NUS
National University of Singapore

Analiza de Rețea în Domeniul Clinic

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Assistant Professor

Universitatea Naționala din Singapore
Șef Laborator NUS Mental Health: Risk, Resilience, and Networks

DESPRE MINE

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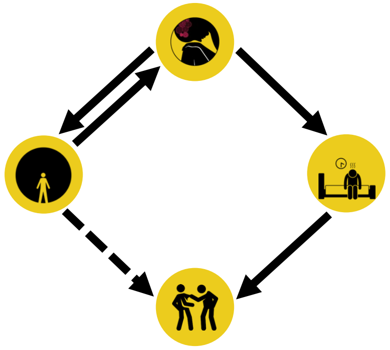
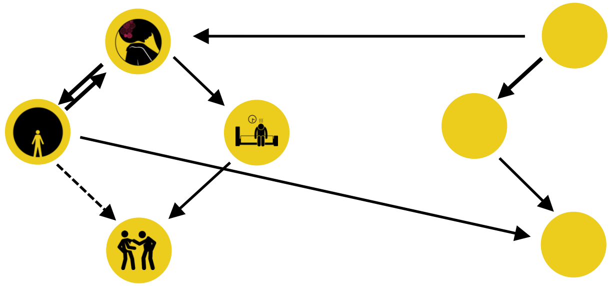
CERCETARE

- Etiologia sănătății mintale
- Căi de la sănătatea mintală la boala mintală
- Comorbiditate și granițe neclare între categorii de diagnostic
- Interacțiunile simptomelor și analiza de rețea în domeniul clinic
- Metode noi în statistică



De la tulburarea psihică A la tulburarea psihică B



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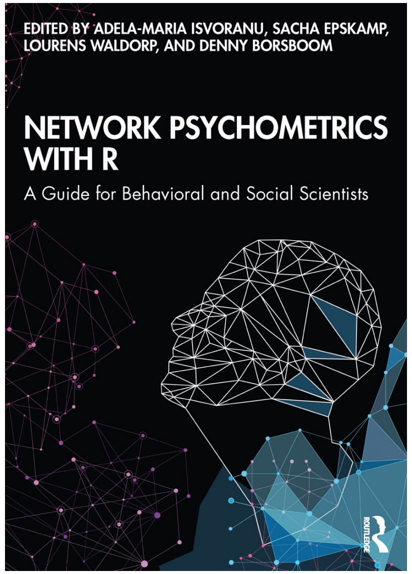
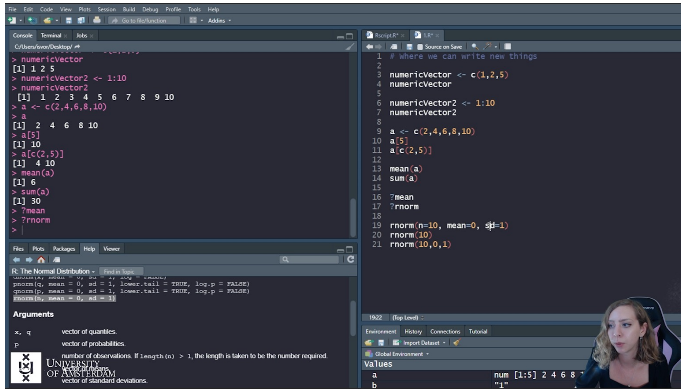
ACTIVITĂȚI ACADEMICE

- Coordonator de curs și lector *Analiza de Rețea* în cadrul diferitelor programe de master și licență
- Organizare workshop-uri tematice
- Editor de manual





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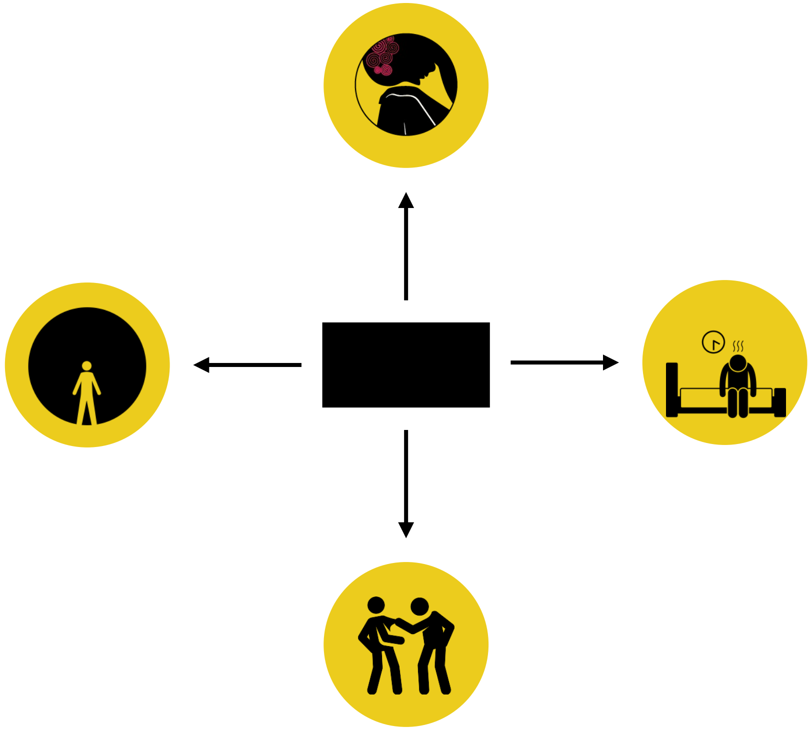
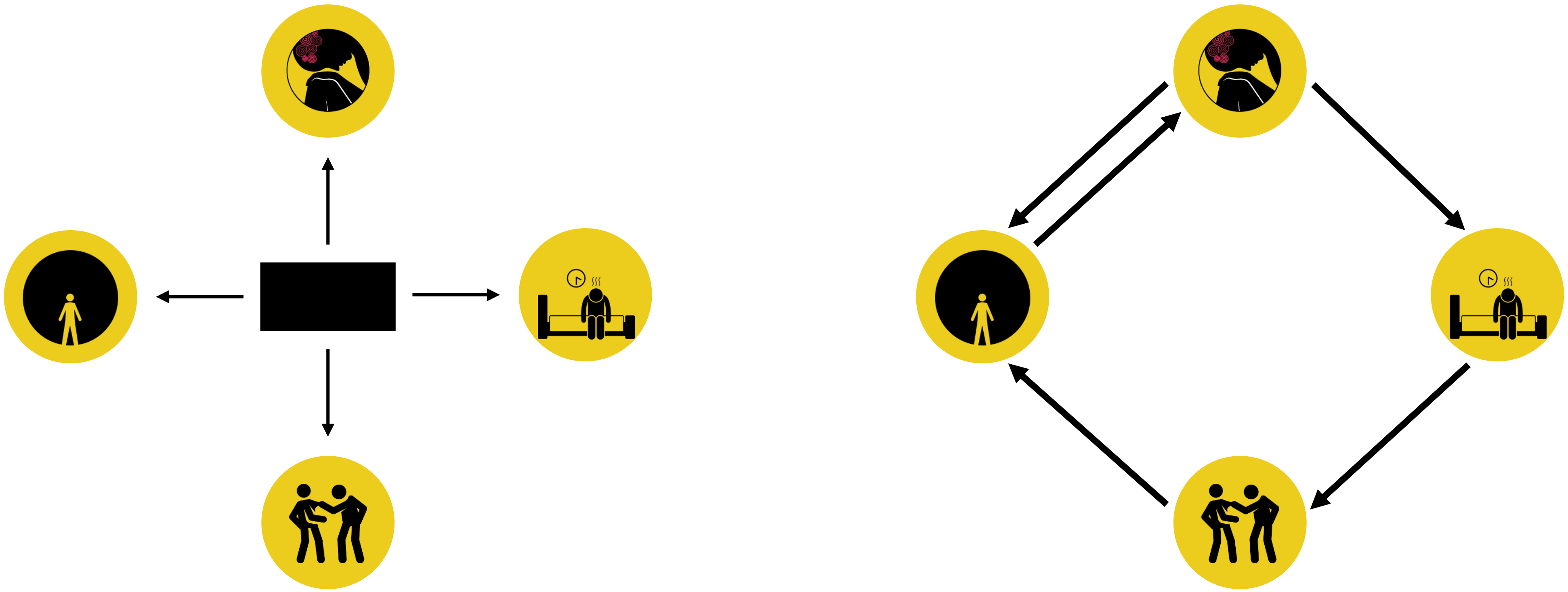


O CONCEPTUALIZARE ALTERNATIVĂ A TULBURĂRILE PSIHICE



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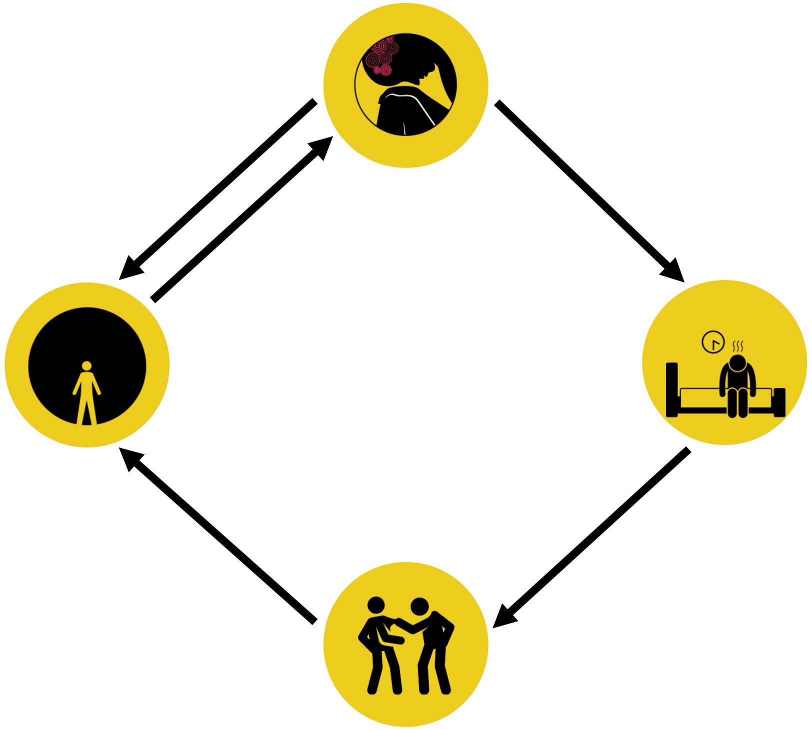

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Analiză statistică

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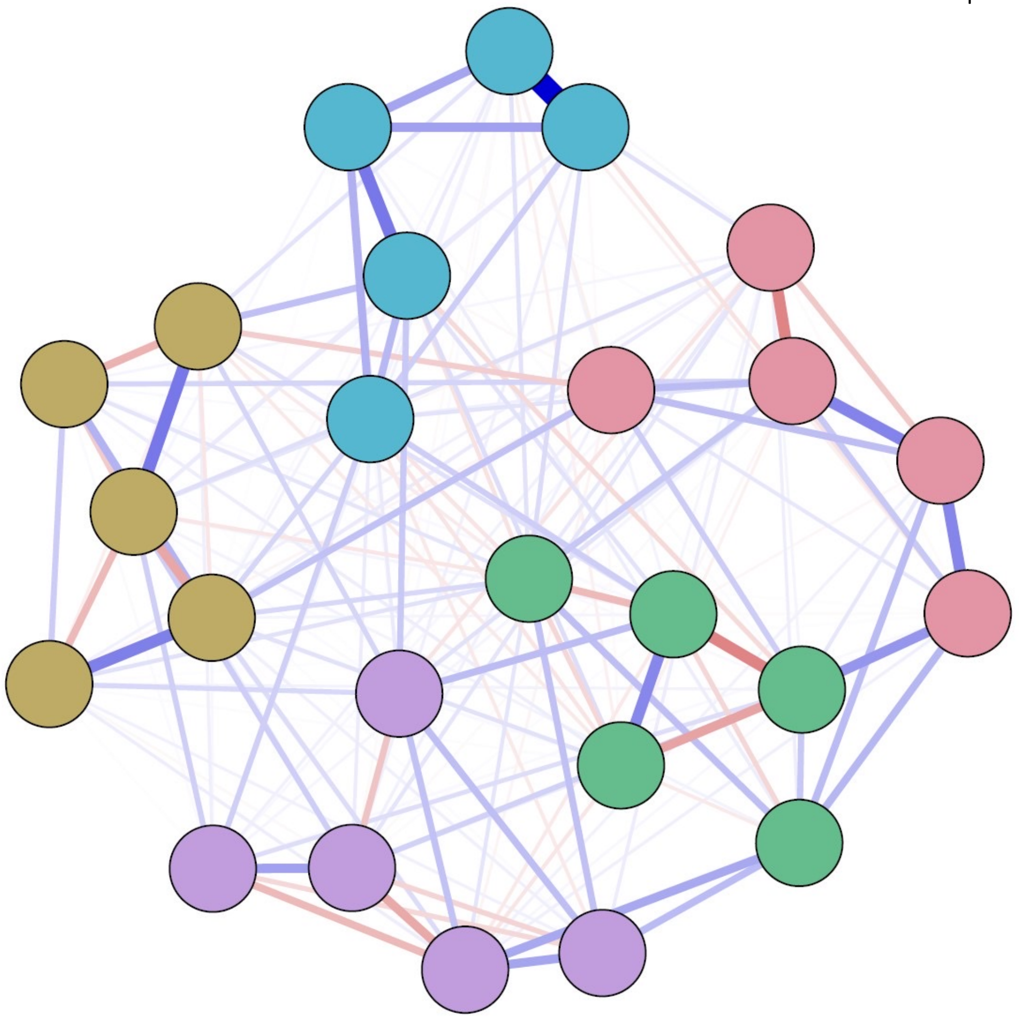

REȚELE NON-DIRECȚIONALE (UNDIRECTED NETWORK MODELS)

Analiză statistică

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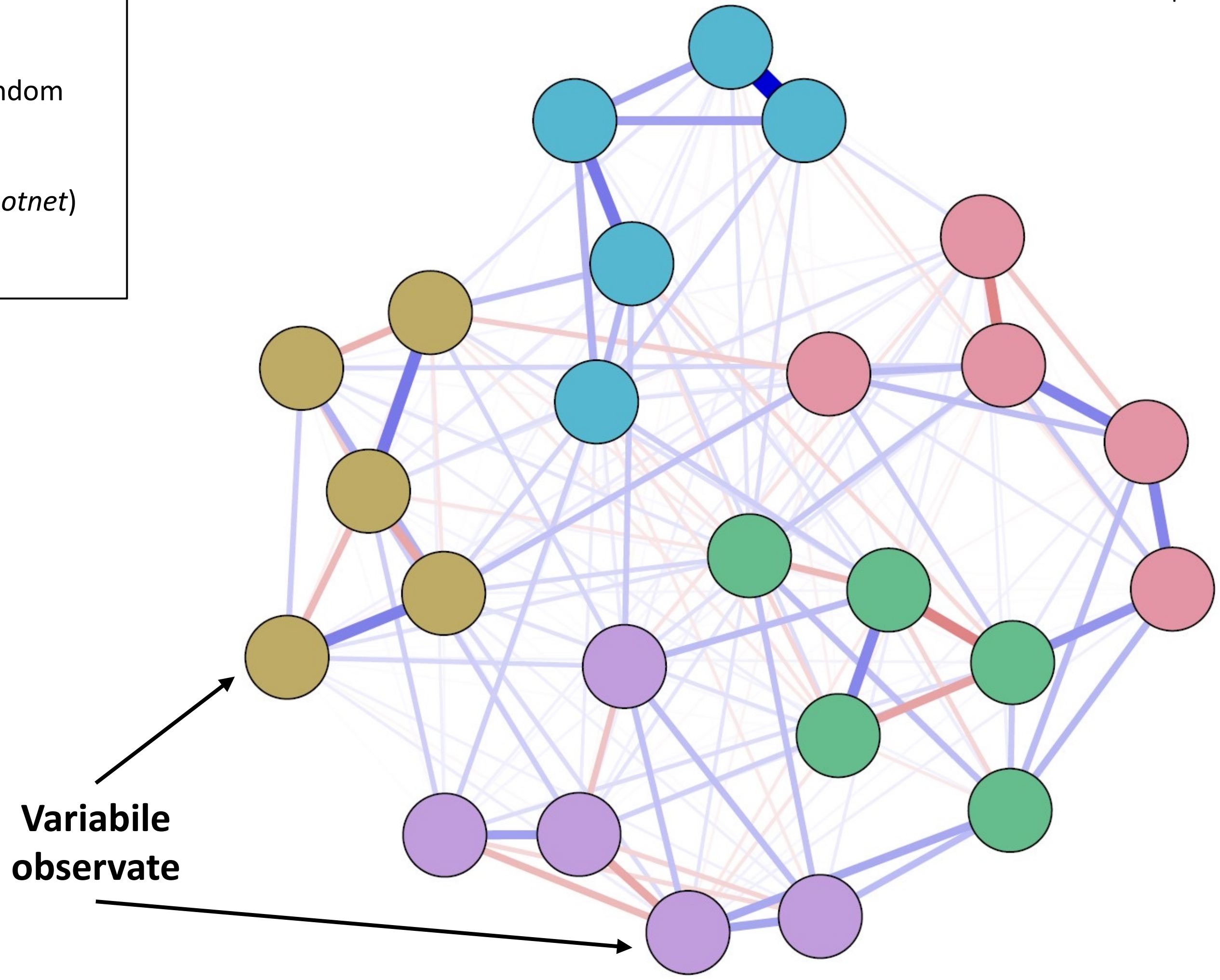

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- În GGM: corelații parțiale

Alegerea modelului de estimare

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- Regularization
- Model Search

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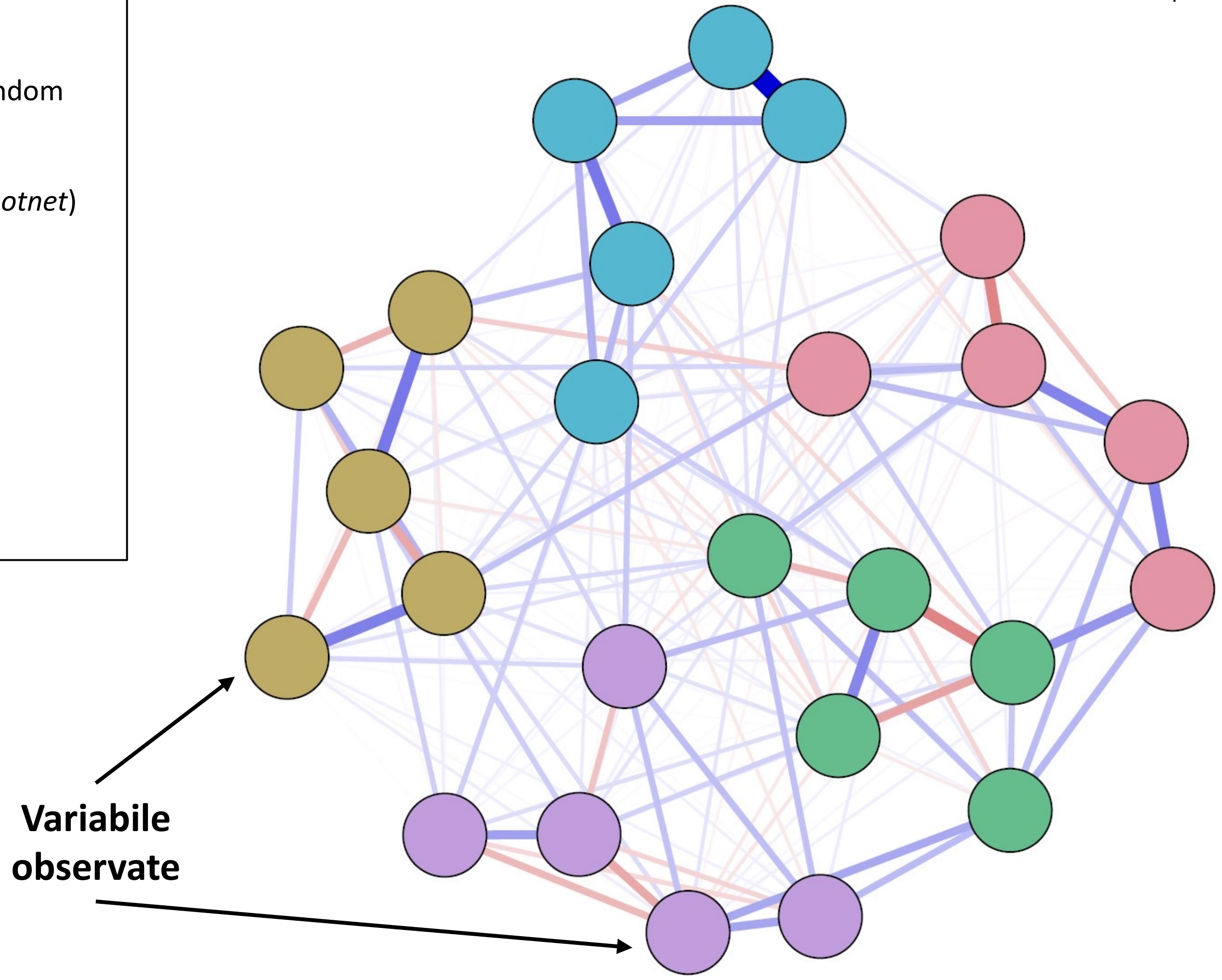

REȚELE NON-DIRECȚIONALE (UNDIRECTED NETWORK MODELS)

Psychological Methods

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Which Estimation Method to Choose in Network Psychometrics? Deriving Guidelines for Applied Researchers

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[1] Department of Psychology, Psychological Methods, University of Amsterdam
[2] Centre for Urban Mental Health, University of Amsterdam

Abstract
The Gaussian graphical model (GGM) has recently grown popular in psychological research, with a large body of estimation methods being proposed and discussed across various fields of study, and several algorithms being identified and recommend as applicable to psychological data sets. Such high-dimensional model estimation, however, is not trivial, and algorithms tend to perform differently in different settings. In addition, psychological research poses unique challenges, including placing a strong focus on weak edges (e.g., bridge edges), handling data measured on ordered scales, and relatively limited sample sizes. As a result, there is currently no consensus regarding which estimation procedure performs best in which setting. In this large-scale simulation study, we aimed to overcome this gap in the literature by comparing the performance of several estimation algorithms suitable for Gaussian and skewed ordered categorical data across a multitude of settings, as to arrive at concrete guidelines from applied researchers. In total, we investigated 60 different metrics across 564,000 simulated data sets. We summarized our findings through a platform that allows for manually exploring simulation results. Overall, we found that an exchange between discovery (e.g., sensitivity, edge weight correlation) and caution (e.g., specificity, precision) should always be expected, and achieving both—which is a requirement for perfect replicability—is difficult. Further, we identified that the estimation method is best chosen in light of each research question and have highlighted, alongside desirable asymptotic properties and low sample size discovery, results according to most common research questions in the field.

Translational Abstract
Estimating network models to explore interactions between psychological variables has grown popular in psychological research. There are many different estimation routines available for this purpose, each of which performs differently in its ability to estimate robust and replicable network structures. Concrete guidelines to which estimator performs best and what sample sizes are required for network estimation are lacking, especially with regards to skewed and ordered categorical data—two types of data commonly occurring in psychological research. In this work, we present and discuss the results from large-scale simulation studies through an interactive environment designed to aid empirical researchers in making these methodological choices.

Keywords: GGM, network psychometrics, network models, network analysis

The Gaussian graphical model (GGM; Epskamp et al., 2018; Lauritzen, 1996)—a network structure of variables represented by nodes and linked by edges that are weighted by partial correlation coefficients—has recently grown popular in psychological research, especially in the fields of clinical psychology and psychiatry (Robinaugh et al., 2020). While confirmatory fit of a given GGM is possible (Epskamp, Rhemtulla et al., 2017; Kan et al., 2019), in most cases a prior theoretical network structure is absent. Many researchers therefore focus on *exploratory* estimation of GGMs: identifying the structure (absence and presence of edges), as well as estimating the edge weights (i.e., partial correlation coefficients). A large body of estimation methods have been proposed and discussed across various fields of study (e.g., Drton & Perlman, 2004; Friedman et al., 2008; Meinshausen et al., 2009), and several algorithms have been identified and recommend as applicable to psychological datasets (e.g., Epskamp & Fried, 2018; Williams et al., 2019).

Of note, however, such high-dimensional model estimation is not trivial—especially when the sample size is small relative to the

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The authors have declared there are no conflicts of interest in relation to the subject of this study. We would like to thank Denny Borsboom for helpful advice throughout the set-up of the project, as well as useful feedback on this article.

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Psychological Methods

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Reporting Standards for Psychological Network Analyses in Cross-Sectional Data

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[1] Amsterdam Centre for Urban Mental Health, University of Amsterdam
[2] University Medical Center Groningen, University Center Psychiatry (UCP) Interdisciplinary Center Psychopathology and Emotion Regulation (ICPE), University of Groningen
[3] Department of Psychology, University of Amsterdam
[4] Department of Clinical Psychology, Leiden University

OPEN DATA OPEN MATERIALS

Abstract
Statistical network models describing multivariate dependency structures in psychological data have gained increasing popularity. Such comparably novel statistical techniques require specific guidelines to make them accessible to the research community. So far, researchers have provided tutorials guiding the *estimation* of networks and their accuracy. However, there is currently little guidance in determining what parts of the analyses and results should be *documented* in a scientific report. A lack of such reporting standards may foster researcher degrees of freedom and could provide fertile ground for questionable reporting practices. Here, we introduce reporting standards for network analyses in cross-sectional data, along with a tutorial and two examples. The presented guidelines are aimed at researchers as well as the broader scientific community, such as reviewers and journal editors evaluating scientific work. We conclude by discussing how the network literature specifically can benefit from such guidelines for reporting and transparency.

Translational Abstract
In recent years, network models have become increasingly popular in the field of psychology. Such comparably novel statistical techniques require specific guidelines to make them accessible to the research community. So far, researchers have provided tutorials guiding how network analysis can be applied to psychological data. However, there is currently little guidance in determining what parts of the analyses and results should be *documented* in a scientific report. A lack of such reporting standards may result in researchers being confronted with too much choice in reporting their results, which in turn might provide fertile ground for questionable reporting practices. Here, we introduce reporting standards for network analyses in cross-sectional data, along with a tutorial and two examples. The presented guidelines are aimed at researchers as well as the broader scientific community, such as reviewers and journal editors evaluating scientific work. We conclude by discussing how the network literature specifically can benefit from such guidelines for reporting and transparency.

Keywords: network analysis, reporting standards, reproducibility

Over the past decade, there has been a rapid increase in empirical contributions applying network analytic methods across many psychological disciplines. The increasing interest in networks (Barabási, 2012; Watts & Strogatz, 1998) led to empirical applications in various fields of psychology (Robinaugh et al., 2019) and resulted in a large number of special issues in journals such as

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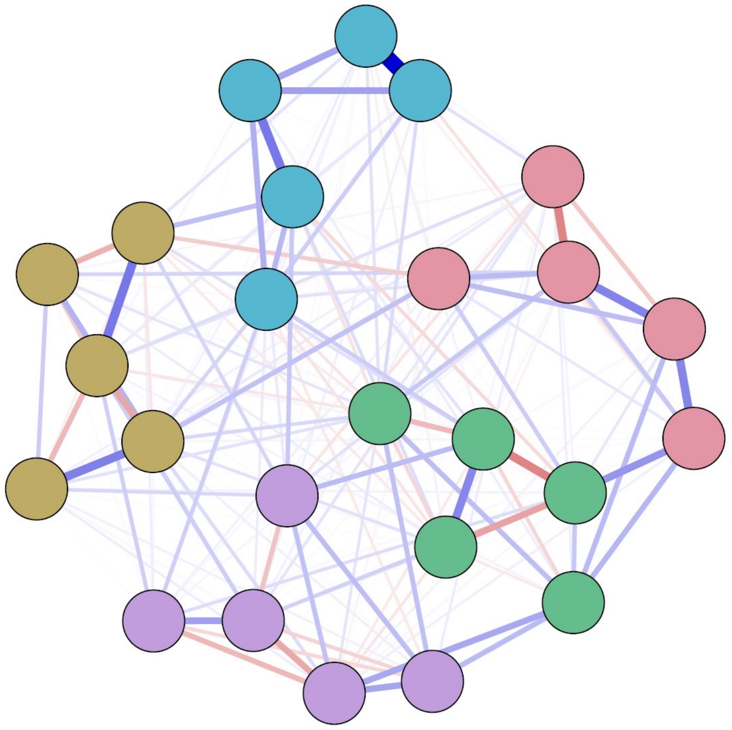
*Julian Burger and Adela-Maria Isvoranu contributed equally to this article.

The data are available at https://osf.io/msjcb/
The materials are available at https://osf.io/p9wn2/

Correspondence concerning this article should be addressed to Julian Burger, Hanzeplein 1, 9713 GZ, Groningen, the Netherlands. Email: j.burger@uva.nl



REȚELE NON-DIRECȚIONALE (UNDIRECTED NETWORK MODELS)

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Folosim adesea modele de rețea non-direcțională (Markov random fields)

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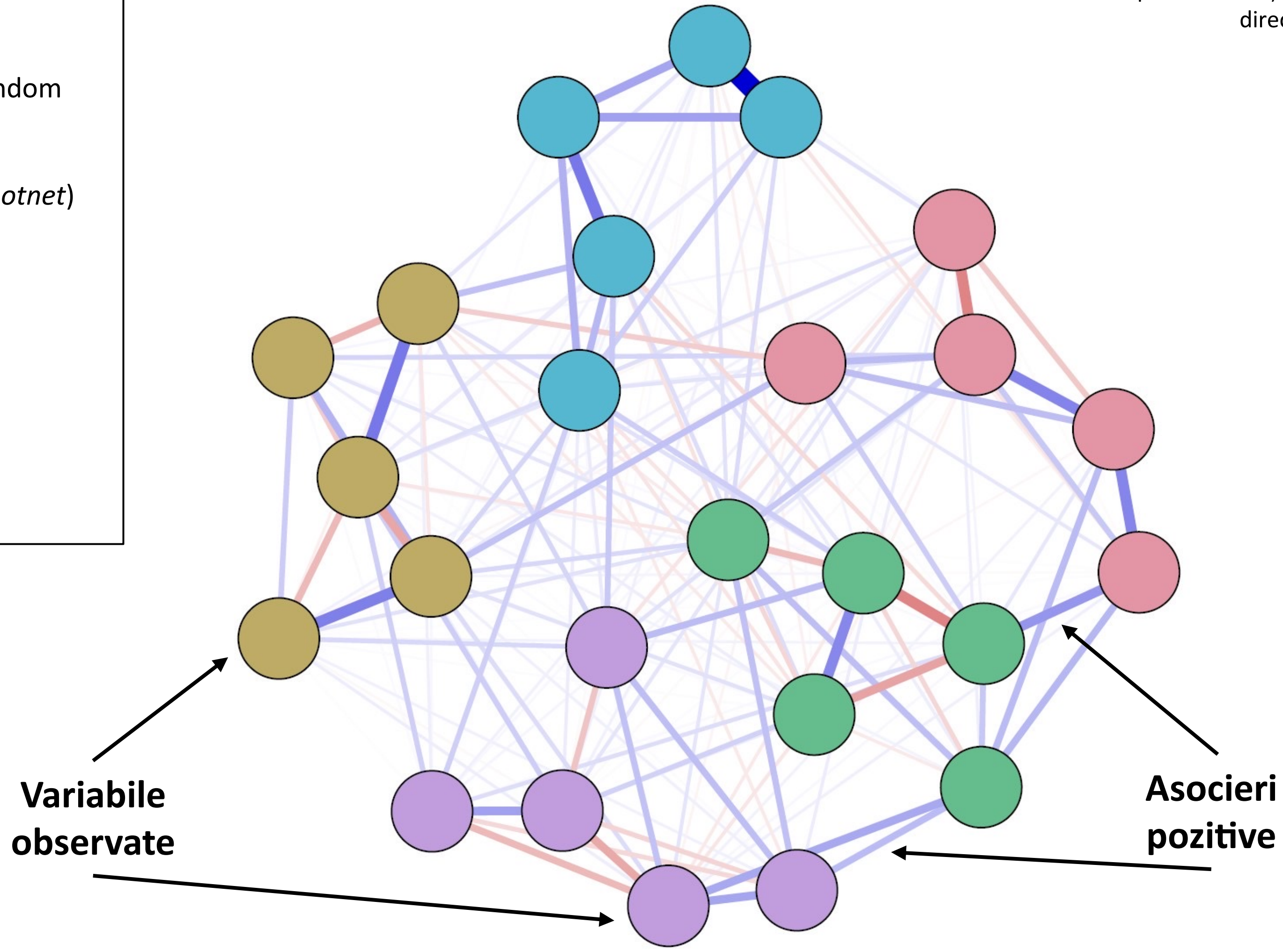
Conexiunile reprezintă dependențe condiționale (*conditional dependencies)*

- În GGM: corelații parțiale

Alegerea modelului de estimare

- Pruning
- Regularization
- Model Search

Exemplu al unei rețele non-direcționale



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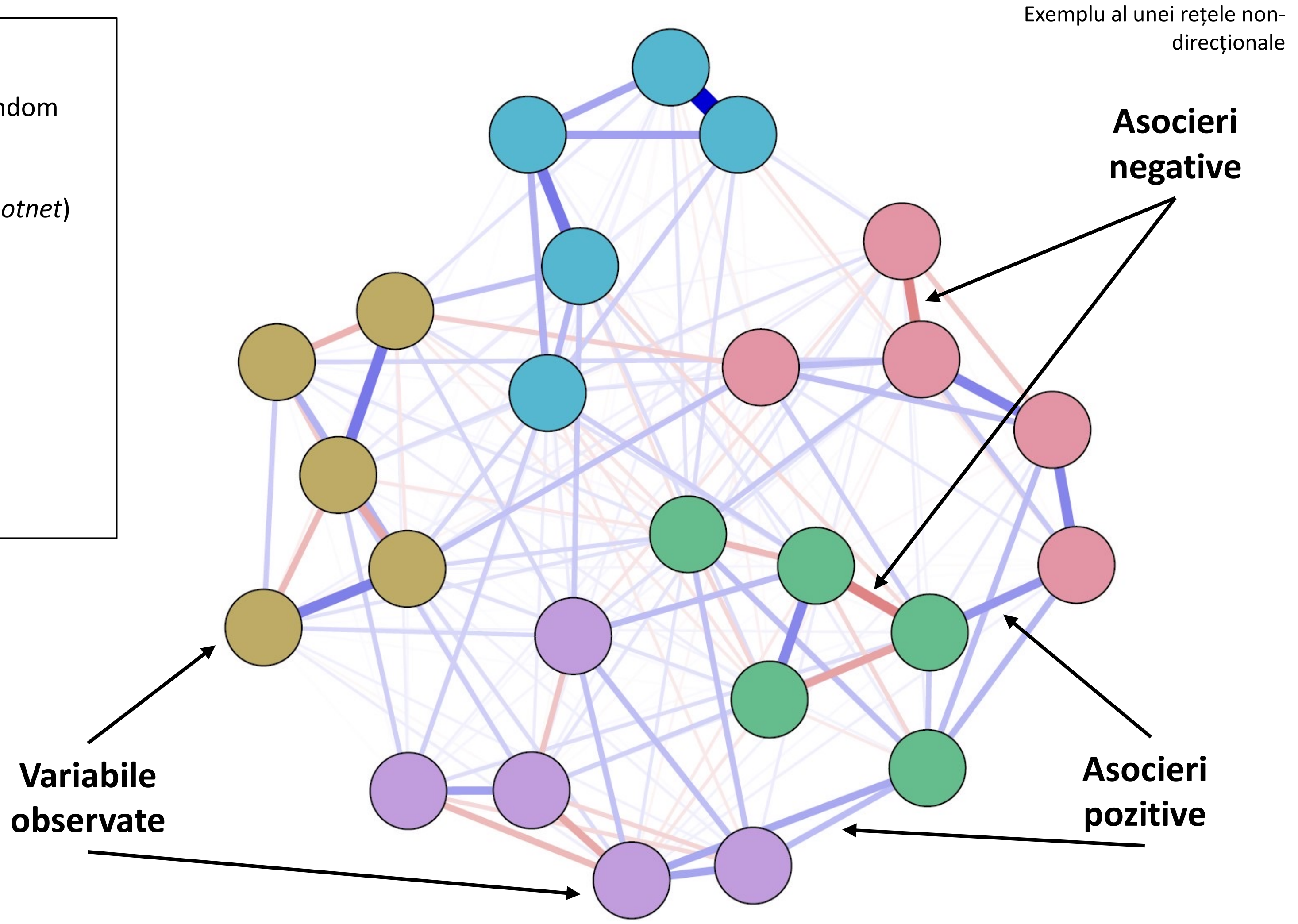

REȚELE NON-DIRECȚIONALE (UNDIRECTED NETWORK MODELS)

Obiective: Identificarea simptomelor care pot fi declanșate de expunerea la traume timpurii și traiectoriile dintre trauma și simptomatologie

Date: Genetic Risk and Outcome of Psychosis (GROUP)

552 pacienți

Material: Gamă largă de simptomatologie

- Traumă în copilărie: neglijare fizică, neglijare emoțională, abuz sexual, abuz emoțional, abuz fizic
- Positive and Negative Syndrome Scale

Analiză statistică: Rețea non-direcțioanlă (Markov random fields, Gaussian Graphical Model)

Conexiunile reprezintă corelații parțiale regularizate

Nodurile = variabile

Conexiuni albastru = pozitive, Conexiuni roșii = negative, Margini late = mai puternice

Schizophrenia Bulletin vol. 43 no. 1 pp. 187–196, 2017
doi:10.1093/schbul/sbw055
Advance Access publication May 10, 2016

A Network Approach to Psychosis: Pathways Between Childhood Trauma and Psychotic Symptoms

Adela-Maria Isvoranu*[,1], Claudia D. van Borkulo[1,2], Lindy-Lou Boyette[3,4], Johanna T. W. Wigman[2], Christiaan H. Vinkers[5], and Denny Borsboom[1]; Group Investigators[†]

[†]Genetic Risk and Outcome of Psychosis investigators: René Kahn[5], Lieuwe de Haan[4], Jim van Os[6], Durk Wiersma[2]; Richard Bruggeman[2], Wiepke Cahn[5], Carin Meijer[4], and Inez Myin-Germeys[6]

[1]Department of Psychology, Psychological Methods, University of Amsterdam, Amsterdam, The Netherlands; [2]Department of Psychiatry, Interdisciplinary Center for Psychopathology and Emotion Regulation, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands; [3]Department of Clinical Psychology, University of Amsterdam, Amsterdam, The Netherlands; [4]Department of Psychiatry, Academic Medical Center, Amsterdam, The Netherlands; [5]Department of Psychiatry, Brain Center Rudolf Magnus, University Medical Center Utrecht, Utrecht, The Netherlands; [6]Department of Psychiatry and Psychology, School of Mental Health and Neuroscience, Maastricht University Medical Center, Maastricht, The Netherlands

*To whom correspondence should be addressed; Department of Psychology, Psychological Methods, University of Amsterdam, Nieuwe Achtergracht 129-B, 1018 WT, Amsterdam, The Netherlands; tel: +31-(0)20-525-6870, e-mail: isvoranu.adela@gmail.com

Childhood trauma (CT) has been identified as a potential risk factor for the onset of psychotic disorders. However, to date, there is limited consensus with respect to which symptoms may ensue after exposure to trauma in early life, and whether specific pathways may account for these associations. The aim of the present study was to use the novel network approach to investigate how different types of traumatic childhood experiences relate to specific symptoms of psychotic disorders and to identify pathways that may be involved in the relationship between CT and psychosis. We used data of patients diagnosed with a psychotic disorder (*n* = 552) from the longitudinal observational study Genetic Risk and Outcome of Psychosis Project and included the 5 scales of the Childhood Trauma Questionnaire-Short Form and all original symptom dimensions of the Positive and Negative Syndrome Scale. Our results show that all 5 types of CT and positive and negative symptoms of psychosis are connected through symptoms of general psychopathology. These findings are in line with the theory of an affective pathway to psychosis after exposure to CT, with anxiety as a main connective component, but they also point to several additional connective paths between trauma and psychosis: eg, through poor impulse control (connecting abuse to grandiosity, excitement, and hostility) and motor retardation (connecting neglect to most negative symptoms). The results of the current study suggest that multiple paths may exist between trauma and psychosis and may also be useful in mapping potential transdiagnostic processes.

Key words: early trauma/psychotic disorders/affective pathway to psychosis/schizophrenia/network analysis

Introduction

Childhood trauma (CT) has been extensively investigated as a potential risk factor for the onset and course of psychosis, and found to relate to some of the most severe forms of symptomatology in adulthood, including hallucinations, delusions, and paranoia (here used with the meaning "suspiciousness").[1–4] However, in spite of intense research into the topic, the nature of the relationship between CT and psychosis is yet to be fully understood.

Current psychometric practices in psychopathology research conceptualize psychotic disorders—and mental disorders in general—as common causes of symptoms.[5] In other words, symptoms are taken to be indicators of an underlying disease entity and correlations between symptoms can be fully explained by the common influence of the latent variable. Despite decades of research, however, finding such underlying causes for symptoms has been very rare[6]; instead, the causes appear to be multifactorial, thus, challenging the likelihood of a common cause explanation for associations between symptoms.[7–10] As a result, in recent years, the common cause approach to mental disorders has been called into question and the dynamical systems conceptualization of psychopathology gained ground, leading to the

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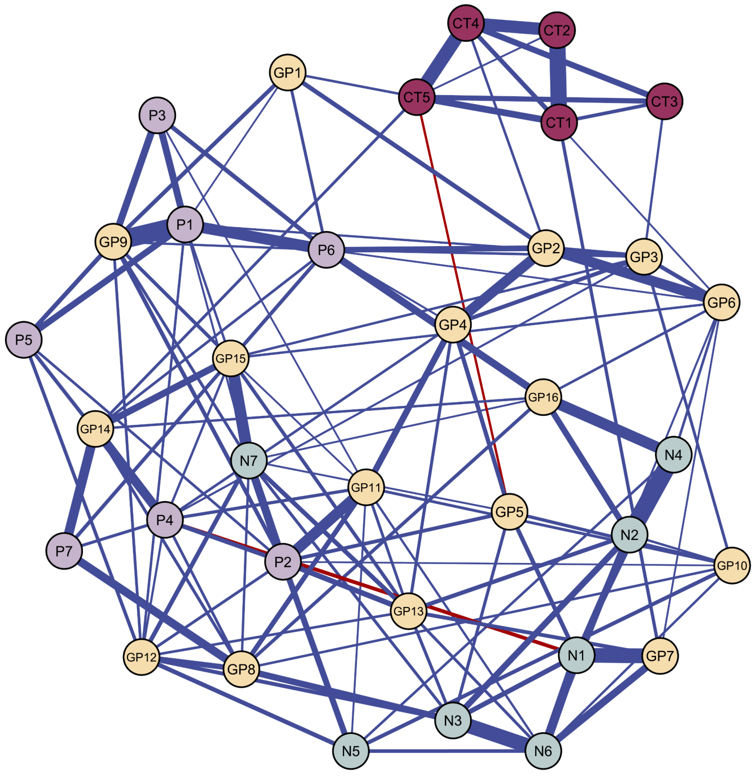
DE LA FACTORI DE RISC LA SIMPTOMATOLOGIE



Childhood Trauma

CT1: Physical neglect
CT2: Emotional neglect
CT3: Sexual abuse
CT4: Emotional abuse
CT5: Physical absue

Positive Symptoms

P1: Delusions
P2: Conceptual disorganization
P3: Hallucinations
P4: Excitement
P5: Grandiosity
P6: Paranoia/ suspiciousness
P7: Hostility

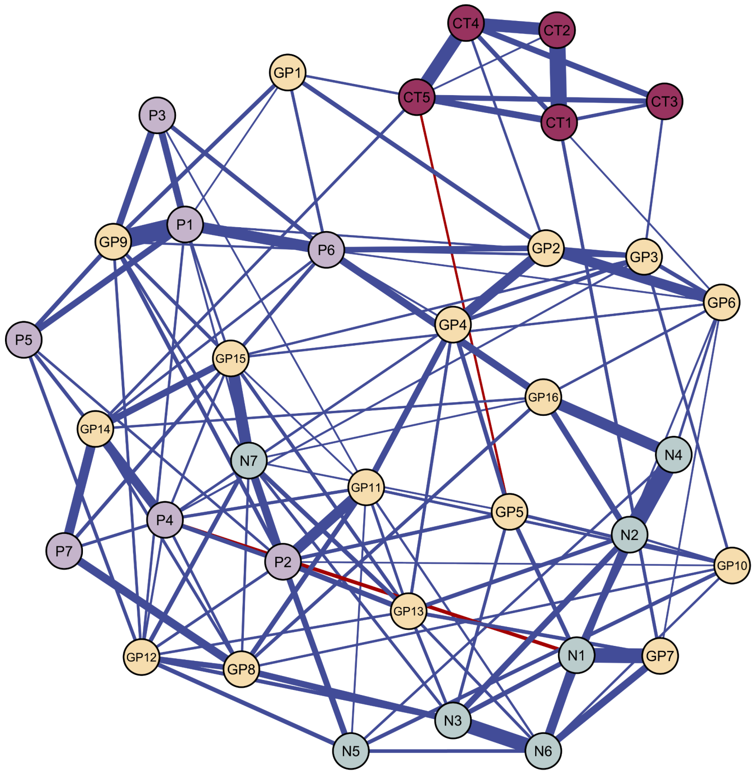
Negative Symptoms

N1: Blunted affect
N2: Emotional withdrawal
N3: Poor rapport
N4: Social withdrawal
N5: Difficulty in abstract thinking
N6: Lack of spontaneity
N7: Stereotyped thinking

General Psychopahtology

GP1: Somatic concern
GP2: Anxiety
GP3: Guilt
GP4: Tension
GP5: Mannerism and posturing
GP6: Depression
GP7: Motor retardation
GP8: Uncooperativeness
GP9: Unusual thought content
GP10: Disorientation
GP11: Poor attention
GP12: Poor judgement and insight
GP13: Disturbed willpower
GP14: Poor impulse control
GP15: Preoccupation
GP16: Active social avoidance

DE LA FACTORI DE RISC LA SIMPTOMATOLOGIE



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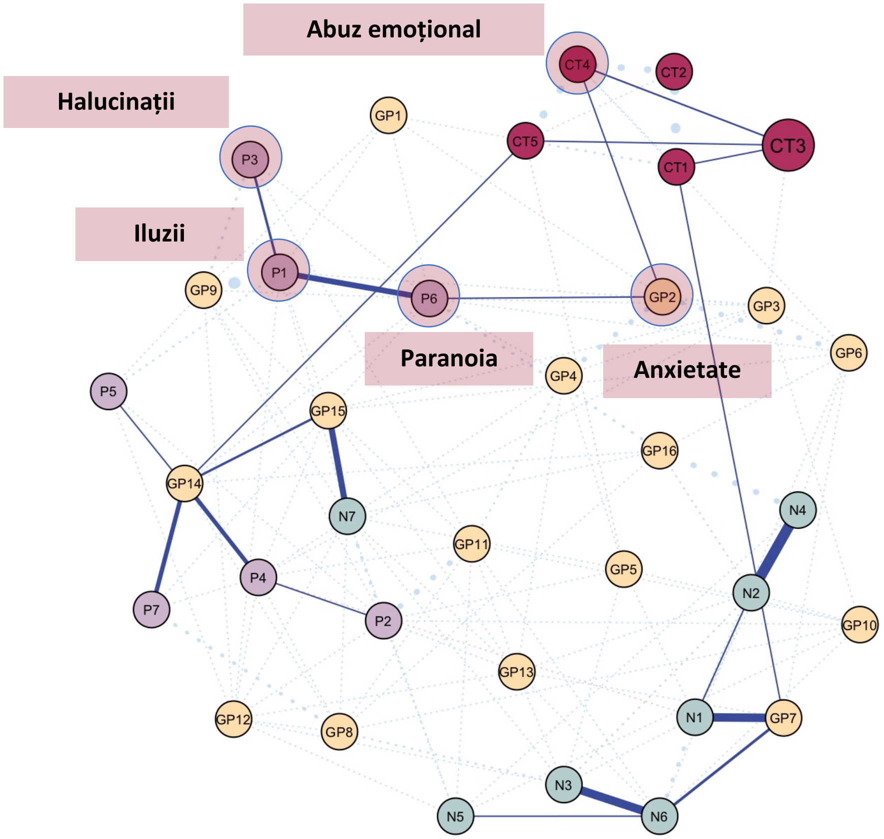

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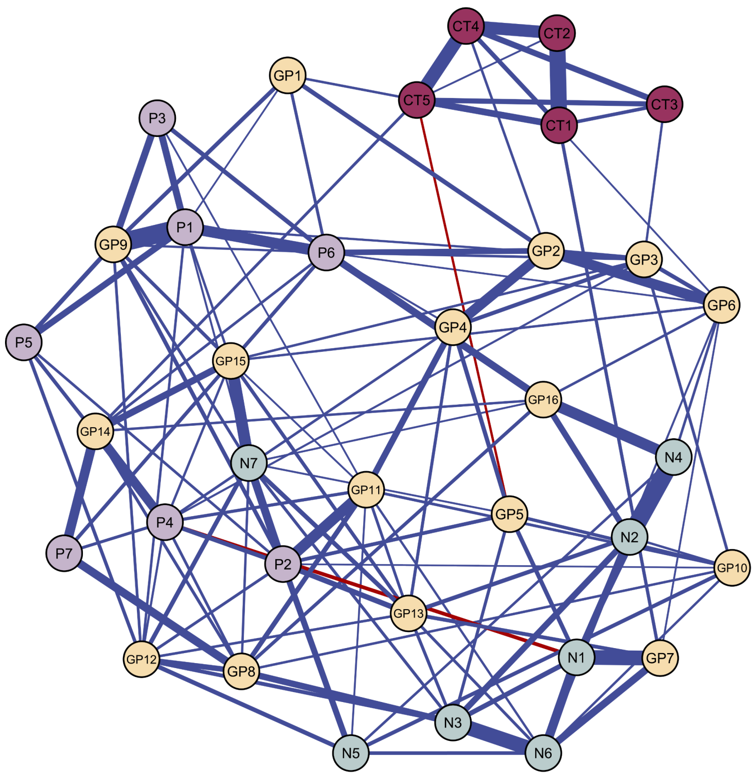

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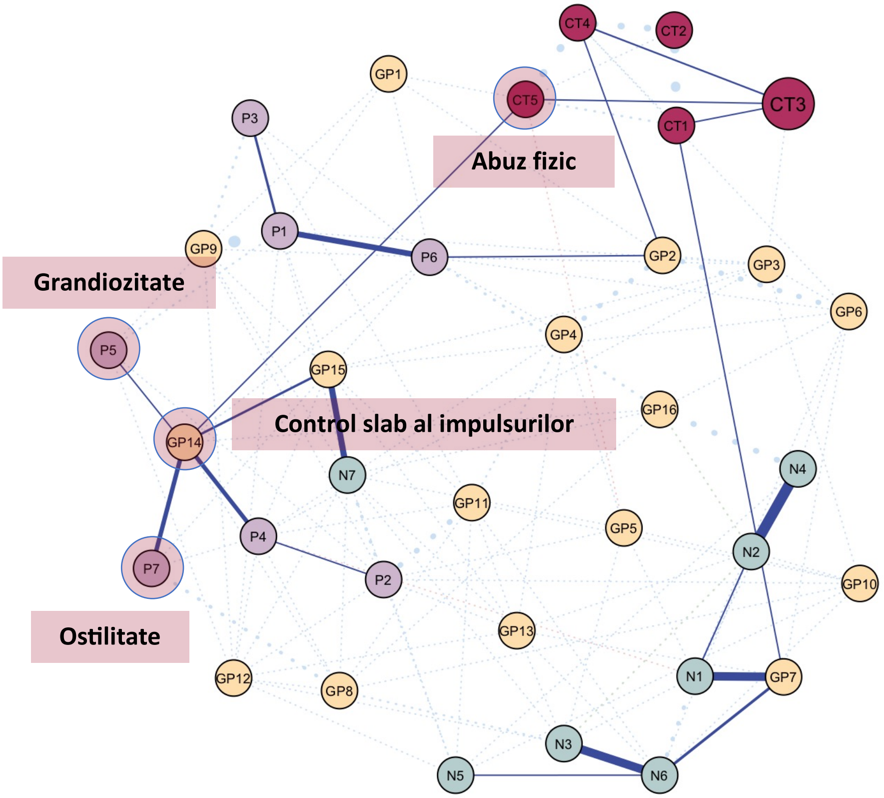

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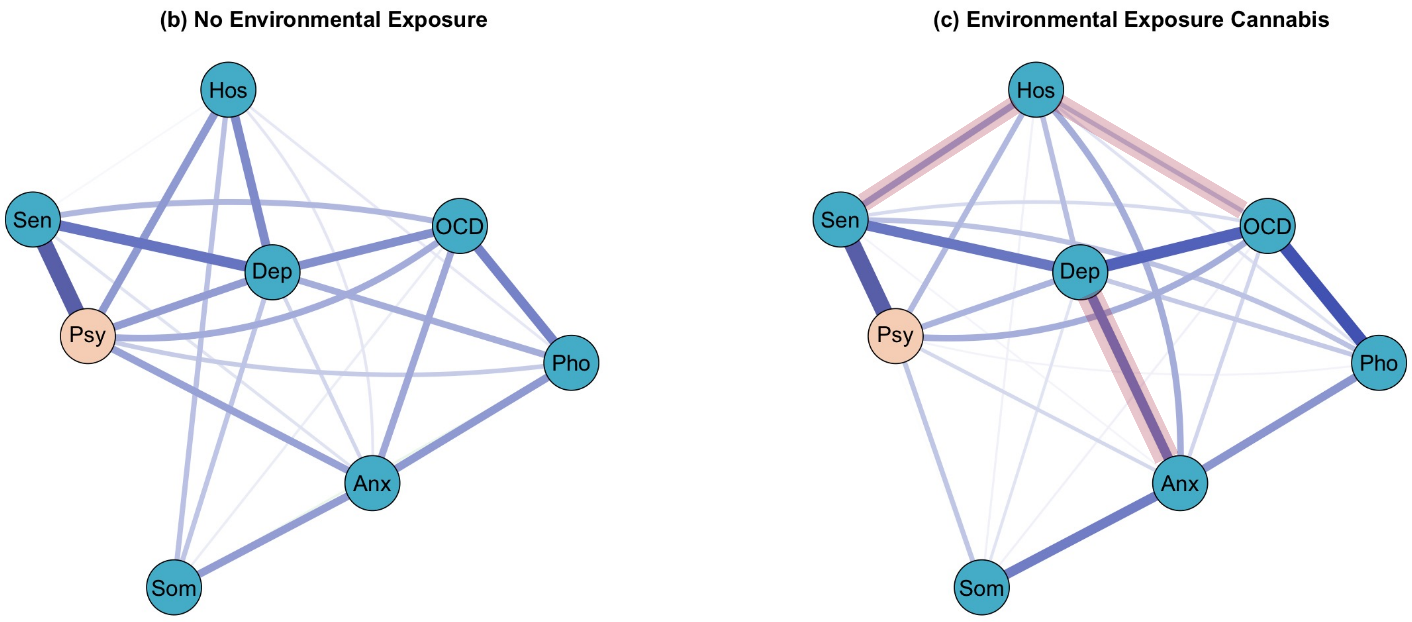

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Advance Access publication May 13, 2016

A Network Approach to Environmental Impact in Psychotic Disorder: Brief Theoretical Framework

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The spectrum of psychotic disorder represents a multifactorial and heterogeneous condition and is thought to result from a complex interplay between genetic and environmental factors. In the current paper, we analyze this interplay using network analysis, which has been recently proposed as a novel psychometric framework for the study of mental disorders. Using general population data, we construct network models for the relation between 3 environmental risk factors (cannabis use, developmental trauma, and urban environment), dimensional measures of psychopathology (anxiety, depression, interpersonal sensitivity, obsessive-compulsive disorder, phobic anxiety, somatizations, and hostility), and a composite measure of psychosis expression. Results indicate the existence of specific paths between environmental factors and symptoms. These paths most often involve cannabis use. In addition, the analyses suggest that symptom networks are more strongly connected for people exposed to environmental risk factors, implying that environmental exposure may lead to less resilient symptom networks.

Key words: psychosis/environmental exposure/risk factors/network analysis

Introduction

Disorders in the psychosis spectrum represent one of the leading causes of long-term disability worldwide.[1] In spite of extensive efforts, their etiology remains poorly understood, hampering progress in treatment and prognosis.[2]

While collaborative efforts have confirmed the impact of genetic factors, an important role in the onset and progression of psychotic disorders is thought to be attributable to several environmental risk factors. Specifically, meta-analytical reviews have shown that psychosis expression is associated with developmental trauma, cannabis use, growing up in an urban environment, and minority group position.[3] These findings have resulted in extensive research—using a broad range of methodological approaches—concerned with mapping and understanding the relations between environmental factors and schizophrenia.

In the current note, we propose and describe a novel psychometric framework for the study of disorders in the psychosis spectrum and show how it can be used to augment these research efforts. The framework is based on the general idea that mental disorders arise from the interaction between affective, cognitive, and behavioral components that make up its psychopathology and is known as *the network approach*.[4]

Psychotic Disorder—Standard Approaches and A Network Alternative

Standard approaches to psychosis spectrum diagnoses such as schizophrenia conceptualize the construct as a latent condition that acts as a *common cause* of its symptoms.[5] In the psychometric representation of this conceptualization, the diagnosis of schizophrenia is represented as a latent variable (or set of latent variables), and its symptoms—such as hallucinations and delusions—are modeled as effects of this latent variable. As a result, symptoms of the disorder are interpreted as passive psychometric indicators, and interactions between symptoms do not form a central research interest. In accordance, this framework typically assumes that environmental factors affect symptoms *via* the latent disorder (ie, the disorder mediates the relation between environment and symptoms). However, recent studies show this assumption to be problematic, as individual symptoms

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Most papers are open access, or an earlier edition should be available at PsyArXiv or arXiv. If you can't find an article, contact us.

Available data & R-scripts are linked inside square brackets.

A list of our publications can also be found on Google Scholar.

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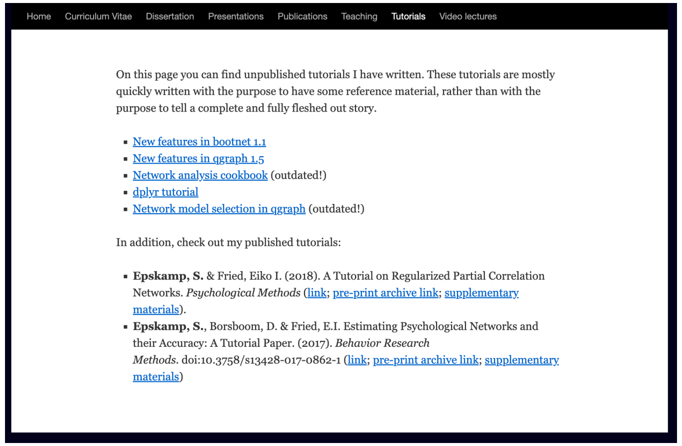

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