A Brief Exploration of Youth Mental Health Symptom Networks

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Goal: Study mental health in terms of how symptoms interact with each other in large sample of youth

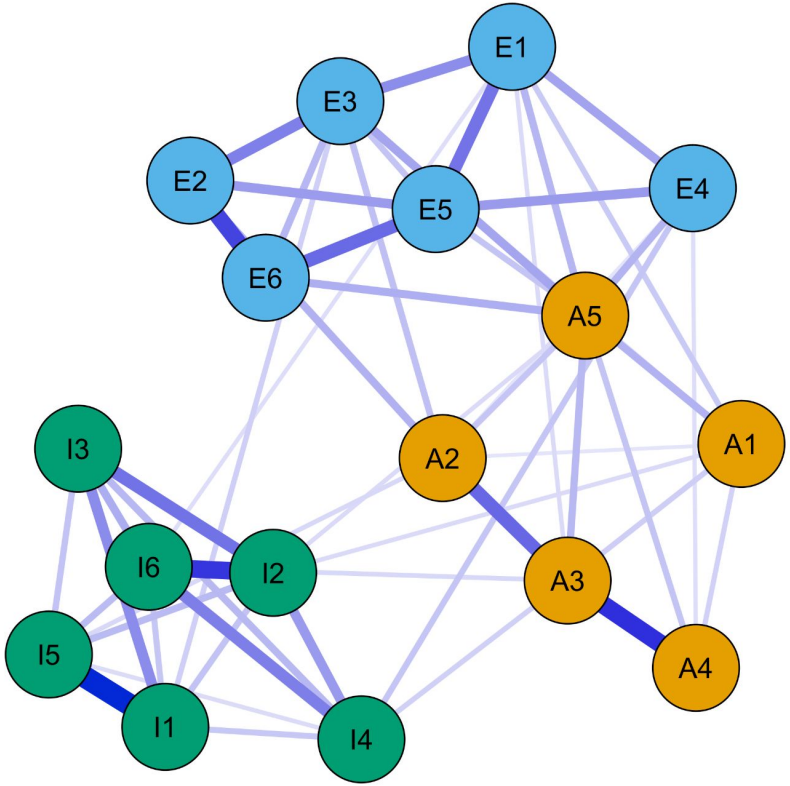
Some questions:

- **What symptoms are most central in a symptom network?**
- **Which symptoms are most strongly associated with each other?**
- Are more central symptoms better predictors of future mental health than less central ones?
- Are youth with denser symptom networks at more risk of future mental health issues (i.e. resilience, Fried et. al. 2016)?

Data: The ABCD Study

- 10 year longitudinal study of youth development across the U.S. (N ~ 11780) starting at ages 9-10 (currently ages 14-15)
- This project:
  - Construct symptom network using Brief Problem Monitor (BPM)
    - Binarized responses ("Not True" vs "Somewhat True" or "Certainly True") to questions across three domains:
      - Internal: "I worry a lot"; "I am unhappy, sad, or depressed"
      - External: "I disobey my parents"; "I argue a lot"
      - Attention: "I have trouble concentrating or paying attention"
  - N = 6239 youth (mean age of my sample = 12.89 years old; 3-year follow-up)
  - Visualize network
  - Compute centrality measures

Results: Symptom Network



Attention
- A1: behavioral immaturity
- A2: poor task completion
- A3: inattention
- A4: hyperactivity
- A5: impulsivity

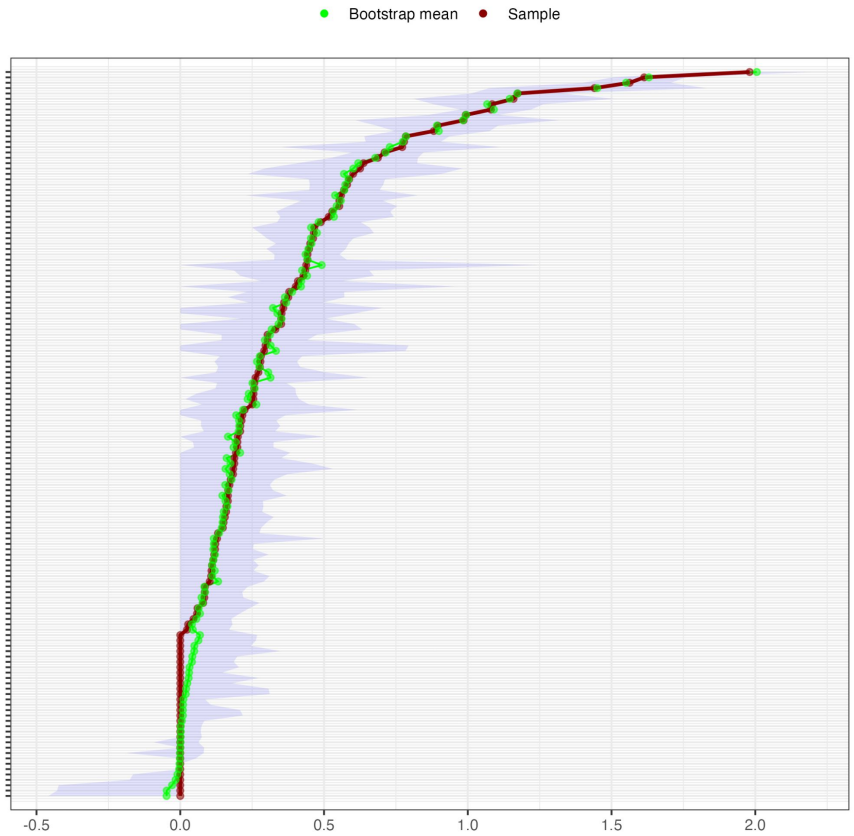
Externalizing
- E1: argumentativeness
- E2: destructiveness
- E3: disobedience
- E4: stubbornness
- E5: irritability
- E6: threats of violence

Internalizing
- I1: worthlessness
- I2: fear
- I3: guilt
- I4: social anxiety
- I5: depressed mood
- I6: worry

Nodes:
BPM item responses

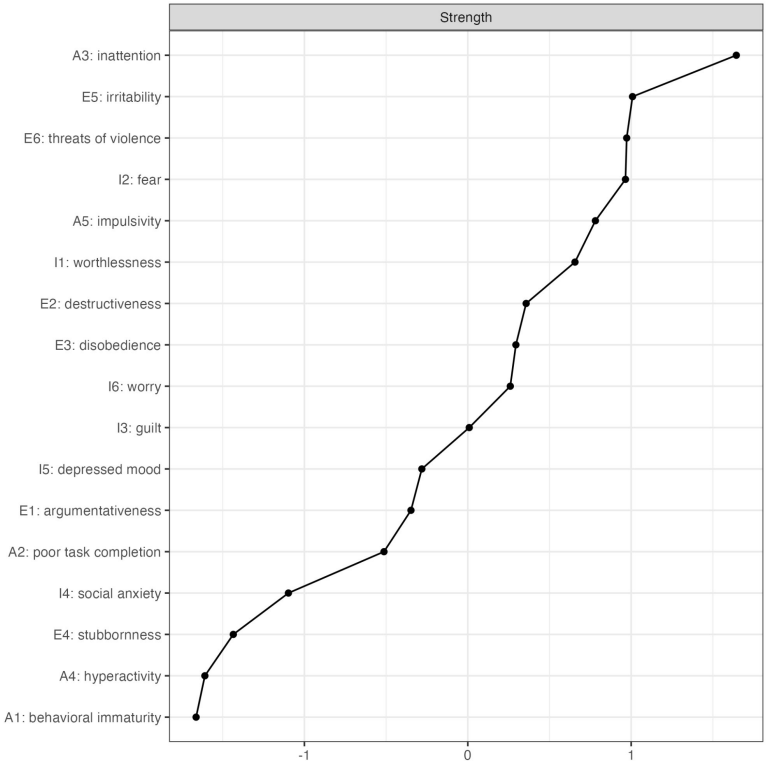
Edges: nodewise logistic regression coefficients (i.e. the remaining statistical association after controlling for all other nodes in the network)

Results: Edge Stability



- Estimated networks subject to sampling variability
- Bootstrapped edge weights and 95% confidence intervals help
- Overall the edges are stable, with a few relatively large intervals

Results: Estimated Influence



- EI is a measure of node centrality (absolute sum of edge weights connected to a node)
- Gives a general overall picture of the network
- Largest absolute centrality:
  - Inattention
  - Behavioral Immaturity
  - Hyperactivity
  - Stubbornness
  - Social anxiety

Some Inconclusive Conclusions

- Symptoms within clusters tend to have stronger relationships than across cluster (expected)
- Though across cluster associations remain (even after regularization and pruning!)
- Centrality measures seem to correlate with onset of puberty and the teenage years? (limited interpretation)

Future Directions

- Incorporate time and directionality
- Include covariates (e.g. parent education, income, etc) to improve validity and generalizability
- Explore relationship between latent variable models and network models