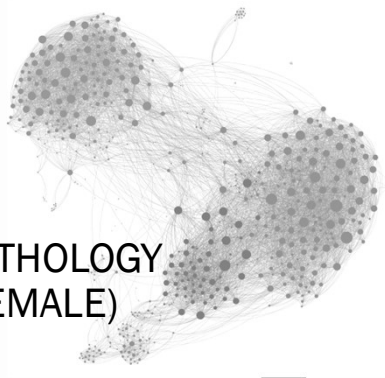

THE NETWORK APPROACH TO PSYCHOPATHOLOGY AN INSIGHTFUL WAY TO RESEARCH (FEMALE) SEXUAL DYSFUNCTION?

M. Werner (MSc; PhD Candidate)
Sexology and Psychosomatic Gynecology (Research),
Psychological Methods (Teaching);
Amsterdam UMC; University of Amsterdam; The Netherlands.
ISSWSH Annual Meeting 2024

References:

https://eiko-fried.com/
https://osf.io/6bn4d/ (CC-By Attribution 4.0 International)

Dys/Functioning (sexually) is just as complex.

Picture: Matthiasmullie (2016; CC-BY-4.0)
Borsboom (2017); van der Maas et al. (2006); Fried (2015); Bringman et al. (2023)

Slide 2 of 44

References:

1. Matthiasmullie, 2016, https://commons.wikimedia.org/wiki/File:Green_Lake,_Whistler.jpg (CC-By Attribution 4.0 International)
2. Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.
3. Van Der Maas, H. L., Dolan, C. V., Grasman, R. P., Wicherts, J. M., Huizenga, H. M., & Raijmakers, M. E. (2006). A dynamical model of general intelligence: the positive manifold of intelligence by mutualism. *Psychological review*, *113*(4), 842.
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5. Bringmann, L., Helmich, M., Eronen, M., & Voelkle, M. (2023). Complex Systems Approaches to Psychopathology. In R. F. Krueger, & P. H. Blaney (Eds.), Oxford Textbook of Psychopathology (4 ed., pp. 103-122). (Oxford Textbook of Psychopathology). Oxford University Press.

Dys/Functioning (sexually) might be more like flocking than you think.

Video: Kunovsky, E. (2020; Pexels)
Emergence: Mitchell (2012)

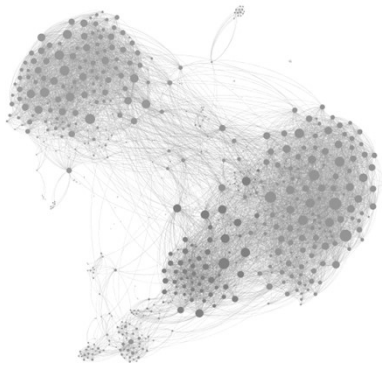
Slide 3 of 44

References:

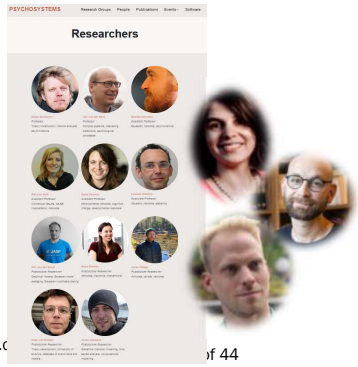
Video by Egor Kunovsky (2020): https://www.pexels.com/video/flock-of-birds-in-a-murmuration-flight-3851642/

Mitchell, S. D. (2012). Emergence: Logical, functional and dynamical. *Synthese*, *185*, 171-186.

Network Approach to FSD



- I – Theories of (Psychological) Dysfunction
- II – Networks
  - *Theory*
  - *Methods and Applications*
- III – (Female) Sexual Dysfunction
  - *Empirical Examples*
  - *Future Avenues*
- IV – Caveats
- V – Resources
- VI – Final Thoughts



Pictures: Fried, E. (CC-BY-4.0), psychosystem.org; laurabringmannlab.com; sachaepskamp.c

References Pictures:
https://osf.io/6bn4d/ (CC-By Attribution 4.0 International)

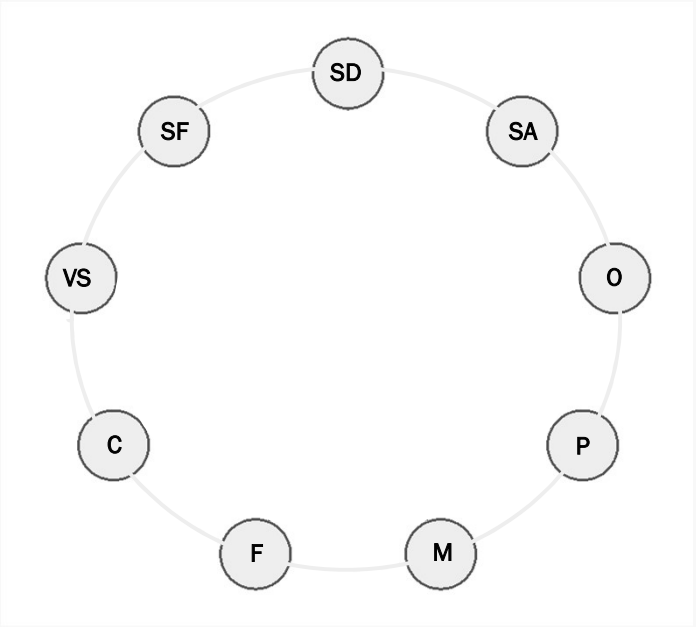
(Some) Developers of the network theory and methodology in psychology (not the application to FSD):
http://psychosystems.org/peoplecombined/
https://www.laurabringmannlab.com/
https://eiko-fried.com/
http://sachaepskamp.com/

I: (PSYCHOLOGICAL) DYSFUNCTION

A Phenomenon to Describe, Predict, Explain, Control

Case

- 47-year-old, married woman.
- Breast cancer (3y ago): mastectomy, adjuvant chemotherapy.
- Loss sexual desire: no response when approached by husband; no arousal nor orgasm during masturbation.
- Experience of orgasm on vacation; since then “nothing”.
- Distress: wish to continue sexual activity – source of tension in relationship.



Kaplan & Owett (1993; p. 17); Figure: Adapted from Fried, E. (CC-BY-4.0)

Slide 6 of 44

References:
Kaplan, H. S., & Owett, T. (1993). The female androgen deficiency syndrome. *Journal of Sex & Marital Therapy*, *19*(1), 3-24.
Note: The discussed case was not diagnosed as FAIS by Kaplan and Owett since the patient showed T-concentration levels in the normal range. See the article for more examples.

Figure: adapted from https://eiko-fried.com/
https://osf.io/6bn4d/ (CC-By Attribution 4.0 International)

SD = Sexual Desire
SA = Sexual Arousal
O = Orgasm
SF = Sexual Fantasy
P = Pleasure
VS = Vasomotor Symptoms
C = Concentration
F = Fatigue
M = Mood

See also: Bachmann, G., Bancroft, J., Braunstein, G., Burger, H., Davis, S., Dennerstein, L., ... & Traish, A. (2002). Female androgen insufficiency: the Princeton consensus statement on definition, classification, and assessment. Fertility and sterility, 77(4), 660-665.

Misfortunes never come singly!

Why do signs and symptoms co-occur in people?

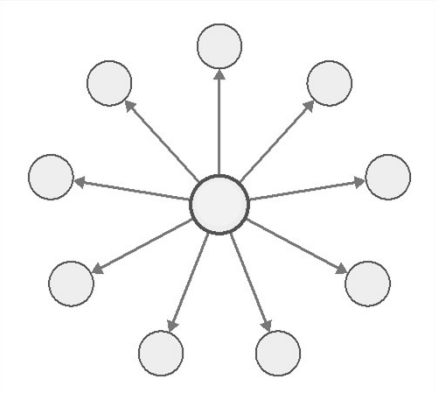


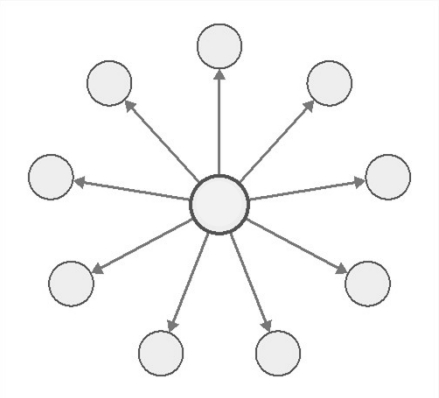
Figure: Fried, E. (CC-BY-4.0); Picture: Steber, B. (1497/8, Public Domain)

Slide 7 of 44

References:
1. https://eiko-fried.com/; https://osf.io/6bn4d/ (CC-By Attribution 4.0 International)
2. Bartholomaus Steber (1497/8): https://en.wikipedia.org/wiki/File:400Behandlung_der_Syphilis.jpg. Wikimedia Commons, Public Domain.

Disease Model of Psycho(physio)pathology?

Why are (mental) health problems correlated?



Describe: DSM and ICD

Predict, Explain: Syndrome-level

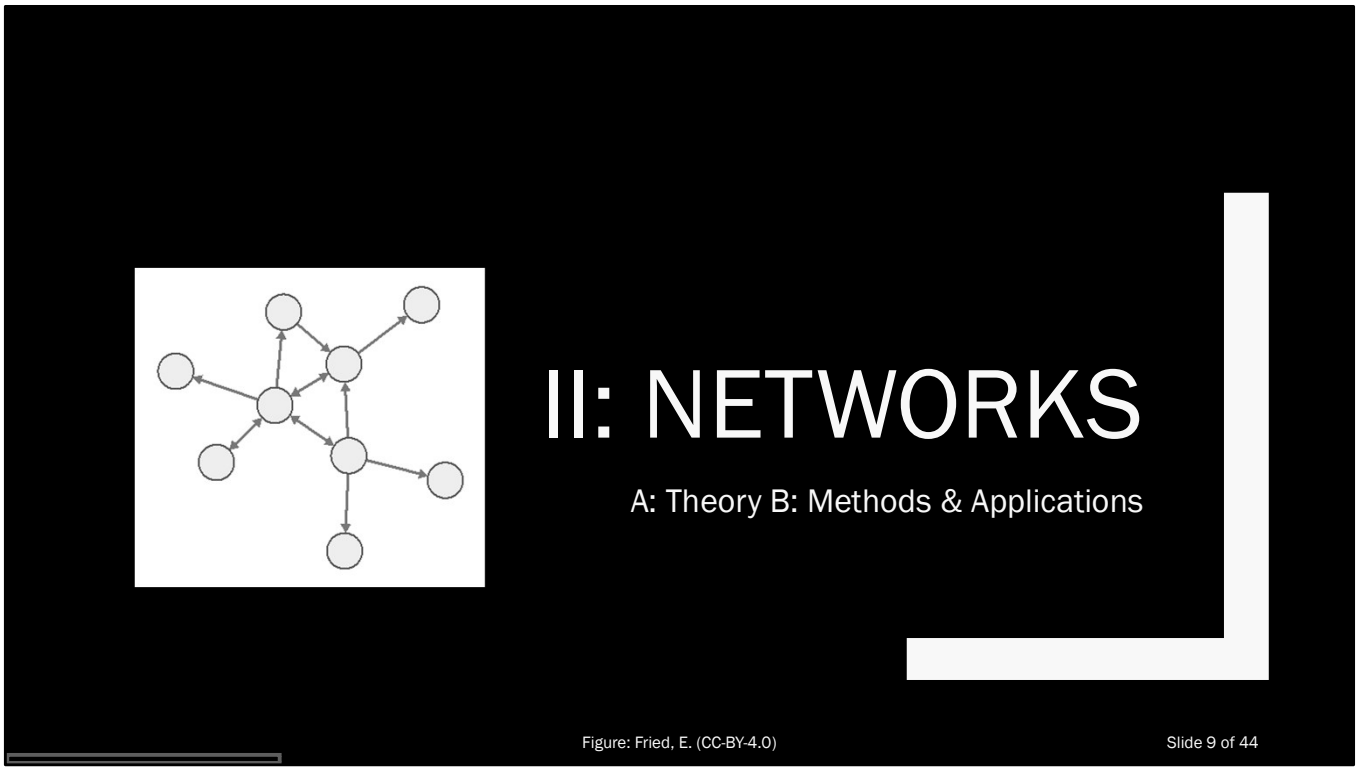
Control: Diagnosis-Indication

Figure: Fried, E. (CC-BY-4.0); Kendell & Jablensky (2003)

Slide 8 of 44

References:
https://eiko-fried.com/
https://osf.io/6bn4d/ (CC-By Attribution 4.0 International)

Kendell, R., & Jablensky, A. (2003). Distinguishing between the validity and utility of psychiatric diagnoses. *American journal of psychiatry*, *160*(1), 4-12.



References:

https://eiko-fried.com/
https://osf.io/6bn4d/ (CC-By Attribution 4.0 International)

THEORY

Network Perspective

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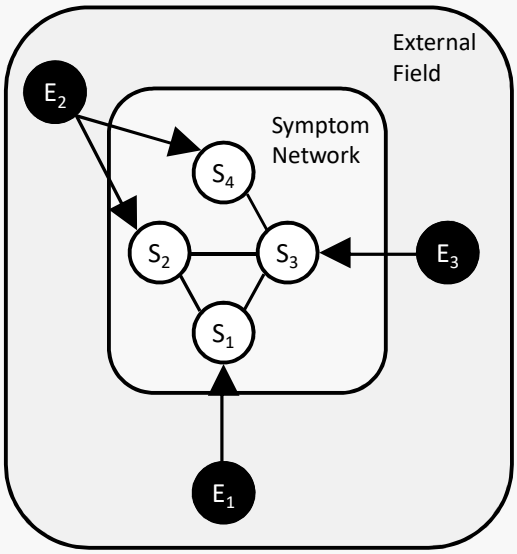
A Network Theory of Mental Disorders

Borsboom (2017)

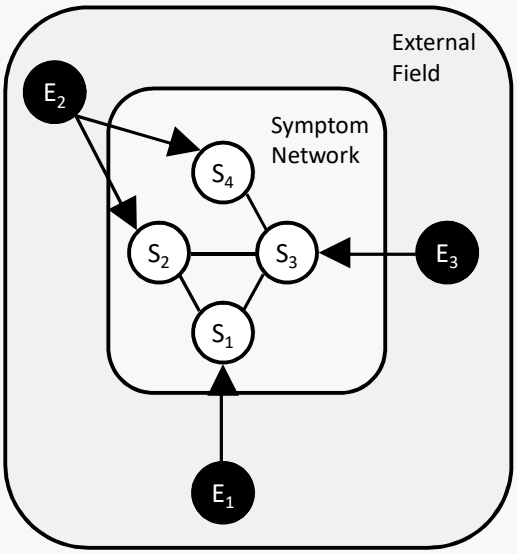
- What are mental disorders?
  - *Which phenomena do they show?*
- How do they arise?
- How should they be treated?



Borsboom (2017) Slide 11 of 44

References:
Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.

1. What are mental disorders?

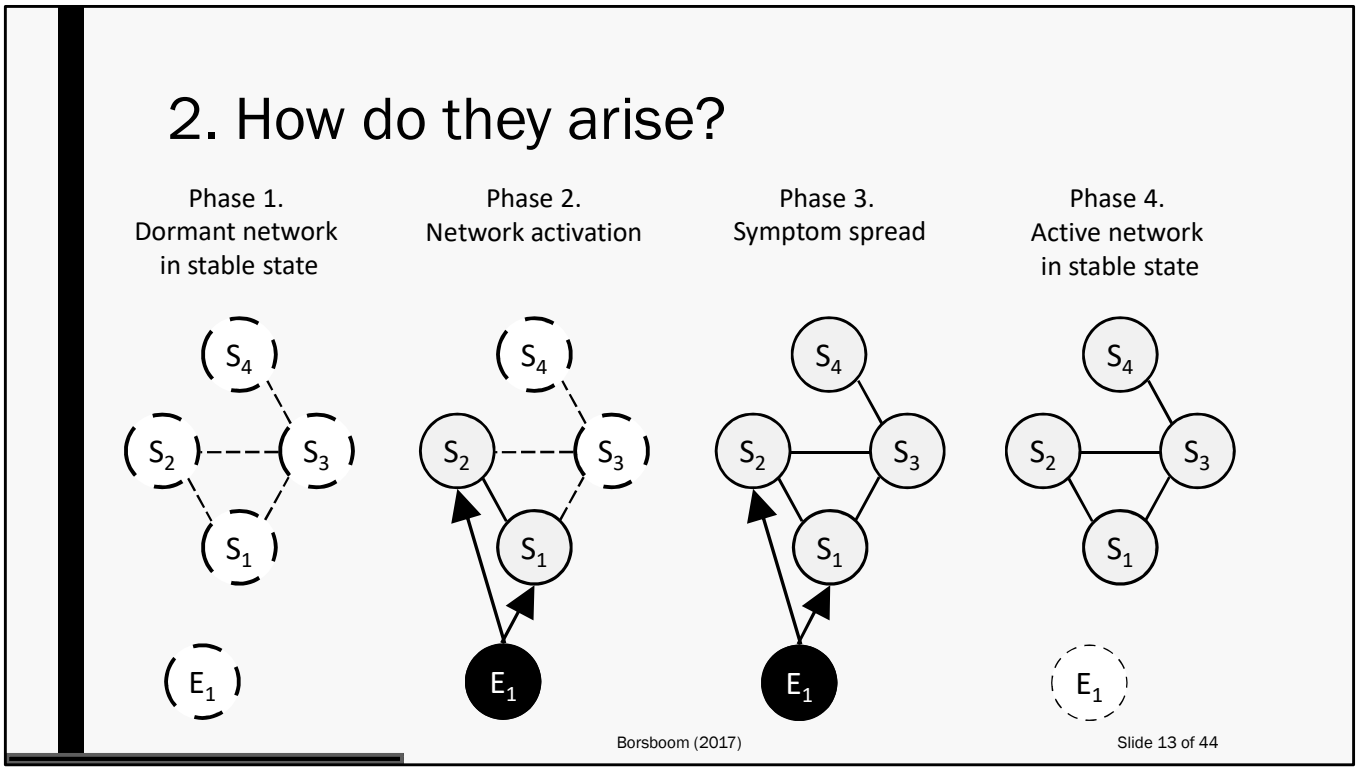


Borsboom (2017)

Slide 12 of 44

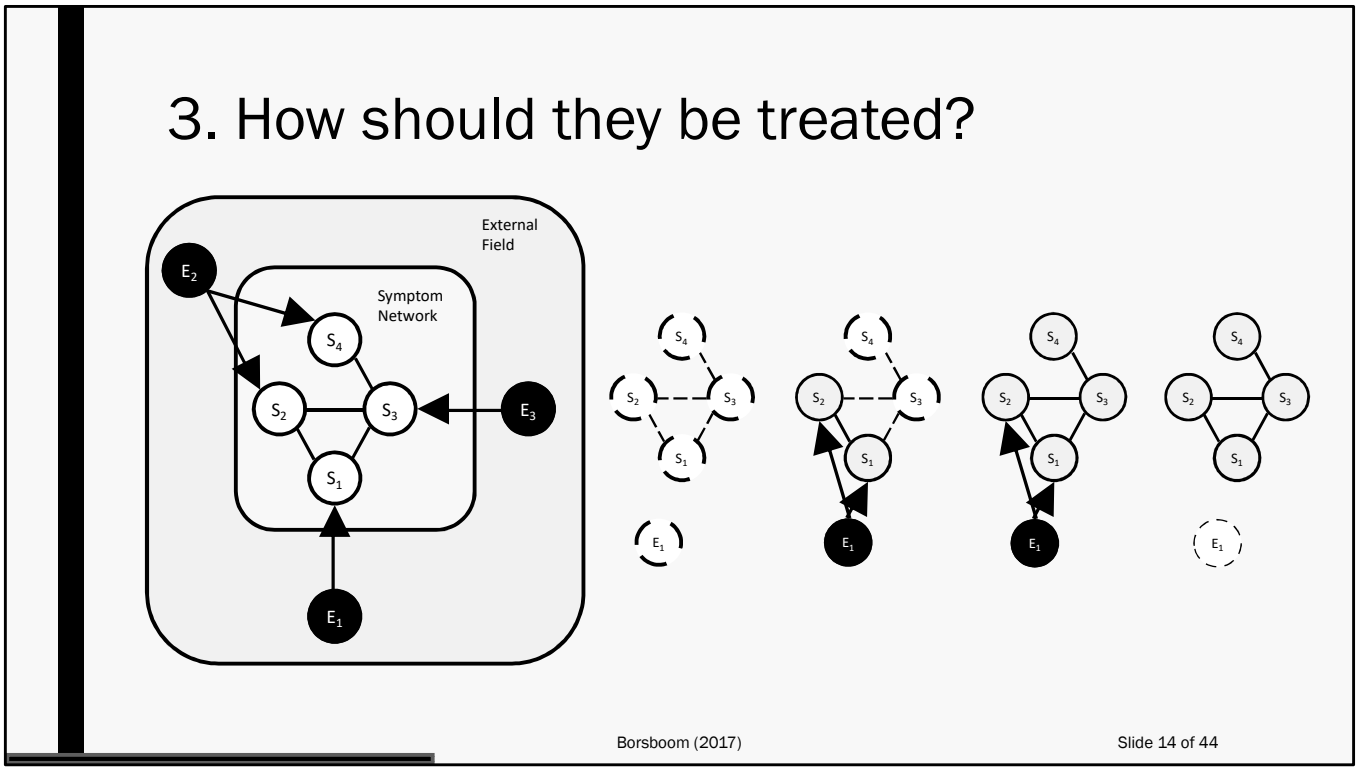
References:

Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.



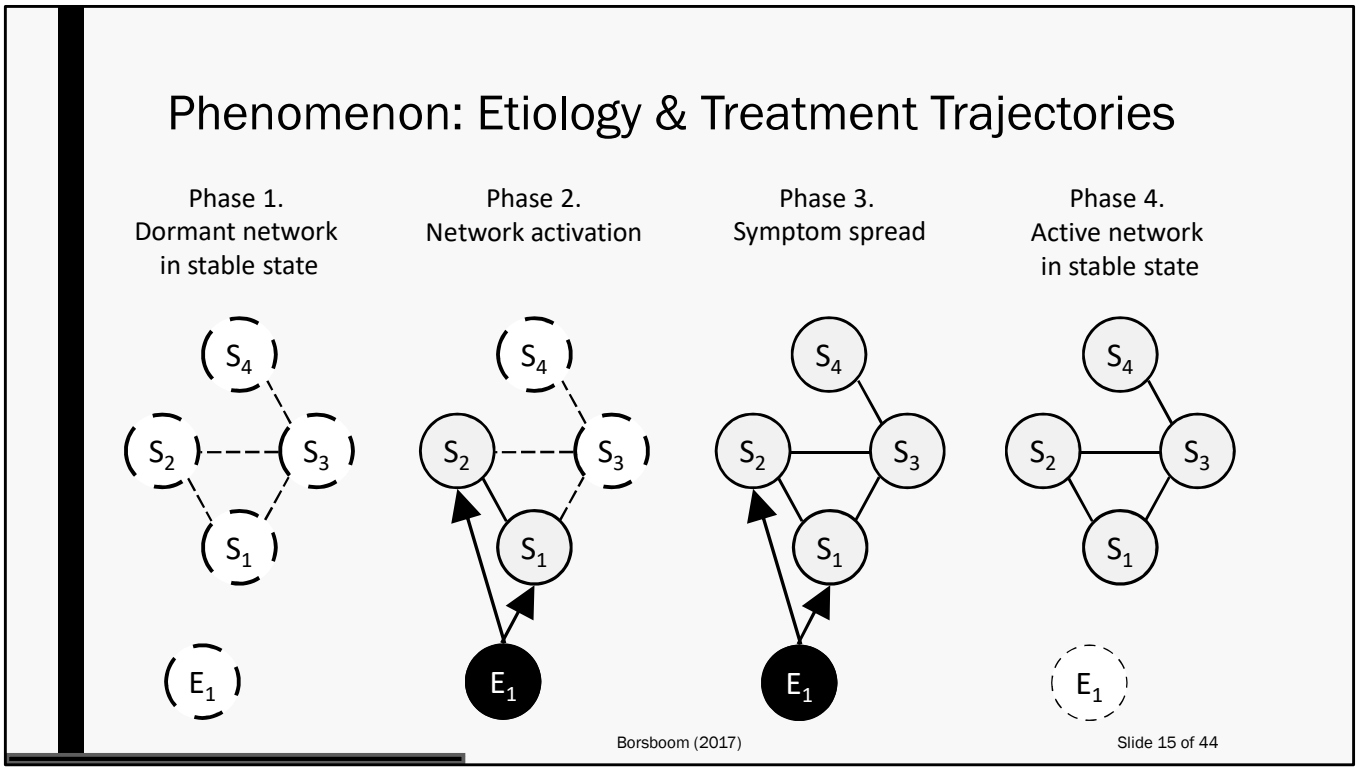
References:

Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.



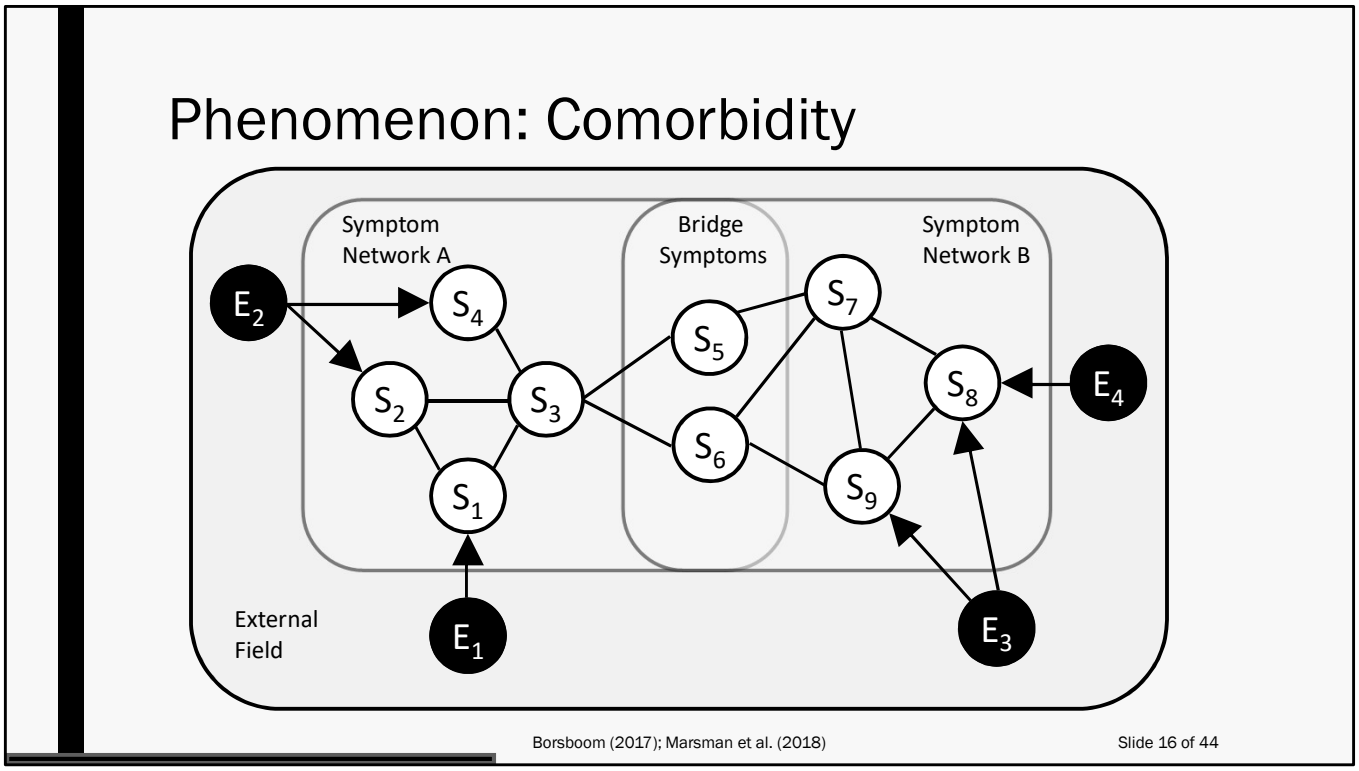
References:

Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.



References:

Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.



References:

Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.

Free access paper + use with permission from author, see also: Borsboom D. A network theory of mental disorders. World Psychiatry. 2017 Feb;16(1):5-13. doi: 10.1002/wps.20375. PMID: 28127906; PMCID: PMC5269502.

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Marsman, M., Borsboom, D., Kruis, J., Epskamp, S., van Bork, R. V., Waldorp, L. J., ... & Maris, G. (2018). An introduction to network psychometrics: Relating Ising network models to item response theory models. *Multivariate behavioral research*, *53*(1), 15-35.

Borsboom (2017)

Denny Borsboom

Professor

Theory construction, network analysis, psychometrics

Picture: psychosystems.org

" … the fact that we have the set of basic symptoms, and also understand many of the relations between them, means that we already have a quite reasonable working model of what disorders are and how they work. If so, our current lack of understanding of mental disorders may not have resulted from limited observational capacities, noisy measurement instruments, or inadequate data, as is typically supposed. Instead, we may have simply lacked a theoretical framework to organize the available empirical facts." (p. 11)

Slide 17 of 44

References:

Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.

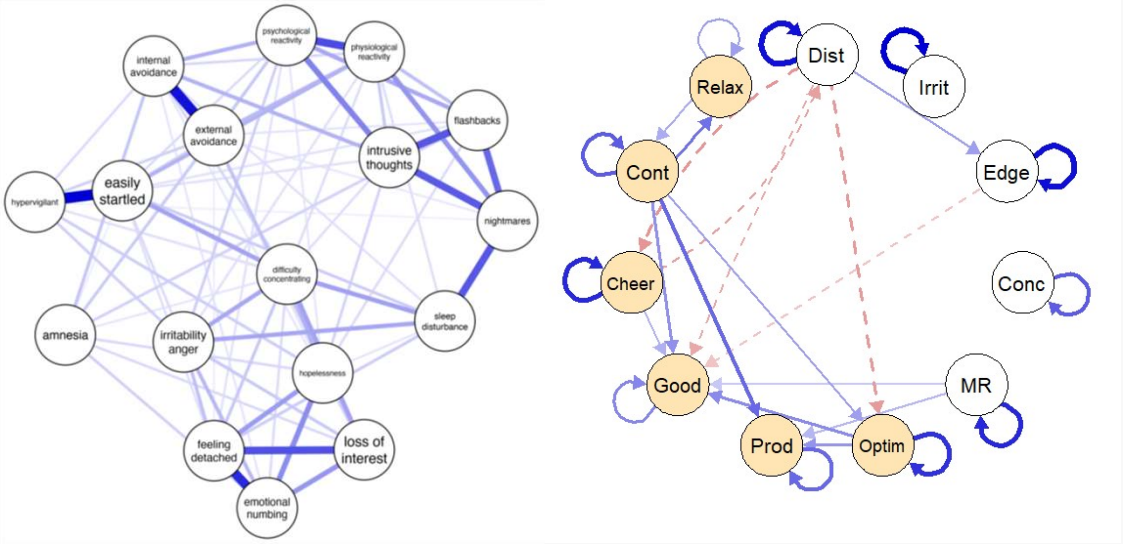
Free access paper, see also: Borsboom D. A network theory of mental disorders. World Psychiatry. 2017 Feb;16(1):5-13. doi: 10.1002/wps.20375. PMID: 28127906; PMCID: PMC5269502.

Picture: http://psychosystems.org/peoplecombined/

APPLICATIONS & METHODS

Description, Prediction, Explanation, Control

1. Description



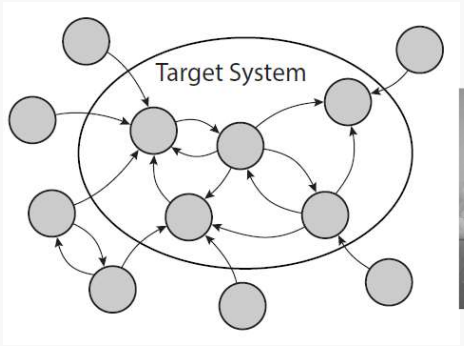
Isvoranu et al. (2021; CC-BY-4.0); McGhie & McNally (2023; CC-BY-4.0) Slide 19 of 44

References:

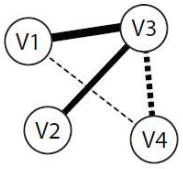
1. Isvoranu, A. M., Epskamp, S., & Cheung, M. W. L. (2021). Network models of posttraumatic stress disorder: A meta-analysis. *Journal of Abnormal Psychology*, *130*(8), 841.
See also: https://osf.io/preprints/psyarxiv/8k4u6 (CC-By Attribution 4.0 International)

2. McGhie, S. F., & McNally, R. J. (2023). Posttraumatic stress disorder symptoms and positive affect: Individual and multilevel dynamic networks. *Psychological Trauma: Theory, Research, Practice, and Policy.* Advance online publication. https://doi.org/10.1037/tra0001605
See also: https://osf.io/preprints/psyarxiv/xfz2b (CC-By Attribution 4.0 International)

Intermezzo: Network Estimation



Data Model



Data

V1	V2	V3	V4
1.58	3.00	2.47	4.01
2.83	6.13	4.89	2.33
4.82	3.46	6.73	5.44
0.64	5.72	3.91	2.54
5.11	4.49	2.27	4.03

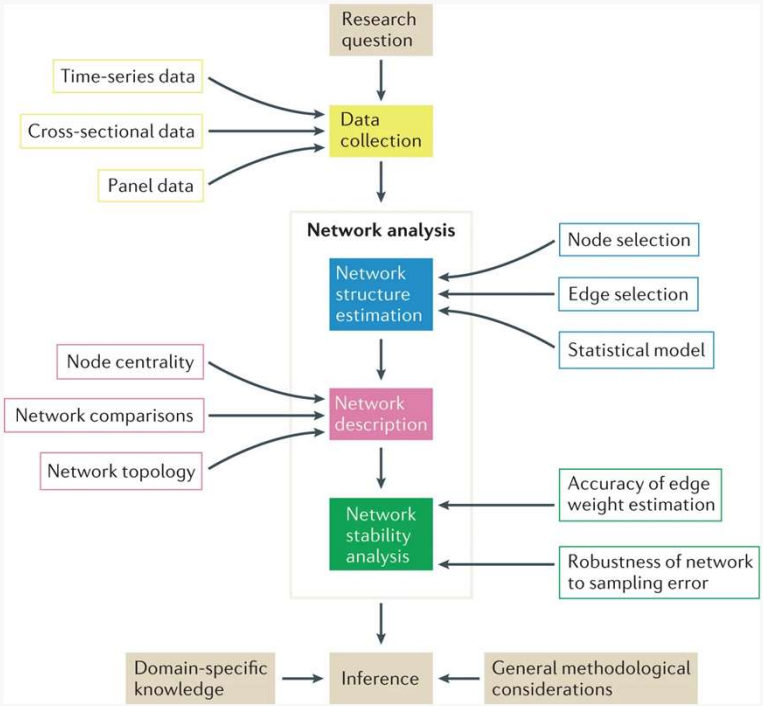
Picture: Adapted from Pexels User Kostina (2022); Figures: Adapted from Haslbeck et al. (2022; CC-BY-4.0) Slide 20 of 44

References:

Figures: Haslbeck, J. M. B., Ryan, O., Robinaugh, D. J., Waldorp, L. J., & Borsboom, D. (2022). Modeling psychopathology: From data models to formal theories.*Psychological Methods, 27*(6), 930–957. https://doi.org/10.1037/met0000303
See also: https://osf.io/preprints/psyarxiv/jgm7f (CC-By Attribution 4.0 International)

Picture: Pexels User Kostina (2022): https://www.pexels.com/de-de/foto/mann-gehen-draussen-seile-11631304/

Intermezzo: Network Estimation

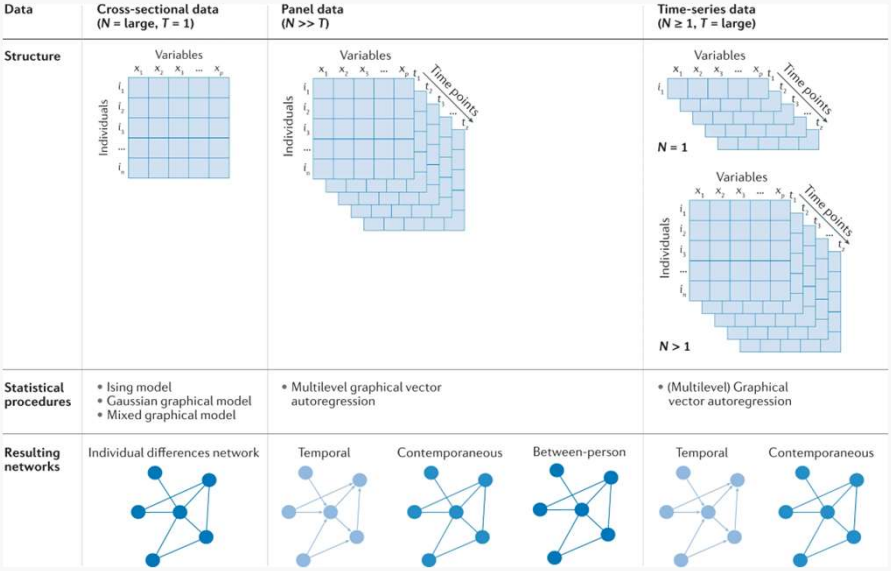


Borsboom et al. (2021)

Slide 21 of 44

References:
Borsboom, D., Deserno, M.K., Rhemtulla, M. *et al.* Network analysis of multivariate data in psychological science. *Nat Rev Methods Primers* **1**, 58 (2021). https://doi.org/10.1038/s43586-021-00055-w
https://www.nature.com/articles/s43586-021-00055-w/figures/2

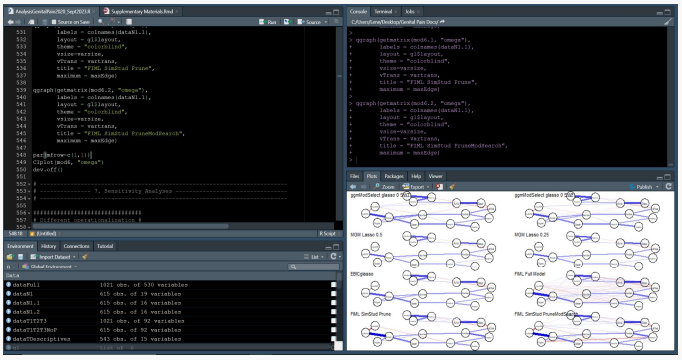
Intermezzo: Network Estimation



Borsboom et al. (2021)

References:
Borsboom, D., Deserno, M.K., Rhemtulla, M. *et al.* Network analysis of multivariate data in psychological science. *Nat Rev Methods Primers* **1**, 58 (2021). https://doi.org/10.1038/s43586-021-00055-w
https://www.nature.com/articles/s43586-021-00055-w/figures/3

Intermezzo: Network Estimation



https://www.r-project.org/
https://posit.co/download/rstudio-desktop/

https://jasp-stats.org/

R Core Team (n.d.); Rstudio Team (n.d.); JASP Team (n.d.)

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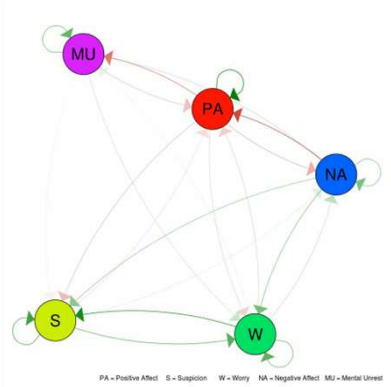
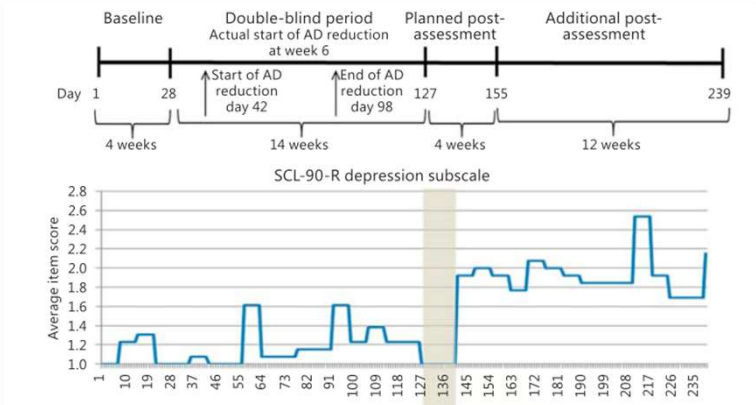
Screenshot of R/Rstudio.
More info on JASP can be found at: https://jasp-stats.org/

2. Prediction





Wichers & Groot (2016; CC-BY-NC-ND-4.0)

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References:

Wichers, M., Groot, P. C., Psychosystems, E. S. M., & EWS Group. (2016). Critical slowing down as a personalized early warning signal for depression. *Psychotherapy and psychosomatics*, *85*(2), 114-116. (CC-BY-NC-ND-4.0)

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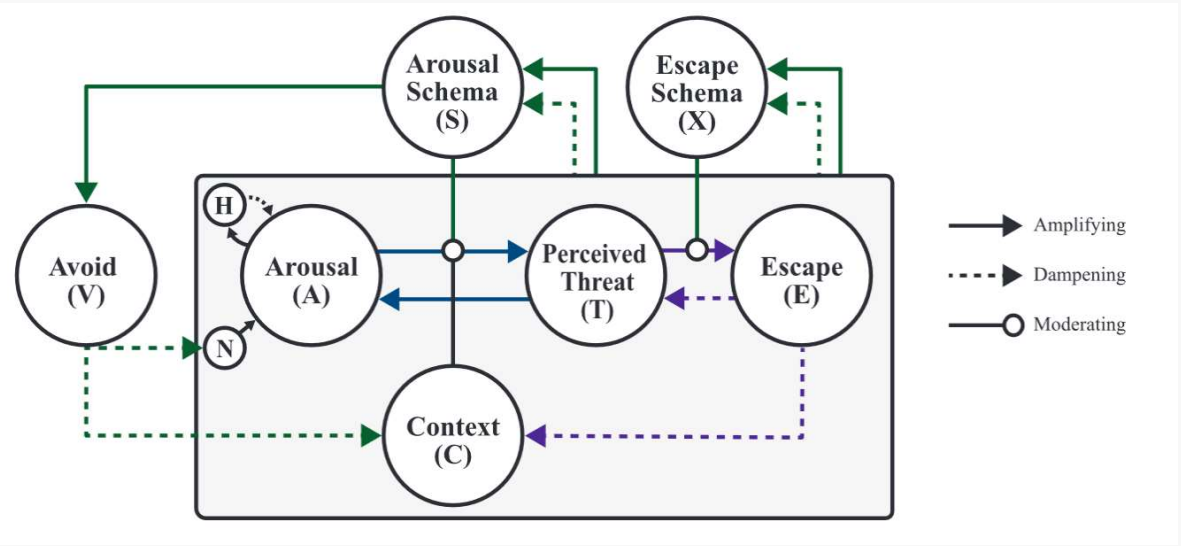
3. Explanation



Robinaugh et al. (2019; CC-BY-4.0)

Slide 25 of 44

References:
Robinaugh, D., Haslbeck, J., Waldorp, L., Kossakowski, J., Fried, E. I., Millner, A., ... & Borsboom, D. (2019). Advancing the network theory of mental disorders: A computational model of panic disorder.
See: https://osf.io/preprints/psyarxiv/km37w (CC-By Attribution 4.0 International)

4. Control

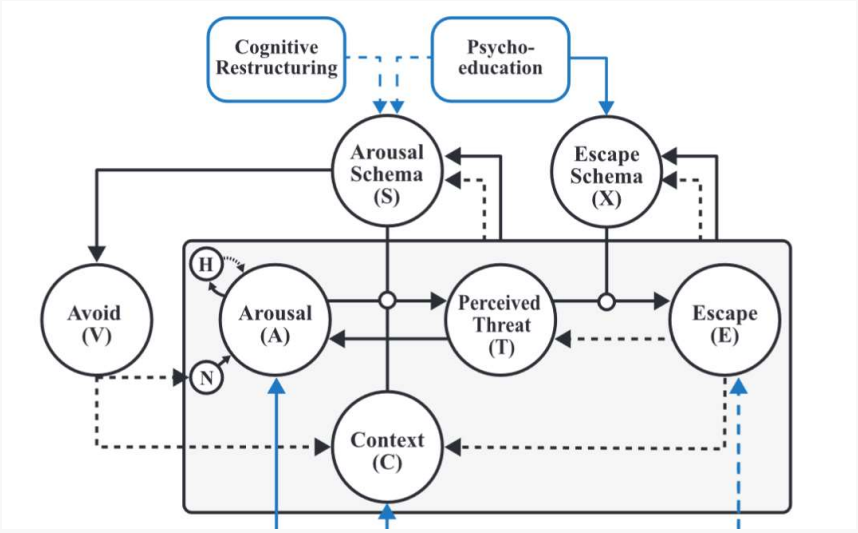


Figure: Robinaugh et al. (2019; CC-BY-4.0); Burger et al. (2020)

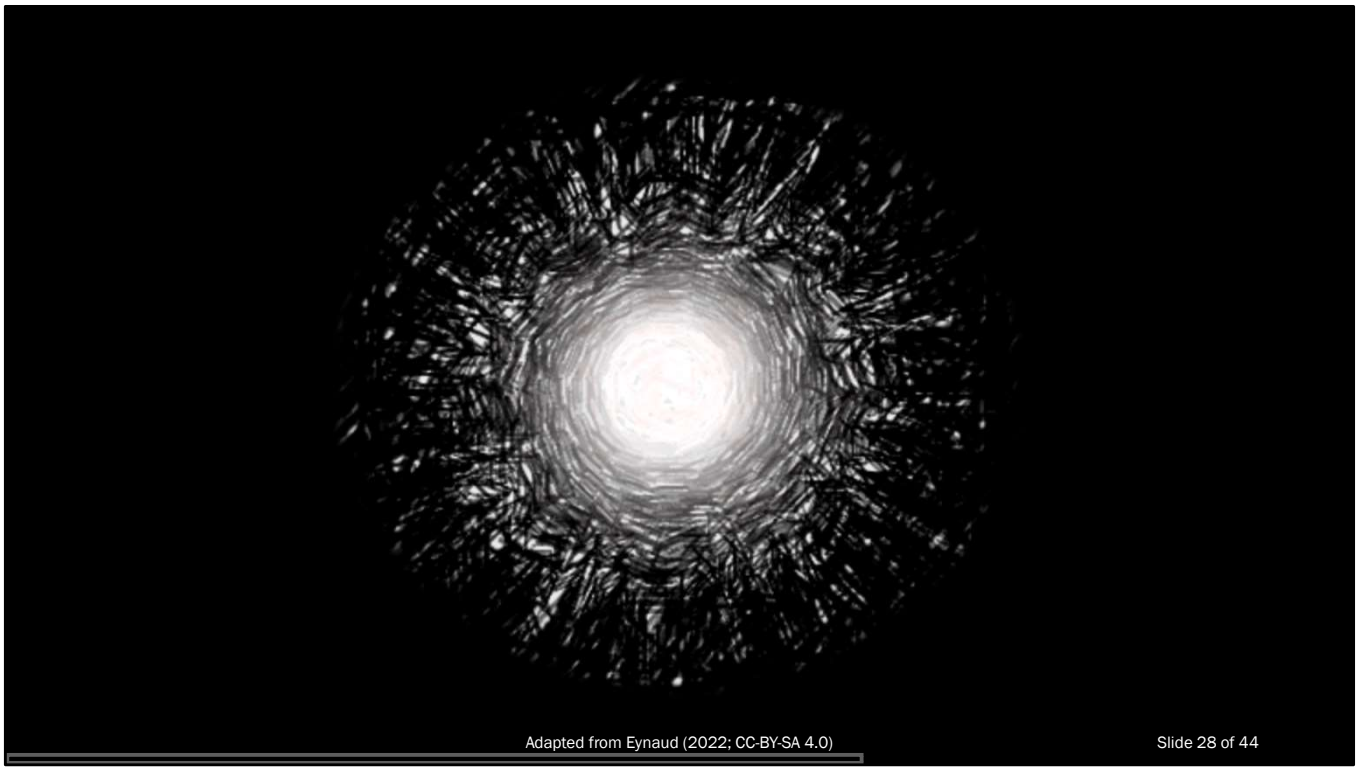
Slide 26 of 44

References:

Robinaugh, D., Haslbeck, J., Waldorp, L., Kossakowski, J., Fried, E. I., Millner, A., ... & Borsboom, D. (2019). Advancing the network theory of mental disorders: A computational model of panic disorder.
See: https://osf.io/preprints/psyarxiv/km37w (CC-By Attribution 4.0 International)

Burger, J., van der Veen, D. C., Robinaugh, D. J., Quax, R., Riese, H., Schoevers, R. A., & Epskamp, S. (2020). Bridging the gap between complexity science and clinical practice by formalizing idiographic theories: a computational model of functional analysis. *BMC medicine*, *18*, 1-18.

III: (FEMALE) SEXUAL DYSFUNCTION



References:

Picture adapted from Eynaud, 2022: https://commons.wikimedia.org/wiki/File:Big_Bang_-_Vista_d%27artista.png, CC BY-SA 4.0

Example Area I: “Hypersexuality”

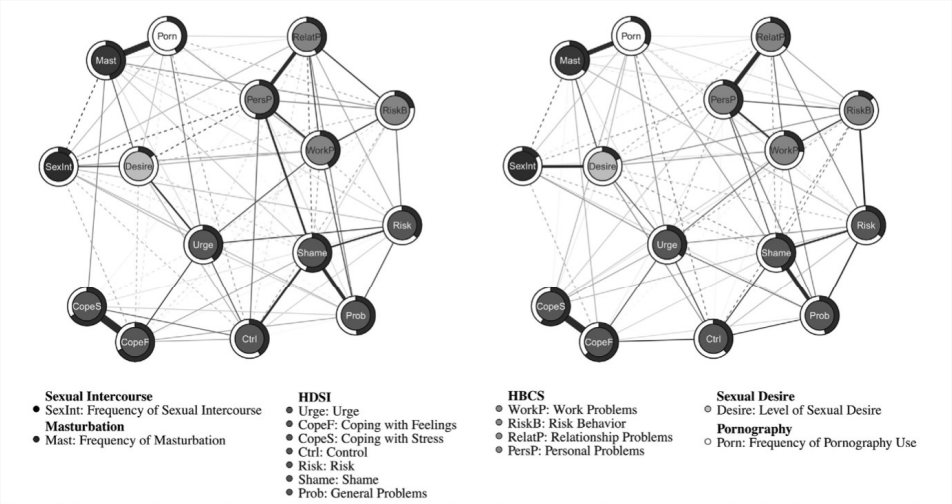


Figure 1. Hypersexuality network topology (average layout visualization). Men’s network is presented on the left and women’s network on the right. Solid edges indicate positive and dashed edges indicate negative relationships. HBCS = Hypersexual Behavioral Consequences Scale; HDSI = Hypersexual Disorder Screening Inventory.

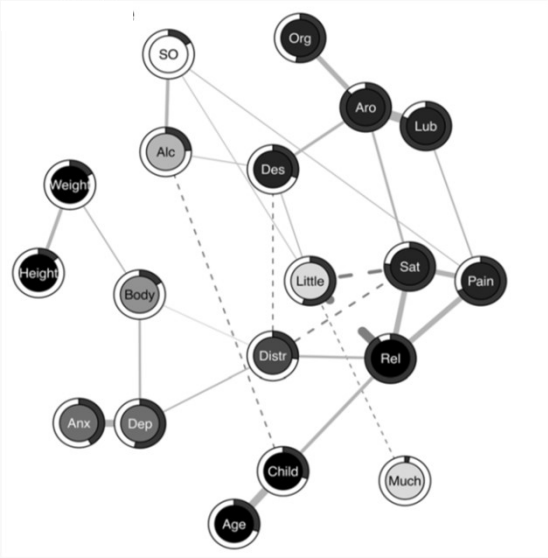
Werner et al. (2018)

Slide 29 of 44

References:

Werner, M., Štulhofer, A., Waldorp, L., & Jurin, T. (2018). A network approach to hypersexuality: Insights and clinical implications. *The Journal of Sexual Medicine*, *15*(3), 373-386.

Example Area II: Female Sexual Function

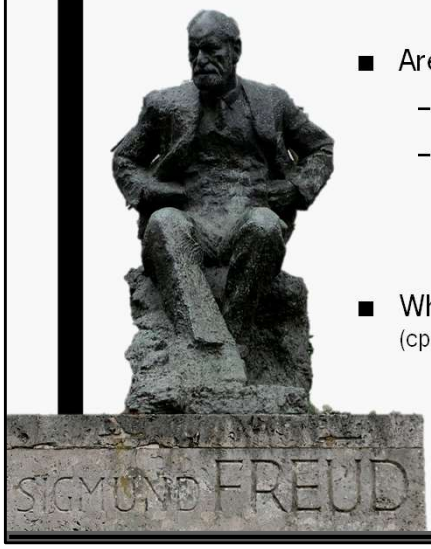


References:
Gunst, A., Werner, M., Waldorp, L. J., Laan, E. T., Källström, M., & Jern, P. (2018). A network analysis of female sexual function: comparing symptom networks in women with decreased, increased, and stable sexual desire. *Scientific Reports*, *8*(1), 15815.
See: https://www.nature.com/articles/s41598-018-34138-8 (Creative Commons Attribution 4.0 International License)

Further examples of network application in sexology (not discussed due to copyright of figures, time constraints, relevance of content to FSD, nonreview/unpublished status). But please check them out if you are interested!:

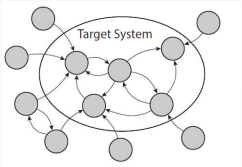
1. Kratzer L, Heinz P, Schennach R, et al. Sexual symptoms in post-traumatic stress disorder following childhood sexual abuse: a network analysis. *Psychological Medicine*. 2022;52(1):90-101. doi:10.1017/S0033291720001750
2. Lonza, A., Štulhofer, A., & Graham, C. (2020). Emotional intimacy and distress about sexual difficulties in partnered older European men and women: A network analysis. *Journal of sex & marital therapy*, *46*(5), 474-490.
3. Van de Grift, T. C., Cohen-Kettenis, P. T., Elaut, E., De Cuypere, G. R. E. T. A., Richter-Appelt, H., Haraldsen, I. R., & Kreukels, B. P. (2016). A network analysis of body satisfaction of people with gender dysphoria. *Body image*, *17*, 184-190.
4. von Andrian-Werburg, M. T., Klopp, E., & Schwab, F. (2023). Fantasy made flesh-a network analysis of the reciprocal relationship between sexual fantasies, pornography usage, and sexual behavior. *The Journal of Sex Research*, 1-15.
5. Kolbuszewska, M. (2023). *Comparing associations between sexual function, sexual distress, and psychological symptoms in women with and without sexual function difficulties* (Masters Thesis, University of British Columbia).

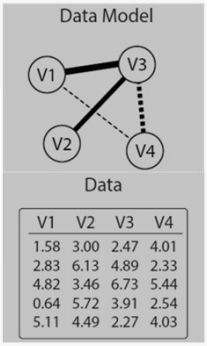
The Network(s) of FSD



- Are we limited by the same theoretical assumptions?
  - *Female Sexual Arousal/Interest Disorder*
  - *Genito-Pelvic Pain Disorder* *(Forbes et al. 2017)*

- What is our target system?
  (cp. Monteleone & Cascino, 2021)





Picture: Peel, M. (2010; CC-BY-SA-4.0);
Figure: Adapted from Haslbeck et al. (2022; CC-BY-4.0)

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References:

Picture: Mike Peel (2010; CC-BY-SA-4.0)
https://commons.wikimedia.org/wiki/File:Sigmund_Freud_statue,_London_1.jpg
https://www.mikepeel.net/photography/

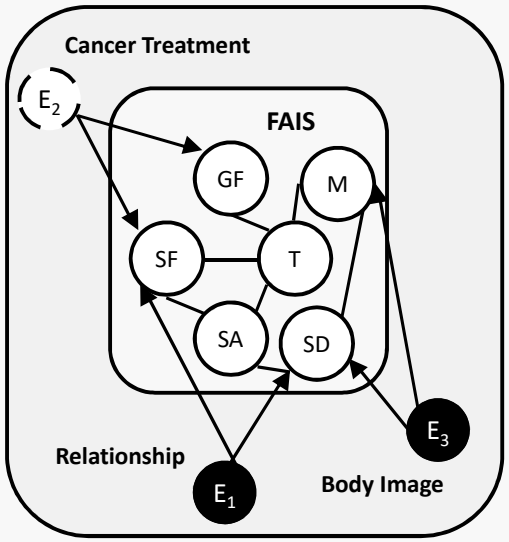
Figure: Haslbeck, J. M. B., Ryan, O., Robinaugh, D. J., Waldorp, L. J., & Borsboom, D. (2022). Modeling psychopathology: From data models to formal theories. *Psychological Methods, 27*(6), 930–957. https://doi.org/10.1037/met0000303
See also: https://osf.io/preprints/psyarxiv/jgm7f (CC-By Attribution 4.0 International)

HiTOP:
Forbes, M. K., Baillie, A. J., Eaton, N. R., & Krueger, R. F. (2017). A place for sexual dysfunctions in an empirical taxonomy of psychopathology. *The Journal of Sex Research*, *54*(4-5), 465-485.

See for a related discussion:
Monteleone, A. M., & Cascino, G. (2021). A systematic review of network analysis studies in eating disorders: Is time to broaden the core psychopathology to non specific symptoms. European Eating Disorders Review, 29(4), 531-547.

Case

- 47-year-old, married woman.
- Breast cancer (3y ago): mastectomy, adjuvant chemotherapy.
- Loss sexual desire: no response when approached by husband; no arousal nor orgasm during masturbation.
- Experience of orgasm on vacation; since then, “nothing”.
- Distress: wish to continue sexual activity – source of tension in relationship.



Kaplan & Owett (1993, p. 17); Figure: Adapted from Borsboom (2017)

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References:

Kaplan, H. S., & Owett, T. (1993). The female androgen deficiency syndrome. *Journal of Sex & Marital Therapy*, *19*(1), 3-24.

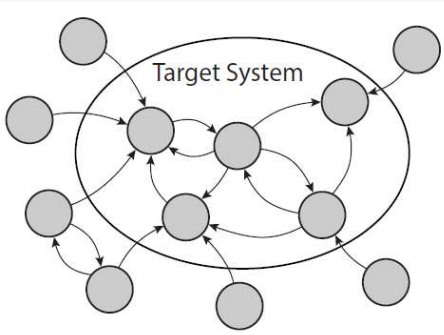
Note: The discussed case was not diagnosed as FAIS by Kaplan and Owett since the patient showed T-concentration levels in the normal range. See the article for more examples.

Figure adapted from: Borsboom, D. (2017). A network theory of mental disorders. *World psychiatry*, *16*(1), 5-13.

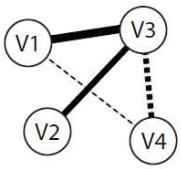
Network represents a sketch for the purposes of this example rather than a full valid model:
GF = Gonadal Function
T = Testosterone
SA = Sexual Arousabilty
SF = Sexual Frequency
SD = Sexual Desire
M = Mood

IV: CAVEATS

Caveat I: Garbage in – Garbage Out



Data Model



Data

V1	V2	V3	V4
1.58	3.00	2.47	4.01
2.83	6.13	4.89	2.33
4.82	3.46	6.73	5.44
0.64	5.72	3.91	2.54
5.11	4.49	2.27	4.03

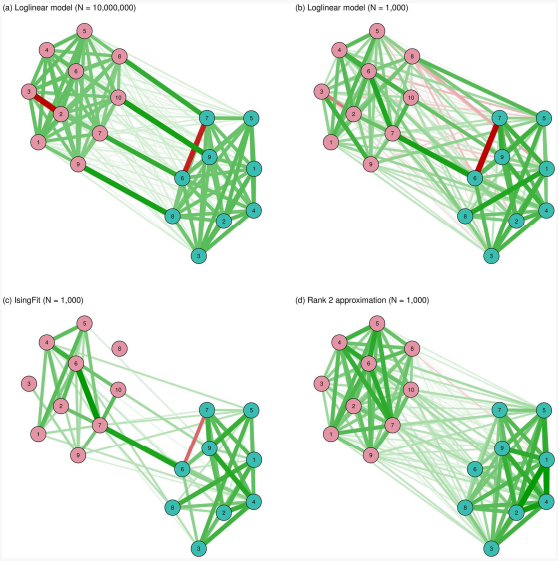
Picture: Adapted from Pexels User Kostina (2022); Figures: Adapted from Haslbeck et al. (2022; CC-BY-4.0) Slide 34 of 44

References:

Figures: Haslbeck, J. M. B., Ryan, O., Robinaugh, D. J., Waldorp, L. J., & Borsboom, D. (2022). Modeling psychopathology: From data models to formal theories.*Psychological Methods, 27*(6), 930–957. https://doi.org/10.1037/met0000303
See also: https://osf.io/preprints/psyarxiv/jgm7f (CC-By Attribution 4.0 International)

Picture: Pexels User Kostina (2022): https://www.pexels.com/de-de/foto/mann-gehen-draussen-seile-11631304/

Caveat II: Modeling



Epskamp et al. (2017; CC-BY-4.0)

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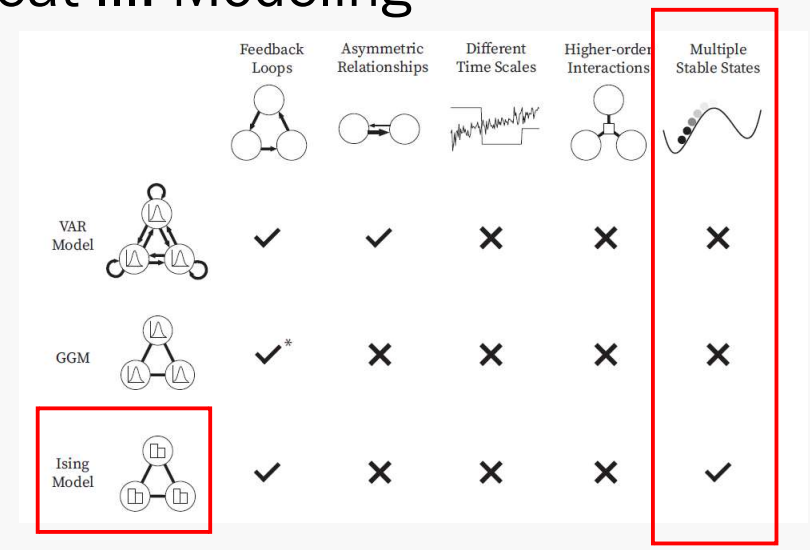
References:
Epskamp, S., Kruis, J., & Marsman, M. (2017). Estimating psychopathological networks: Be careful what you wish for. *PloS one*, *12*(6), e0179891.
See: https://doi.org/10.1371/journal.pone.0179891 (CC-By Attribution 4.0 International)

Caveat III: Modeling



Haslbeck et al. (2022; CC-BY-4.0)

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References:

Haslbeck, J. M. B., Ryan, O., Robinaugh, D. J., Waldorp, L. J., & Borsboom, D. (2022). Modeling psychopathology: From data models to formal theories. *Psychological Methods, 27*(6), 930–957. https://doi.org/10.1037/met0000303

Caveat IV: Math, Stats and Code

Picture: Bellier (2014; CC-BY-2.0)

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References:
Equation, Ulysse Bellier (2014), flickr,
https://www.flickr.com/photos/ulyssebellier/15775934037/, CC BY 2.0

V: RESOURCES

Tutorials & Overviews

- Book: “Network Psychometrics with R: A Guide for Behavioral and Social Scientists” (Isvoranu et al., 2022)
- Tutorial collection:
  - Eiko Fried’s network website
  - YouTube Channel of Sacha Epskamp
- Workshops:
  - Psychosystems website
  - Eiko Fried’s website
- Overviews: Contreras et al. (2019), Robinaugh et al. (2020), & Fried & Cramer (2017)
- For critiques and commentary: Neal et al. (2022) & Borsboom et al. (2022)
- Example words of caution: Dablander & Hinne (2019)

References:
1. https://www.routledge.com/Network-Psychometrics-with-R-A-Guide-for-Behavioral-and-Social-Scientists/Isvoranu-Epskamp-Waldorp-Borsboom/p/book/9780367612948
2. http://psych-networks.com/tutorials/
3. https://www.youtube.com/@Sacha_Epskamp
4. http://psychosystems.org/workshops/
5. https://eiko-fried.com/workshops/
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9. Neal, Z.P., Forbes, M.K., Neal, J.W. et al. Critiques of network analysis of multivariate data in psychological science. Nat Rev Methods Primers 2, 90 (2022). https://doi.org/10.1038/s43586-022-00177-9
10. Borsboom, D., Deserno, M.K., Rhemtulla, M. et al. Reply to ‘Critiques of network analysis of multivariate data in psychological science’. Nat Rev Methods Primers 2, 91 (2022). https://doi.org/10.1038/s43586-022-00178-8
11. Dablander, F., & Hinne, M. (2019). Node centrality measures are a poor substitute for causal inference. *Scientific reports*, *9*(1), 6846.

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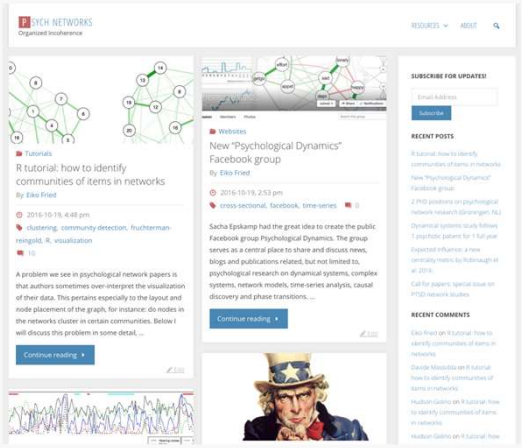
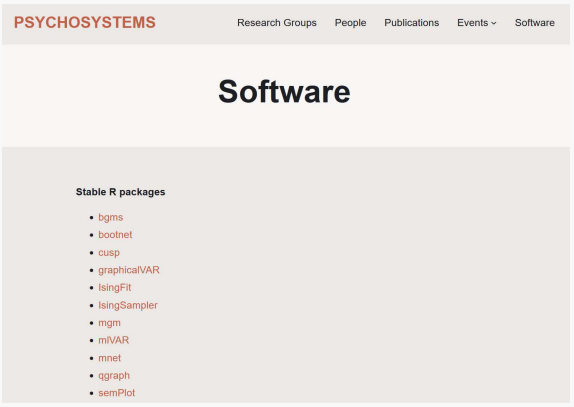
https://eiko-fried.com/

Websites



http://psych-networks.com



http://psychosystems.org/

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https://www.facebook.com/groups/PsychologicalDynamics/

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VI: FINAL THOUGHTS

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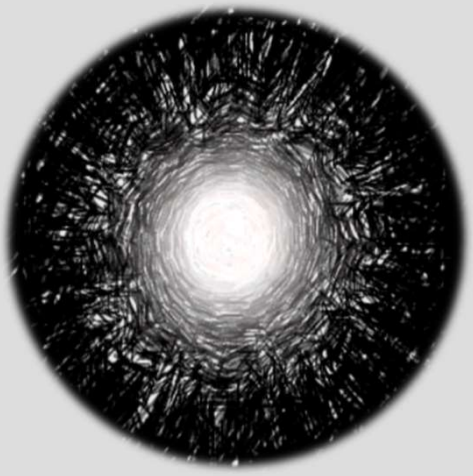

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Dysfunction is complex: Complex system approaches

- Network Theory: Organizing framework & Shared vocabulary
  - *BioPsychoSocial*
- Network Methodology: New toolkit
  - *Description, Prediction, Explanation, Control*
  - *Exploration!*
- A lot to discover…

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References:
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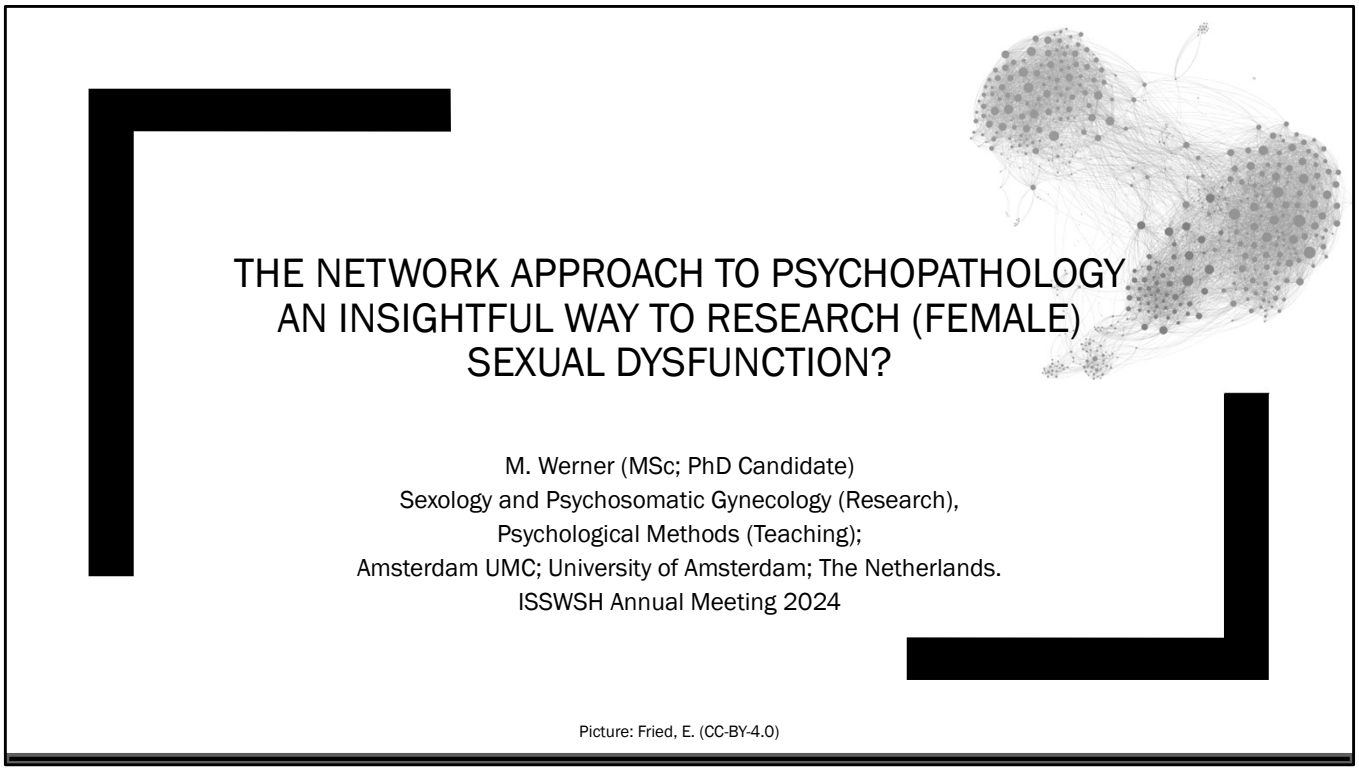

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