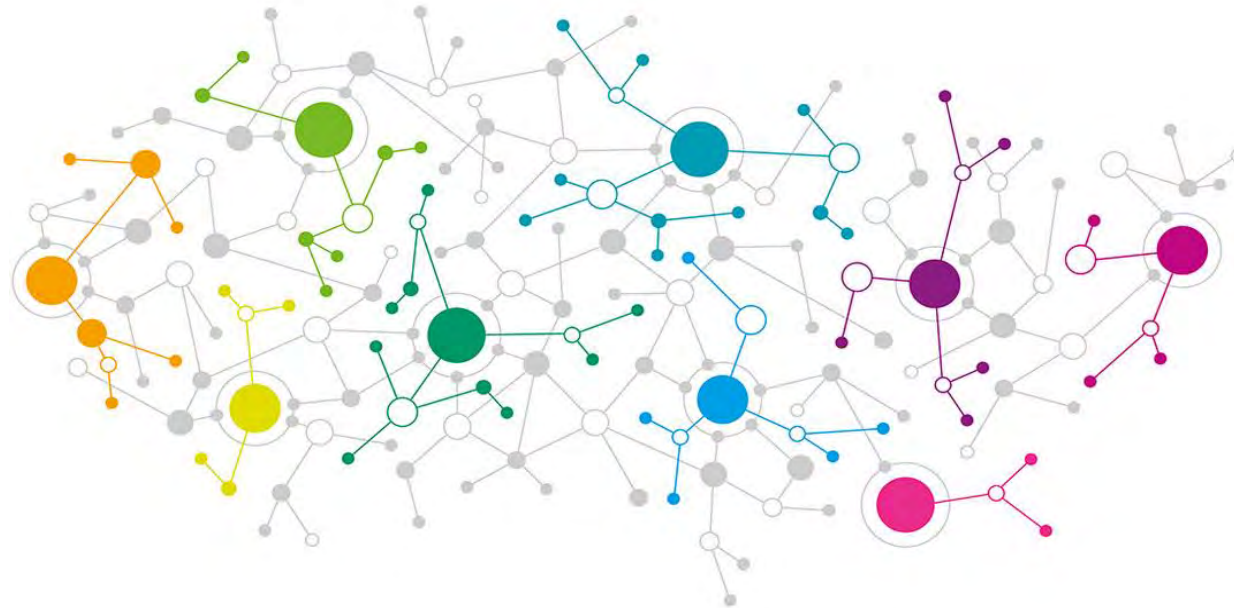


# ADDICTIVE BEHAVIOURS RELATED TO ICT: SIMILARITIES, DIFFERENCES – A NETWORK PERSPECTIVE

Joël Billieux and Stéphanie Baggio



# International Classification of Diseases (ICD-11) - WHO



## ICD-11 for Mortality and Morbidity Statistics (2018)

Search

[? \[ Advanced Search \]](#)

### Section : Disorders Due to Substance Use or Addictive Behaviours

Gaming disorder is manifested by a persistent or recurrent gaming behaviour (i.e., 'digital gaming' or 'video-gaming') characterised by **an impaired control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities and continuation of gaming despite the occurrence of negative consequences**. The behaviour pattern is of sufficient severity to result in **significant impairment in personal, family, social, educational, occupational or other important areas of functioning**. These features and the underlying pattern of gaming are normally evident over a period **of at least 12 months** in order for a diagnosis to be assigned, although the required duration may be shortened if all diagnostic requirements are met and symptoms are severe.

<https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/1448597234>

***Available from 16 June 2018***

A MENTAL DISORDER'S TALE,  
OR THERE AND BACK AGAIN

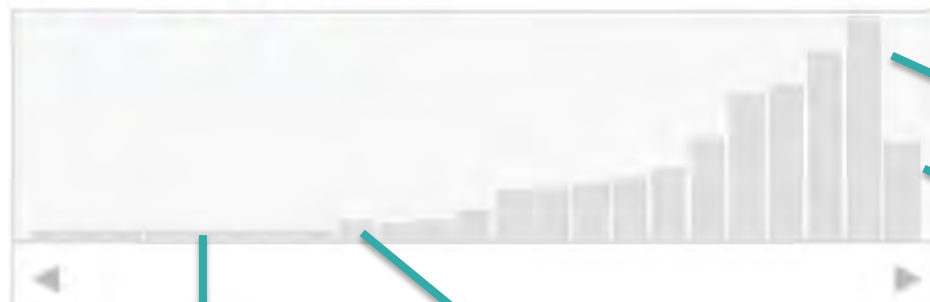
# « INTERNET ADDICTION » - HISTORY

- 1995 « the lure and addiction of life online »;  
published in the New York times
- Psychiatrist Ivan Goldberg **recycled** the criteria for defining substance dependence and first coined the term « Internet Addiction Disorder » **(initially a hoax)**
- Similar approach then used by others  
(Griffiths, 1996, Young, 1998)



Search term :  
« Internet Addiction »  
Date – 8 June 2018

## Results by year



2000 – 15 papers

2004 – 34 papers

2017 – 439 papers

2018 – 188 papers





# Internet addiction: reappraisal of an increasingly inadequate concept

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This article re-examines the popular concept of Internet addiction, discusses the key problems associated with it, and proposes possible alternatives. The concept of Internet addiction is inadequate for several reasons. Addiction may be a correct designation only for the minority of individuals who meet the general criteria for addiction, and it needs to be better demarcated from various patterns of excessive or abnormal use. Addiction to the Internet as a medium does not exist, although the Internet as a medium may play an important role in making some behaviors addictive. The Internet can no longer be separated from other potentially overused media, such as text messaging and gaming platforms. Internet addiction is conceptually too heterogeneous because it pertains to a variety of very different behaviors. Internet addiction should be replaced by terms that refer to the specific behaviors (eg, gaming, gambling, or sexual activity), regardless of whether these are performed online or offline.

# A LOT OF DIFFERENT AND SPECIFIC ACTIVITIES

(AND VARIOUS MEDIUMS: COMPUTERS, SMARTPHONES, TABLETS)

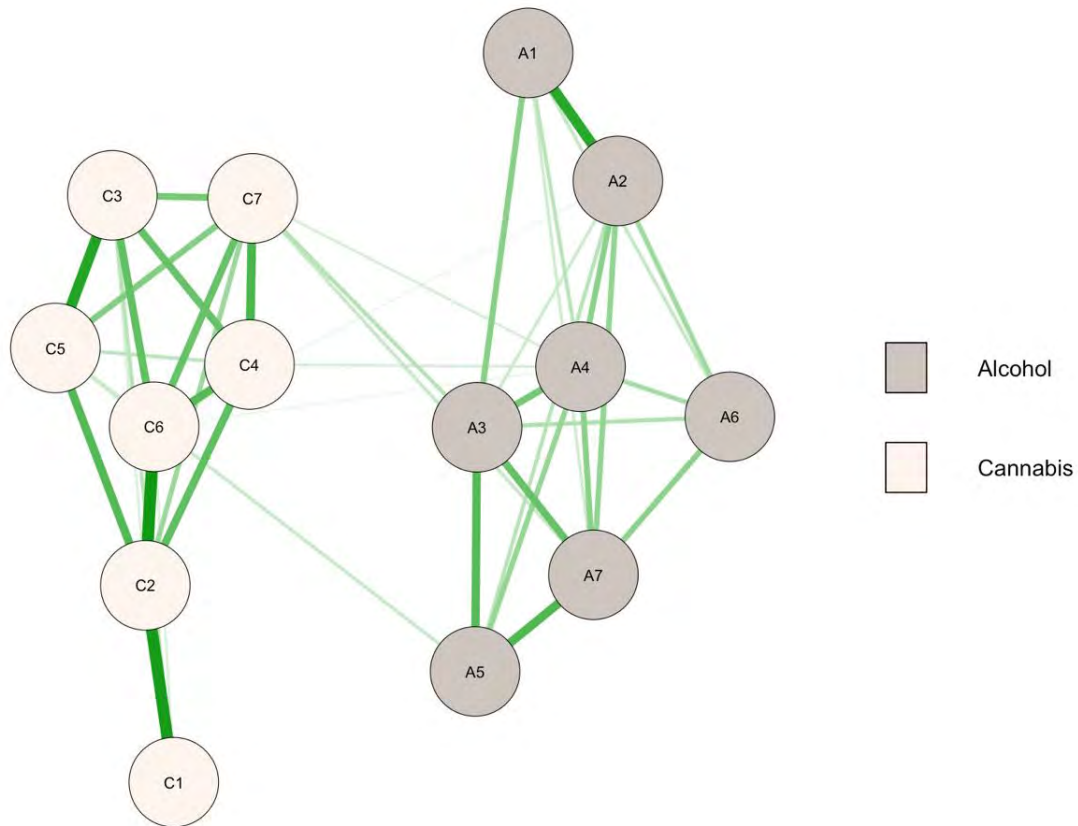
- Online games
    - MMORPGs (World of Warcraft)
    - FPS (Counter Strike)
    - MOBA (League of Legend)
    - Casual Games (Candy Crush)
  - Online sex
    - Solitary-Arousal (Pornography)
    - Partner-Arousal (Webcam, Sexchat, ...)
    - 3D sex Games
  - Social networks
    - Facebook, Twitter, ...
  - Online gambling
    - Poker (Texas all'them)
    - Casino games, sport bets, ...
  - Online shopping
  - Online surfing
  - Emails managing
  - Binge Watching
- A spectrum of disorders relied to common but also and specific risk factors (Billieux, 2012; Starcevic & Billieux, 2017)

# AIMS OF THE STUDY

- The study aims to provide empirically-based evidence to test whether:
  - Technology-mediated behaviours could be conceptualized as a spectrum of related, yet distinct disorders (the **spectrum hypothesis**)
  - “Internet addiction” and “smartphone addiction” constitute **umbrella constructs** and not genuine disorders
- We used a novel data-driven method: the **network analysis** (Boorsbom, World Psychiatry, 2017)

# THE NETWORK ANALYSIS

- What is a network?





# CLASSIC ANALYSES

- In social and medical sciences, concepts are generally assessed using several items.
- Usual way to analyse these data:
  - Use of sum scores and mean scores
  - Use of binary variables (presence/absence)
  - Use of latent variables

*Q1. When I am upset I often act without thinking*

*Q2. When I feel rejected, I will often say things that I later regret*

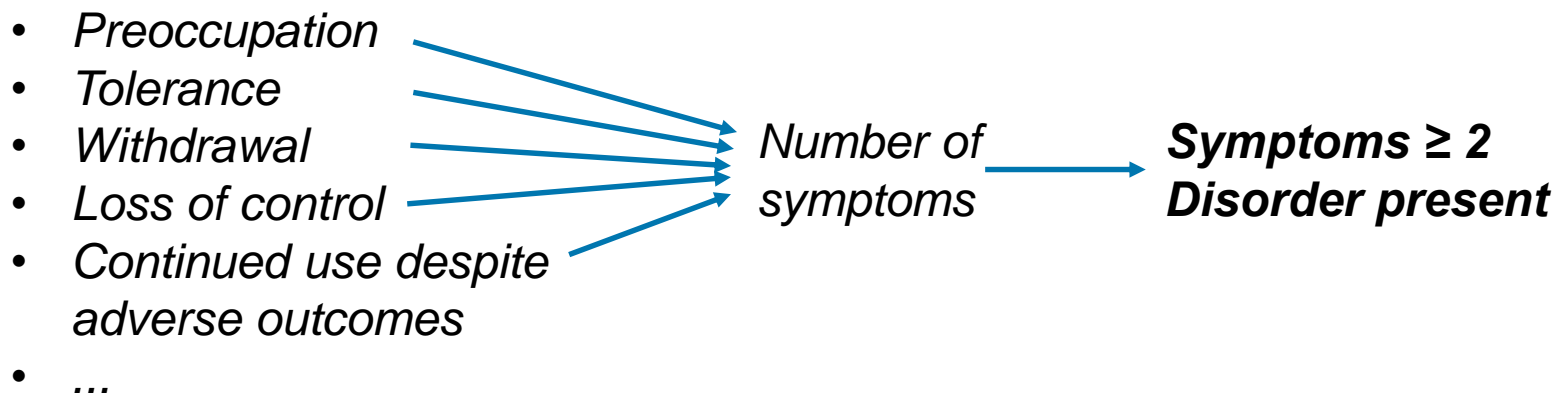
*Q3. I tend to act without thinking when I am really excited*

$Q1+Q2+Q3$

**Total score of impulsivity  
(urgency facet)**

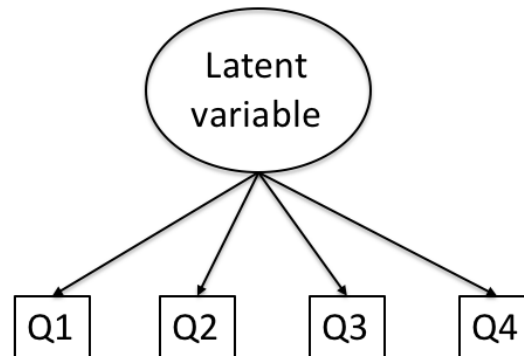
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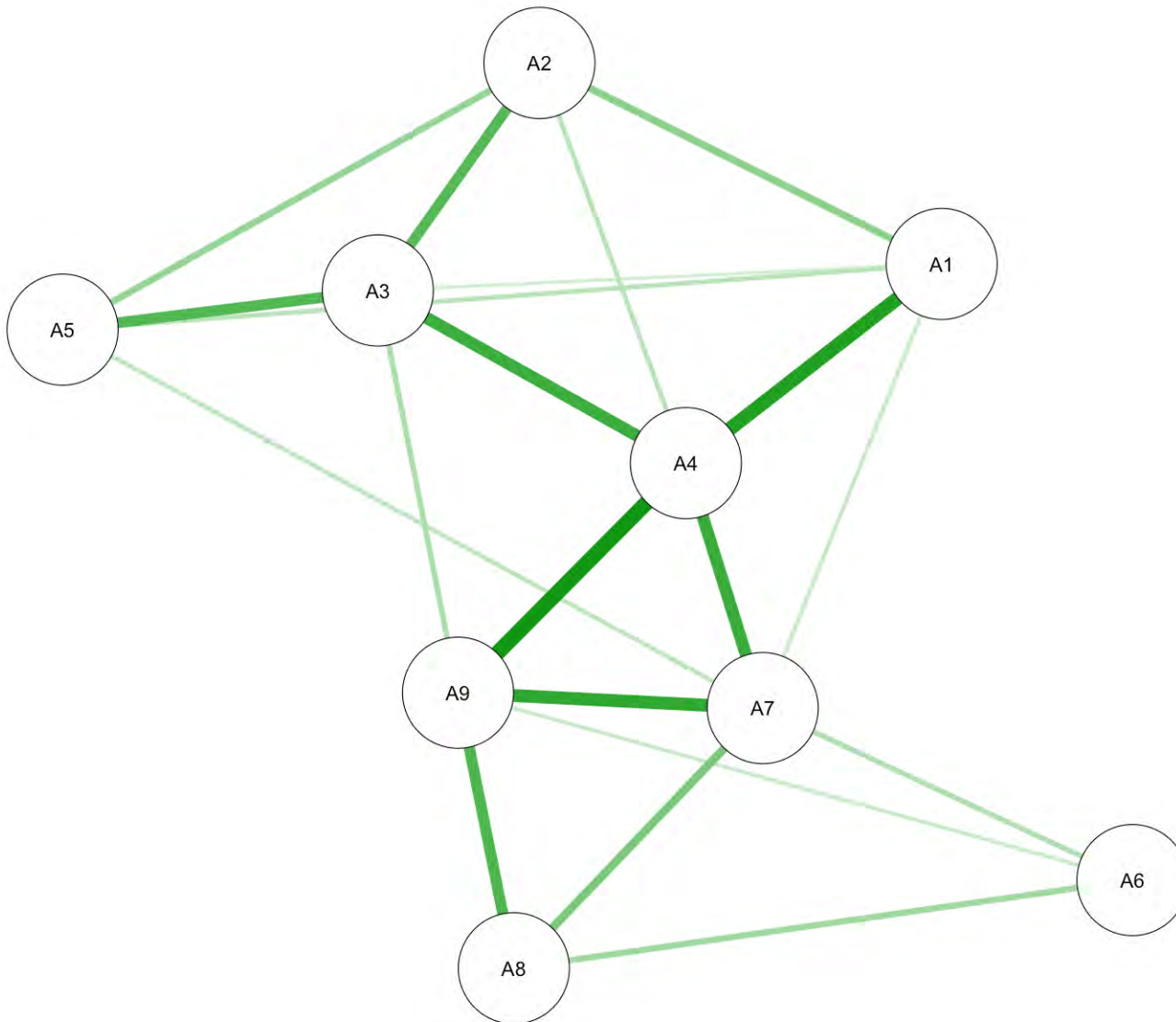
# CLASSIC ANALYSES

- This is the **latent variable approach** or **the common-cause model**: the concept is seen as a latent construct that causes the items
- Disadvantages:
  - Interchangeable and independent symptoms
  - Often the same weight for all symptoms
  - Overlapping symptoms and fuzzy boundaries not taken into account

# THE NETWORK ANALYSIS

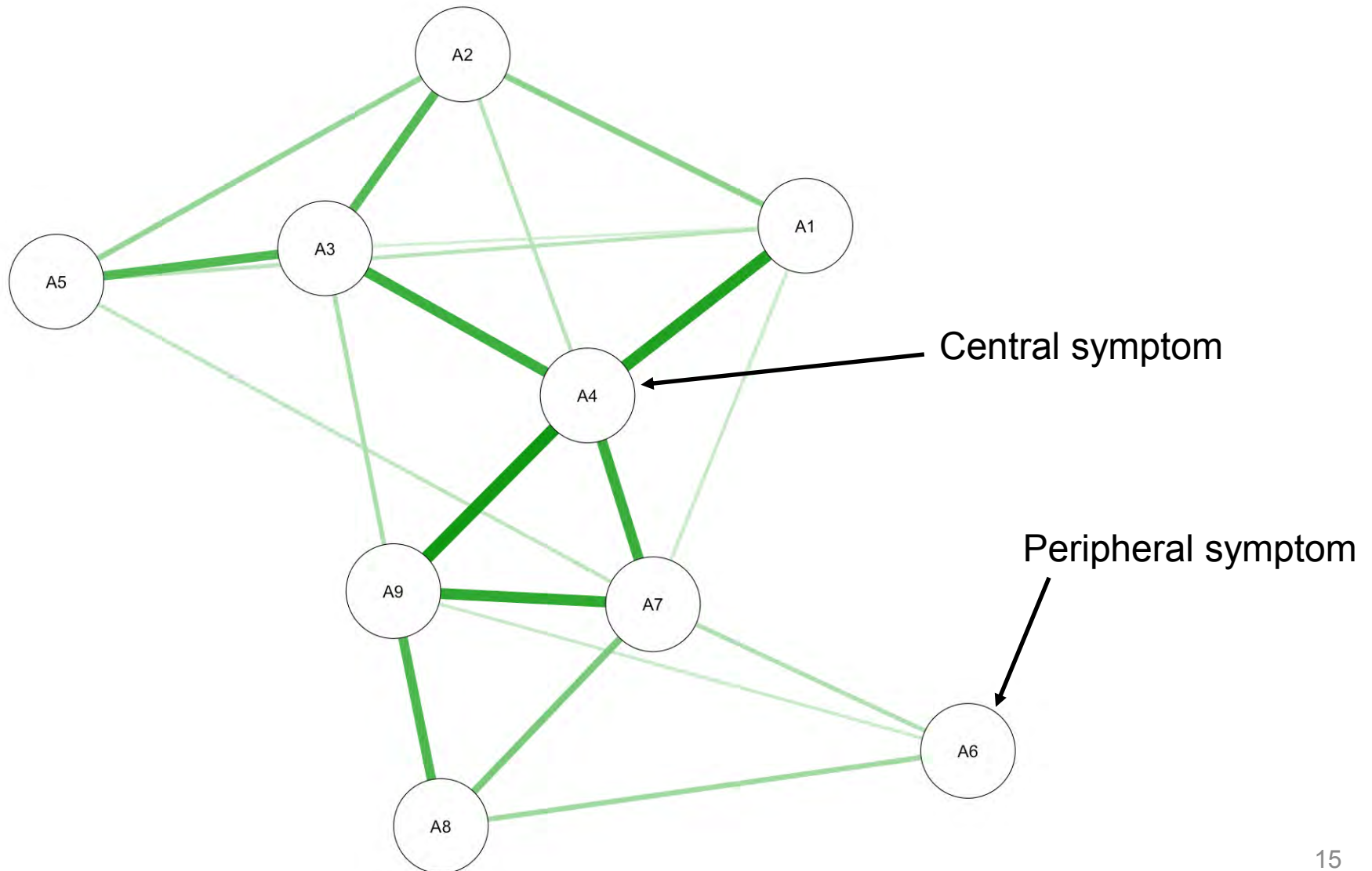
- The construct is a cluster of related items
- The construct is no longer a latent variable or a summary, but a system composed of the items themselves
- Items are represented as **nodes**
- Relationships are represented as **edges**

# EXAMPLE

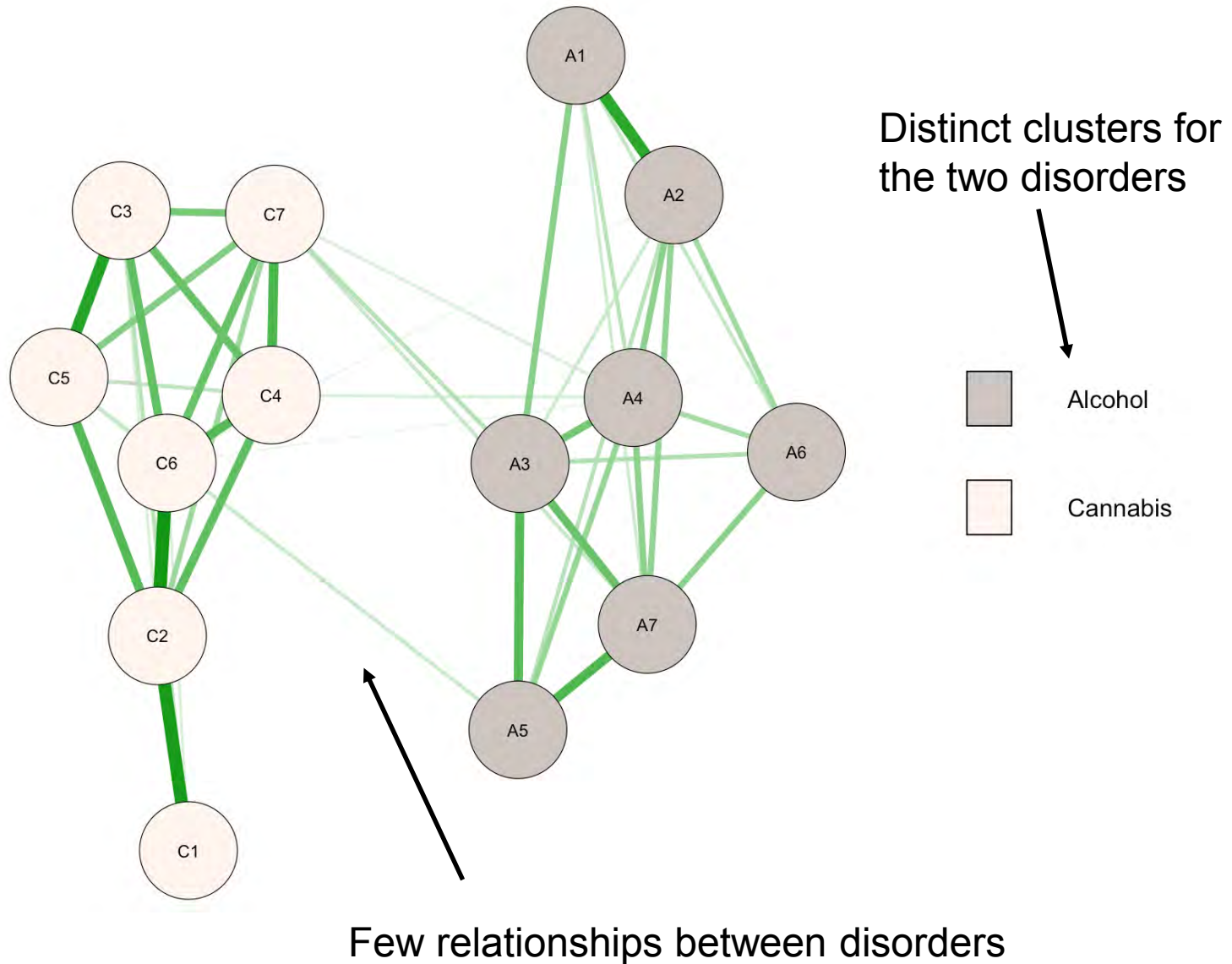




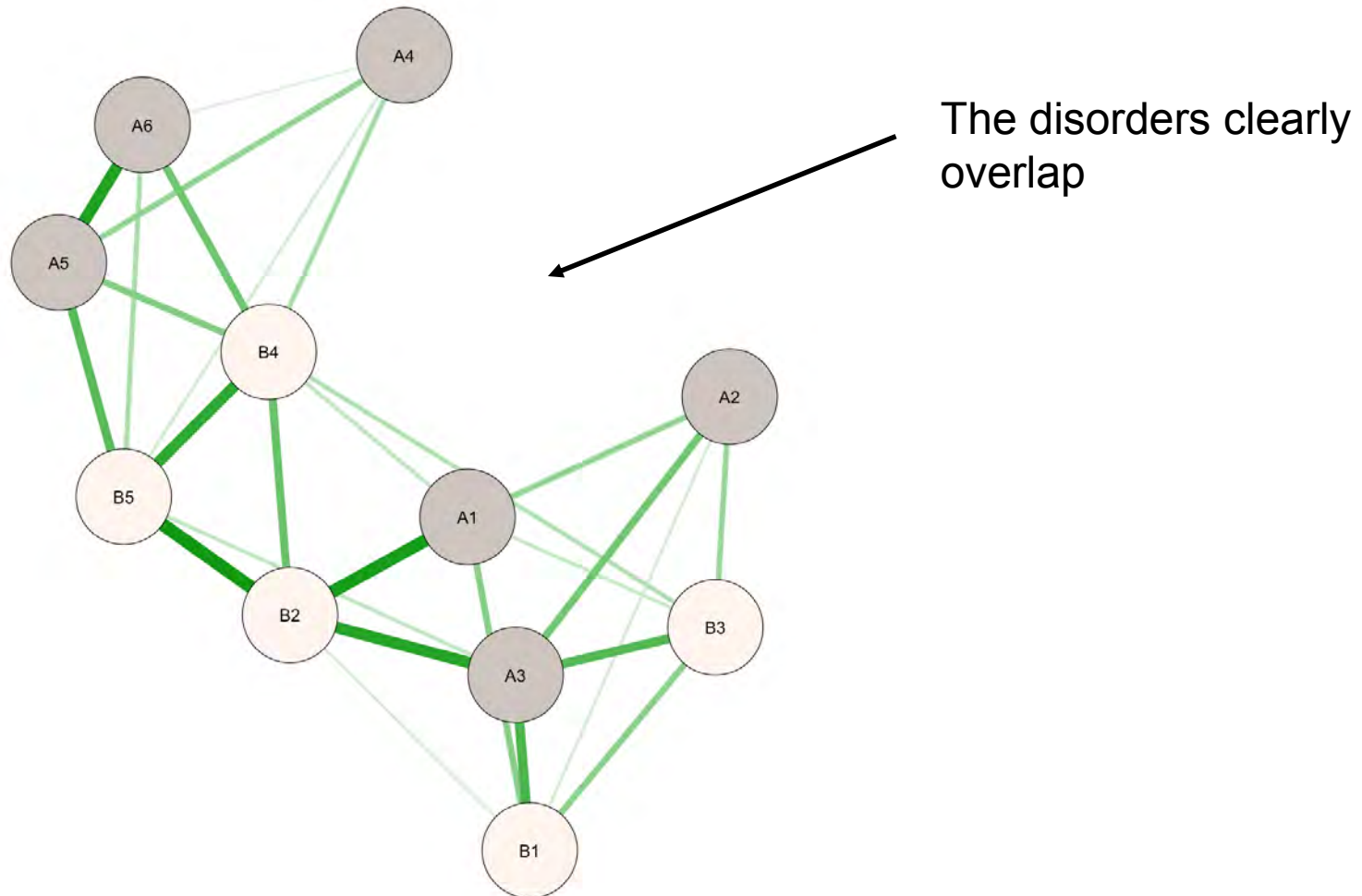
# EXAMPLE: UNEQUAL WEIGHTS



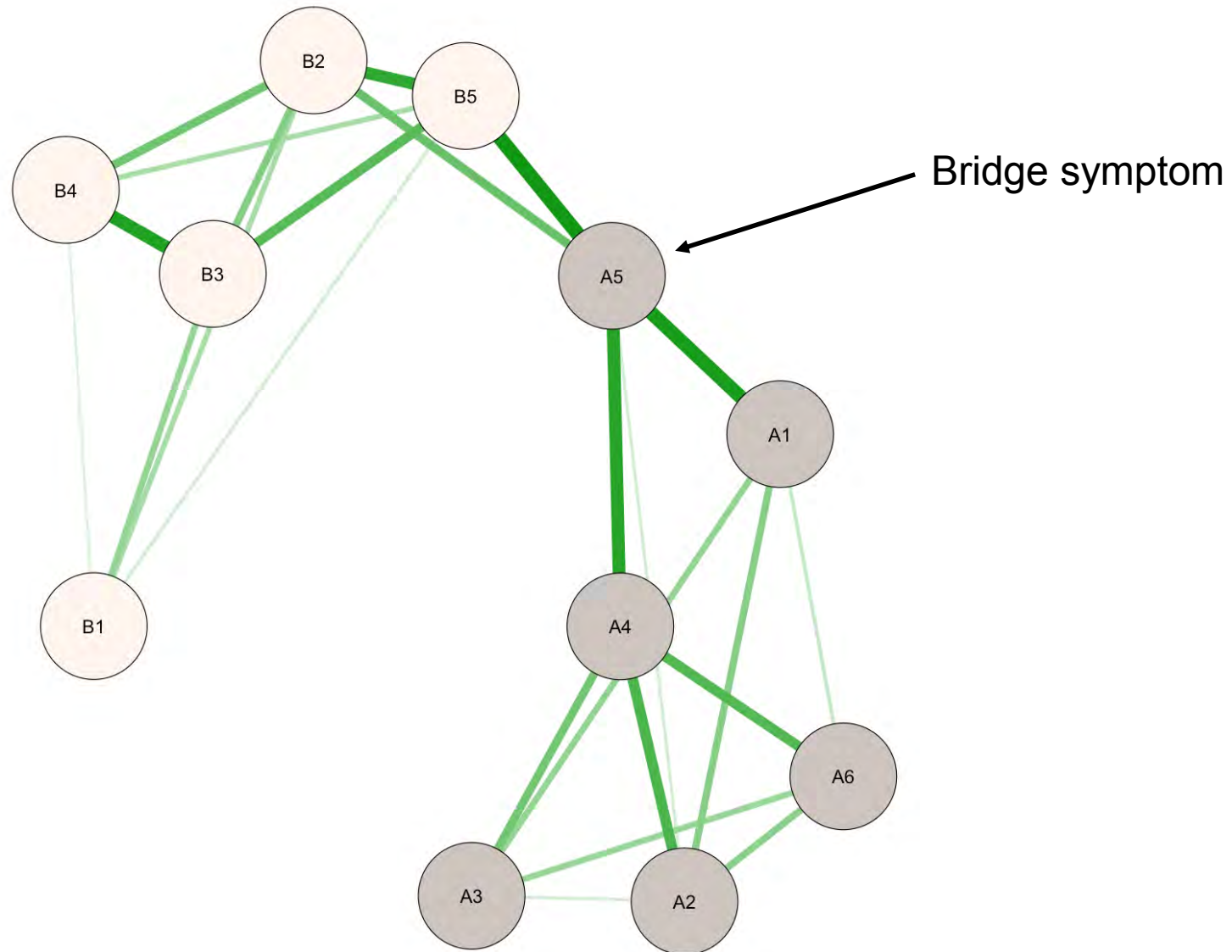
# EXAMPLE: DISORDERS OVERLAP



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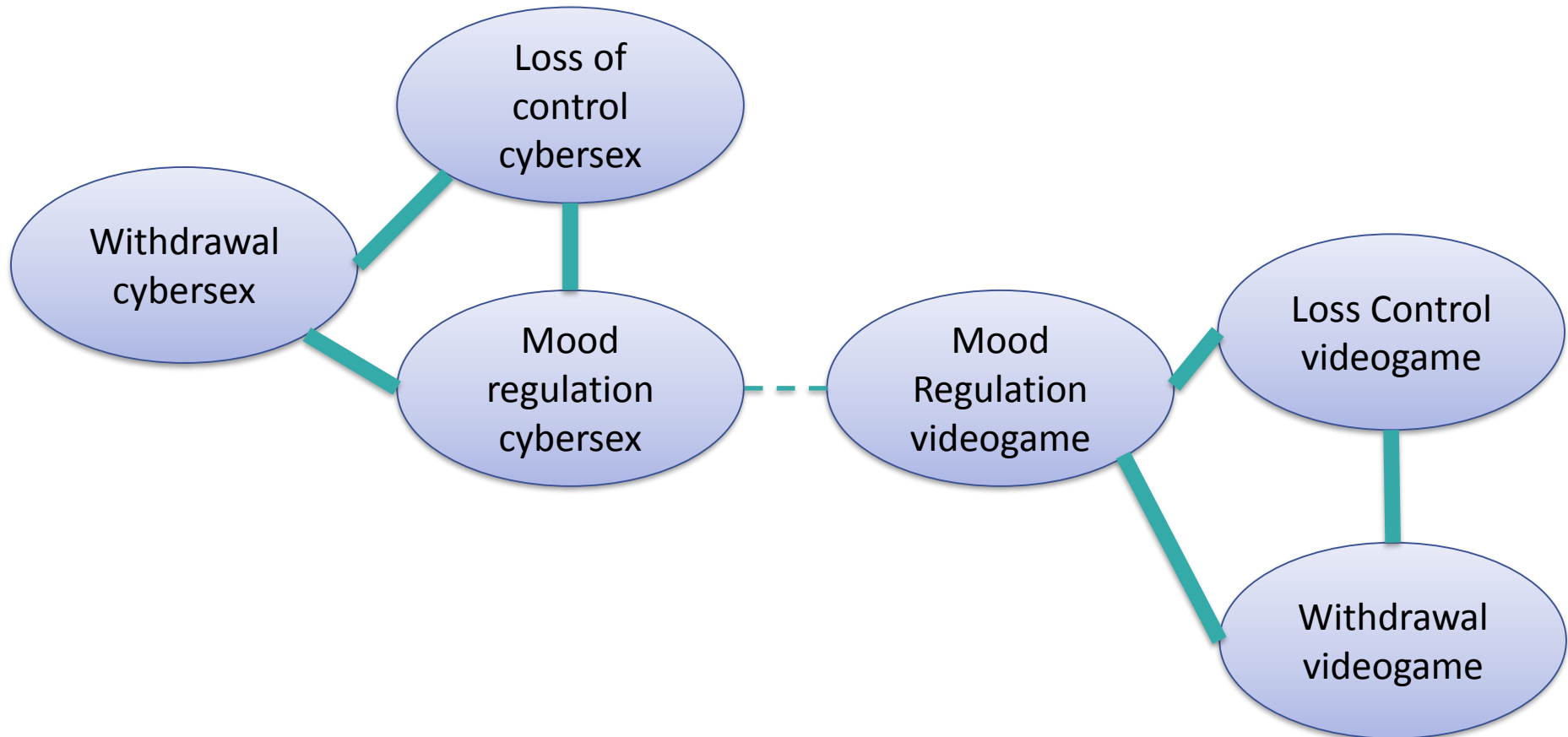
# EXAMPLE: BRIDGE SYMPTOMS



# **STUDY HYPOTHESES**

# SUPPORT FOR THE SPECTRUM HYPOTHESIS

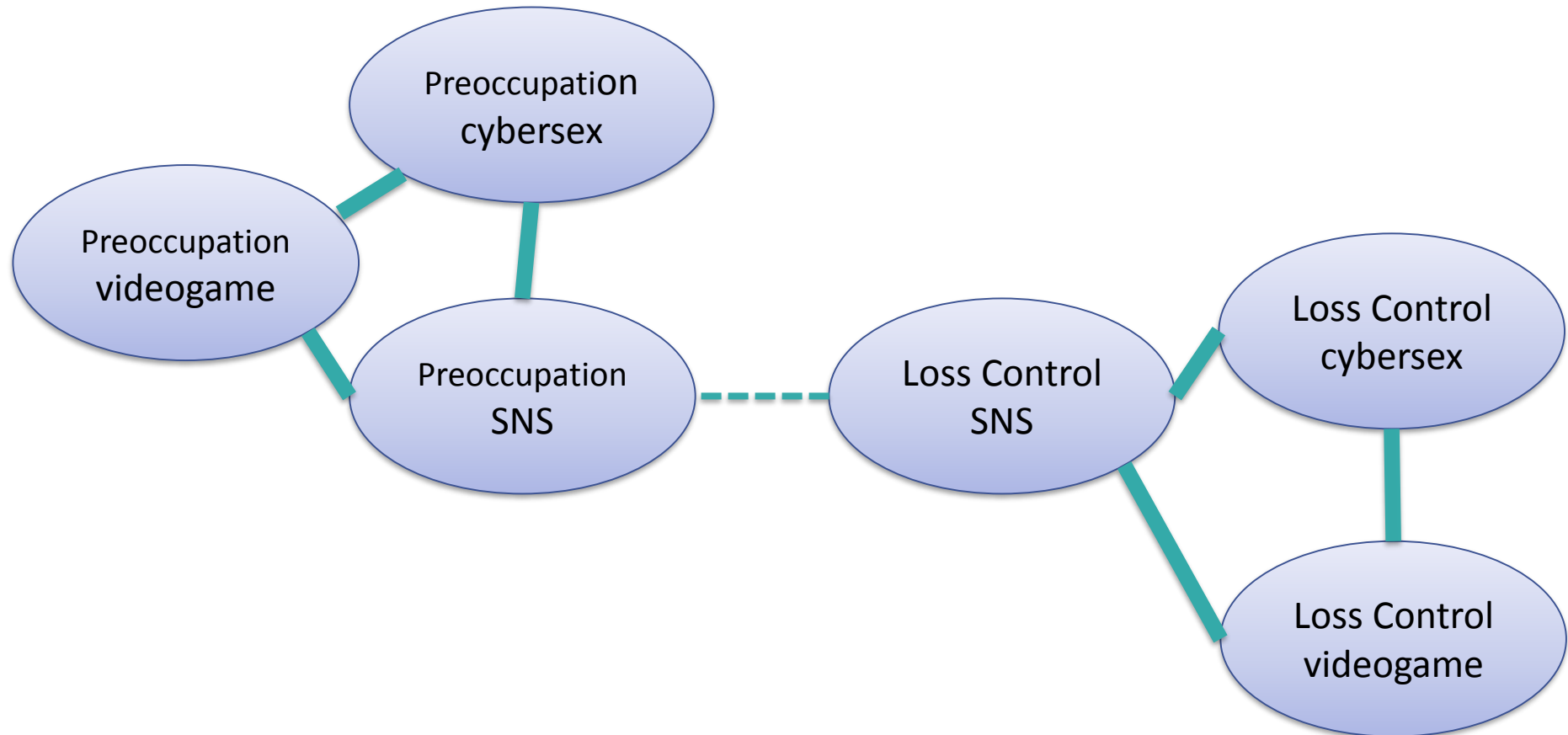
- Internet Addiction is NOT a tenable as a construct
- **Online activities** are grouped independently of the actual **symptoms**





# REJECTION OF SPECTRUM HYPOTHESIS

- Internet Addiction is tenable as a construct
- **Symptoms** are grouped independently of the actual **online activities**



# DATA

- Data from the Swiss Cohort Study on Substance Use and Risk Factors ([www.c-surf.ch](http://www.c-surf.ch))
- Representative sample of young Swiss men (mean age = 25.4)
- Participants reporting four technology-mediated behaviours: Internet use, smartphone use, video gaming, use of cyber-pornography (n=3,404)

The C-SURF study was granted by the Swiss National Science Foundation (no. 148493).

# MEASURES

- Internet addiction: Compulsive Internet Use Scale (CIUS) – 14 items (Meerkerk et al., 2009)
- Smartphone addiction: Smartphone Addiction Scale (SAS) – 10 items (Kwon et al., 2013)
- Video gaming addiction: Gaming Addiction Scale (GAS) – 7 items (Lemmens et al., 2009)
- Cybersex addiction: online sexual compulsive behaviors from the Internet Sex Screening Test (ISST) – 6 items (Delmonico & Miller, 2003)

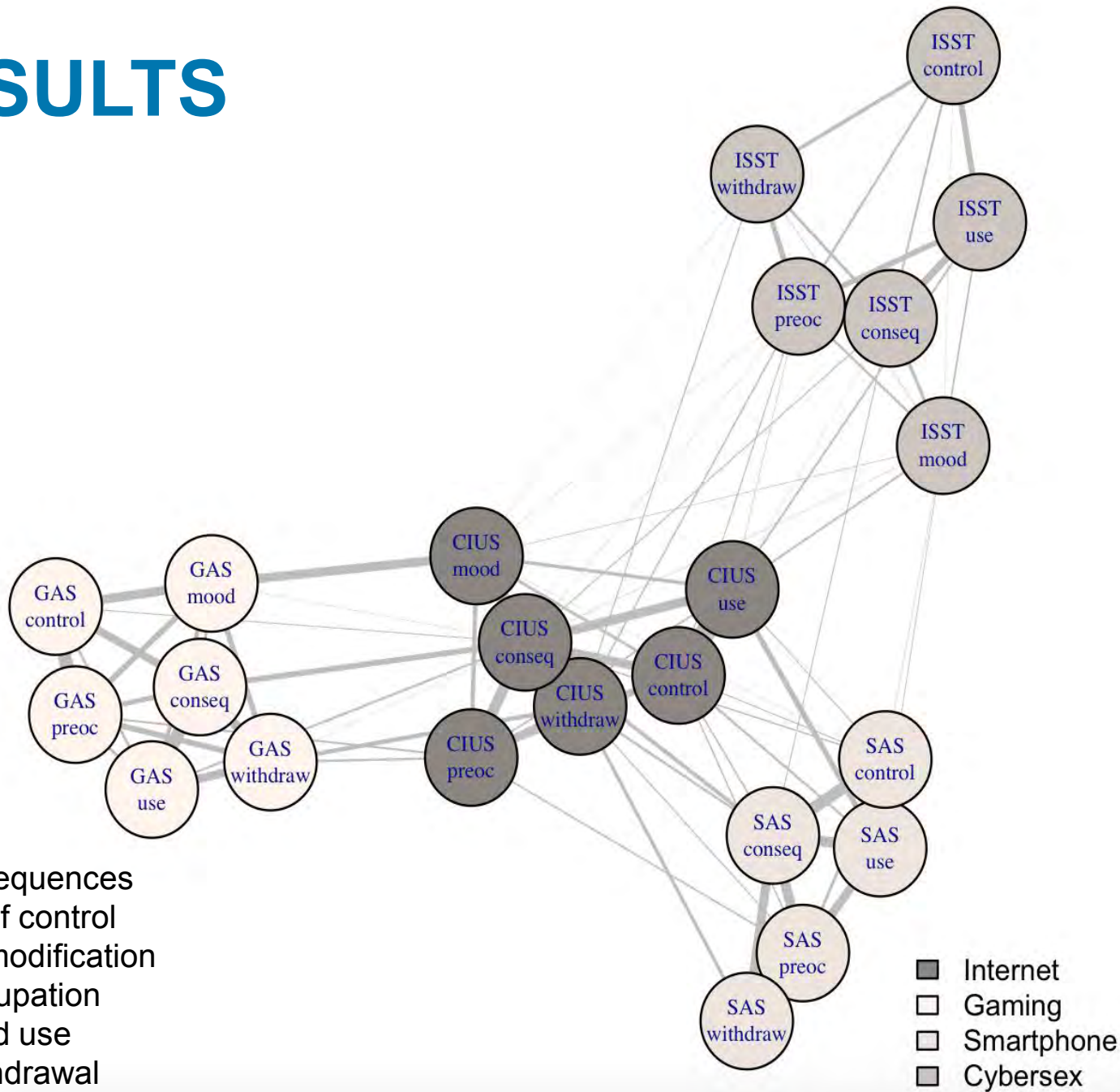
# SCALE MODIFICATION

- To have comparable symptoms for each scale, we selected items corresponding to the DSM-5 Internet gaming disorder criteria (APA, 2013) and the component model of addiction (Brown, 1993; Griffiths, 2005)
- Continued use, mood modification, loss of control, preoccupation, withdrawal, adverse consequences

# ANALYSES

- Network estimation: Gaussian graphical model with a nonparanormal transformation and a penalty parameter
- Community detection analysis: Spinglass algorithm

# RESULTS



Conseq: consequences  
 Control: loss of control  
 Mood: mood modification  
 Preoc: preoccupation  
 Use: continued use  
 Withdraw: withdrawal



# DISCUSSION: SPECTRUM HYPOTHESIS

- The network analysis largely supported the spectrum hypothesis: the construct of a general “technological addiction” as a discrete syndrome is untenable.
- Further studies should focus on specific technology-mediated behaviours.

# DISCUSSION: UMBRELLA CONSTRUCTS

- This hypothesis was not unequivocally supported: Internet and smartphone addictions constituted distinct clusters.
- However, the symptoms of Internet addiction were largely connected with other conditions.
- This finding is in line with the idea that Internet acts as a medium.

# LIMITATIONS

- Some frequent online behaviours were not included (social networking) and may account for the strong interconnections between Internet addiction and smartphone addiction.
- Reliability and validity of the scales used is not firmly established and are subject to controversies.

# NEXT STEPS - PERSPECTIVES

- Follow-up study should other online behaviours
  - SNS
  - Online gambling
  - TV series watching
- Identifying the unique features of specific technology-mediated behaviours (i.e. avoid exclusively focusing on similarities)
- Exploring interactions between addictive technology-mediated behaviours at clinical and non-problematic levels

# A FINAL INTRIGUING OBSERVATION



Fortnite – Battle Royale (FPS-style) –  
Current most popular video game  
worldwide



# A FINAL INTRIGUING OBSERVATION

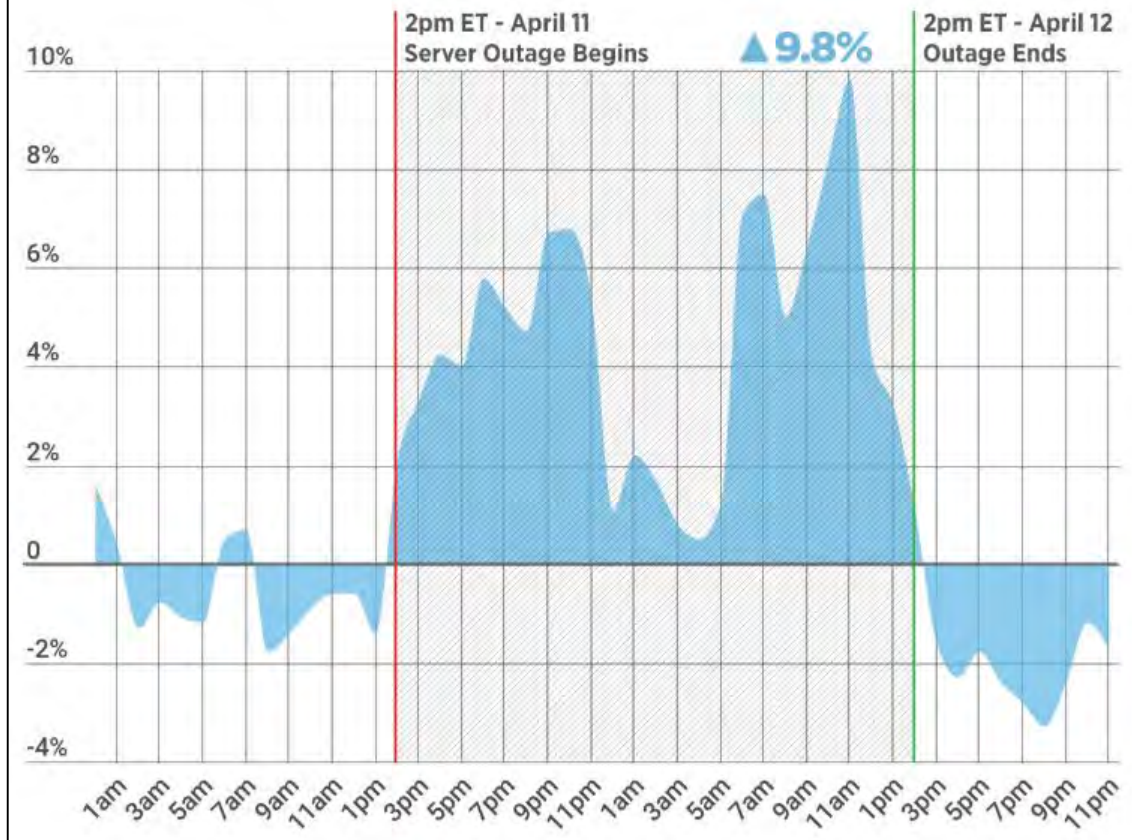


At 2pm ET on April 11th, servers for the popular online shooter **Fortnite** went down, and remained offline until 2pm the following day. The team at **PCGamesN** asked if this downtime might have affected searches and traffic to Pornhub.



# Change in Traffic from Gamers Following April 11th Server Outage

Percent difference in traffic from visitors with a  
"Gaming Fan" affinity compared to an average day



<https://www.pornhub.com/insights/fortnite-server-outage>

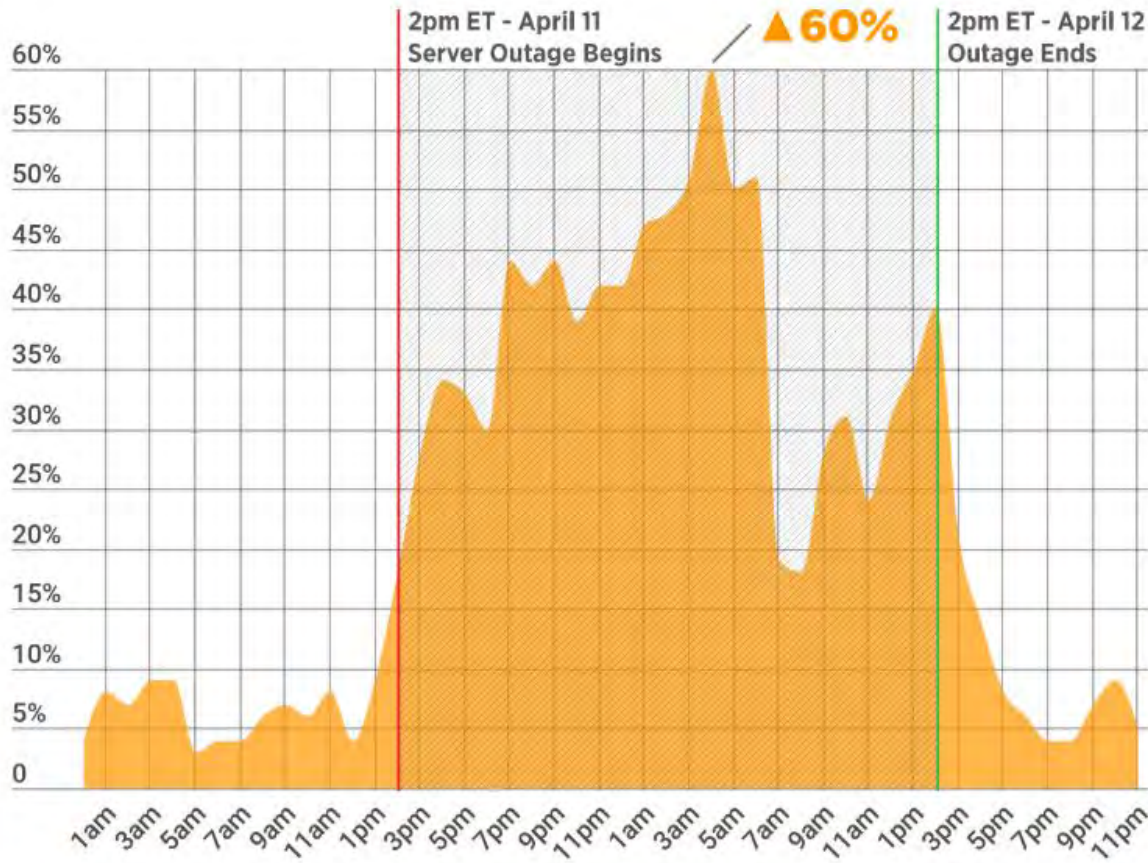
**Increase in 10% of  
porn use in gamers  
(affinity data)**

**Evidence against the  
Spectrum hypothesis?**

**Form of coping?  
Substitution?**

# Increase in Fortnite Searches Following April 11th Server Outage

Percent difference in searches compared to an average day



Increase in **60%** of using the keyword « Fortnite » to search for porn

**Compensation  
mechanism???**

**→ Support for the  
Spectrum hypothesis!**

<https://www.pornhub.com/insights/fortnite-server-outage>

Castro-Calvo, Ballester-Arnal, Potenza, King, & Billieux (submitted). Does “forced abstinence” from gaming lead to pornography use? Insight from an April 2018 crash of Fortnite’s servers

# Technology-Mediated Addictive Behaviors Constitute a Spectrum of Related Yet Distinct Conditions: A Network Perspective

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# THANK YOU