual problems not recorded at first time point (or)
  – Sexual problem selected at T1 but scored 0 or 1

• What factors predict end of episode score of 2+?
New sexual problems by diagnosis

- Missing
- Depression
- Other Diagnosis
- Organic
- Affective Psychosis
- Non F Code
- Non-Affective Psychosis

% of episodes (note: not proportions)
New sexual problems by diagnosis

vs. Non-affective psychosis

- Gender (Male)
- Non F Code
- Organic
- Affective Psychosis
- Other Diagnosis
- Depression
- Missing

Coef (logit scale)

-3 -2 -1 0 1
Predicting new sexual problems from HoNOS

- Male
- Halluc
- Occup
- Rel
- Drugs
- Agg
- Liv Cond
- Cog
- ADL
- Phys
- SI
- Dep
Concluding thoughts…

• Variety of reasons to analyse HoNOS at item level
• Even though items not statistically independent
• Makes analyses more painful
• However, arguably reveals important & interesting relationships in data
• Maybe also helps explore deeper Big Questions around the nature of diagnosis, etc, …

The end!