

# Network complexity modelling of psychopathology to encompass symptoms, genetic and environmental influences

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## Chapter 7

### Impact

The discoveries presented in this thesis shed light on the intricate causal system behind emerging psychopathology, including psychosis. By demonstrating that this system is multi-layered and involves numerous exposures and dimensions, this research could significantly impact the way mental health disorders are studied and treated.

For instance, the thesis highlights the critical role that affective dysregulation plays in the relationship between psychosis expression and risk factors, such as genetics and environmental exposures. This insight could inspire researchers to explore new ways to address emotional imbalances in their studies, potentially leading to innovative therapeutic approaches.

Furthermore, based on our findings, we conceptualized the emergence of psychopathology as a complex dynamical system. Given that such systems are sensitive to small initial changes<sup>1</sup>, this understanding may inspire scientists to explore how early adjustments to specific elements could lead to significantly different mental health outcomes. One possible research direction could involve examining the impact of early interventions targeting various risk factors, not only on multiple levels—such as emotional, environmental, and genetic factors—but also on different layers, both at the entire population and at the individual level. This all-encompassing approach could help us better understand how to support mental health more effectively.

At an individual level regarding the clinical population, the findings of this dissertation, support the development of personalized mental health care. This approach helps patients link their current or past distress with related feelings, thoughts, beliefs, and situations in an open, empathic, and non-judgmental manner. By fostering a non-stigmatizing relationship with the patient, this model bridges the gap between patient and therapist and could be applied from the first contact with mental health facilities.

Chapter 5 demonstrates the feasibility of using the Experience Sampling Method (ESM) self-monitoring in patients with psychotic disorders. This approach allows for the identification of individual patterns that can be beneficial in treatment planning. Future applications of ESM could involve providing patients with immediate, personalized graphs based on recent input. Network analysis reveals the potential for accurately predicting relapse and other prognostic measures, facilitating the development of tailor-made interventions. However, understanding the complex interactions between symptoms in psychotic disorders requires further exploration of how ESM-based clinical network analysis can aid clinical practice<sup>2</sup>.

In addition to the clinical implications of this research, there may also be broader economic and societal advantages. Enhancing the effectiveness of mental health treatment could potentially mitigate the burden on healthcare systems and reduce the overall costs associated with treatment. Moreover, the positive impacts on individuals struggling with mental health issues could create ripple effects on their families and communities, potentially leading to improved social and economic outcomes. In terms of economic repercussions, it is estimated that the total costs of mental health issues amount to over 4% of GDP (exceeding €600 billion) across the 27 EU countries and the United Kingdom<sup>3</sup>.

The need for effective preventive measures are particularly relevant considering that, according to the World Health Organization (WHO), in 2019, 1 in every 8 people, or 970 million people around the world were living with a mental disorder<sup>4</sup>. Similarly, in the United States, it is estimated that about 43.8 million adults (or 18.5% of the adult population) suffer from a mental illness in any given year<sup>5</sup>, with only about half receiving treatment<sup>5</sup>. Consequently, mental health disorders remain among the leading causes of disability worldwide and are associated with negative outcomes such as decreased productivity, increased absenteeism, and an increased risk of physical health problems<sup>5</sup>.

Given this context, and the prevention paradox principle suggesting that small-scale interventions may have a broader impact on the population compared to treatments focused exclusively on high-risk individuals<sup>6</sup>. Our thesis findings could motivate researchers to develop large-scale prevention strategies that address affective dysregulation and other risk factors in the general population. Potential strategies may include creating mental health awareness campaigns, promoting emotional intelligence education in schools, or integrating mental health support and social workers services into primary care settings<sup>7</sup>. By highlighting the role of risk factors such as stressful life events, economical stress, belonging to an ethnic minority group and others in the emergence of mental suffering, this research supports the suggested added value of incorporating social worker services into primary care settings<sup>7</sup>.

Finally, I intend to share my research conclusions with other researchers and plan to present my findings at relevant conferences to engage with professionals in the field. Through various communication channels, I aim to emphasize the significance of my research and its potential impact on clinical practice and on the society on a larger scale. My goal is to continue researching complex dynamical systems, potentially focusing on the development of preventive clinical trials, training programs, and innovative methods for addressing mental health issues more effectively.

In summary, the research carried out in this dissertation holds the potential to make a substantial impact in the field of mental health treatment and prevention. It is my aspiration that these findings will be extensively disseminated and implemented in practice.

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