

Mapping the landscape of sleep problems in young adults using machine learning on nationwide register data from 2 million individuals

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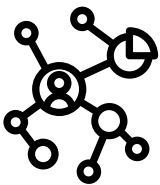
Introduction



- Sleep is crucial for brain development and overall health, especially during adolescence and young adulthood.



- The Lancet Psychiatry Commission on youth mental health: “[...] *the trend of deteriorating mental health is more striking and has continued and even accelerated over the past two decades.*” (McGorry et al., 2024)

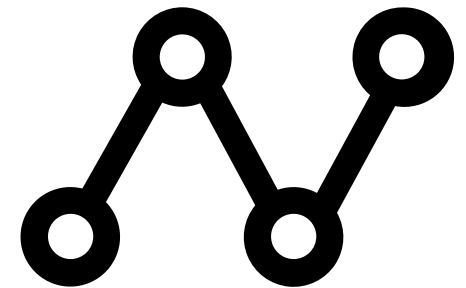


- Complex interplay of biological, environmental, psychological, and sociocultural factors affect sleep.

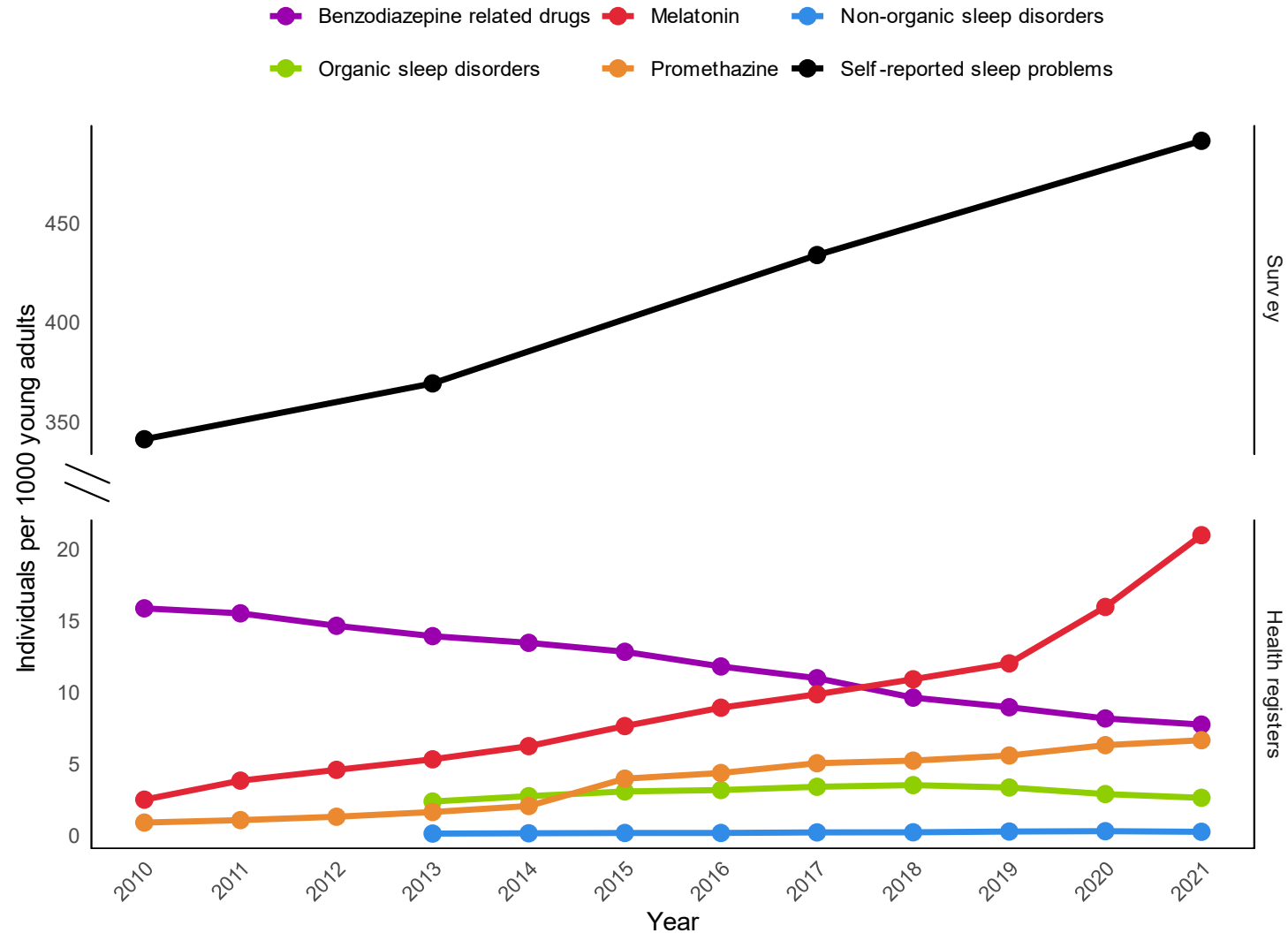
First study aim

Evaluate trends in sleep problems among young adults

- Individuals between 15 to 45 years old from 2010 to 2021
- Danish National Health Survey
- Danish online drug use statistics (MEDSTAT)
- The Danish National Patient Registry (from 2013)



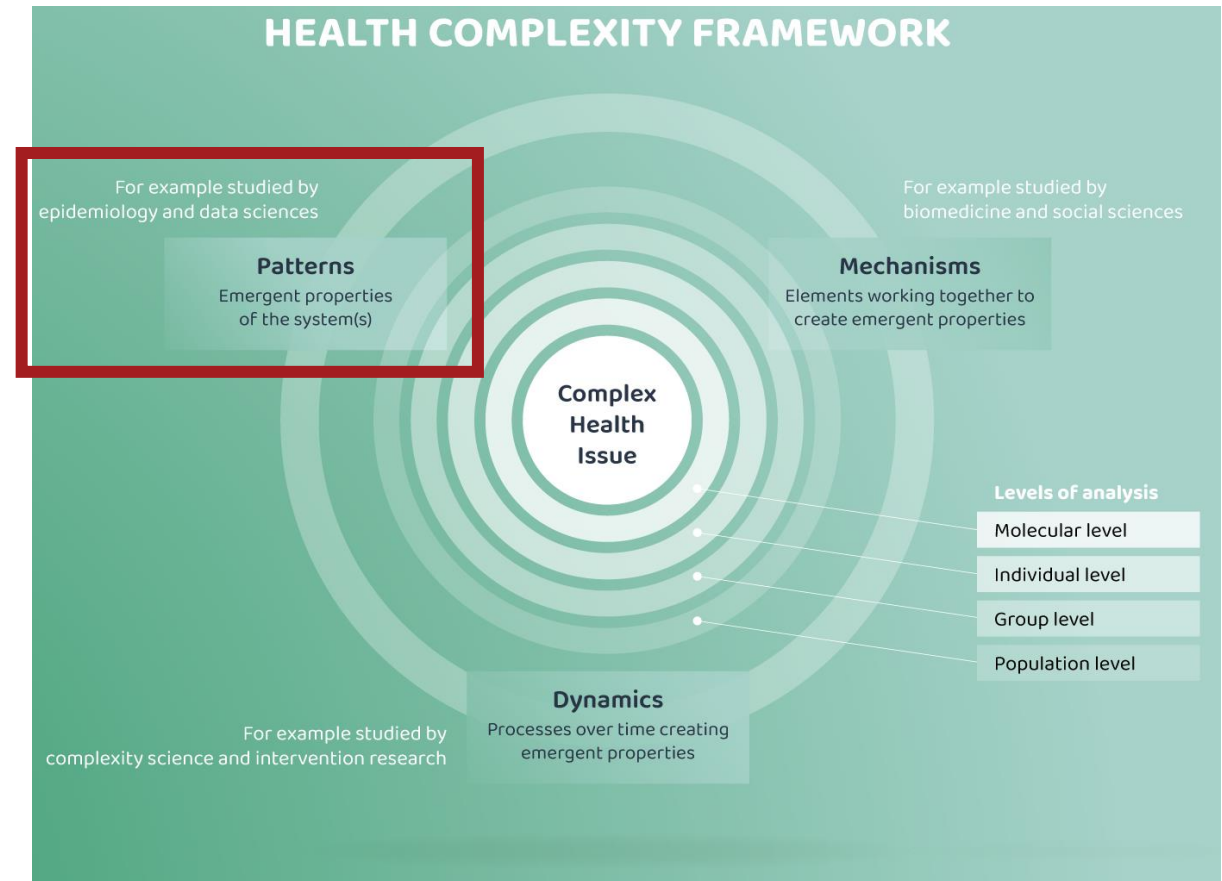
Increased prevalence of sleep disturbances in young adults



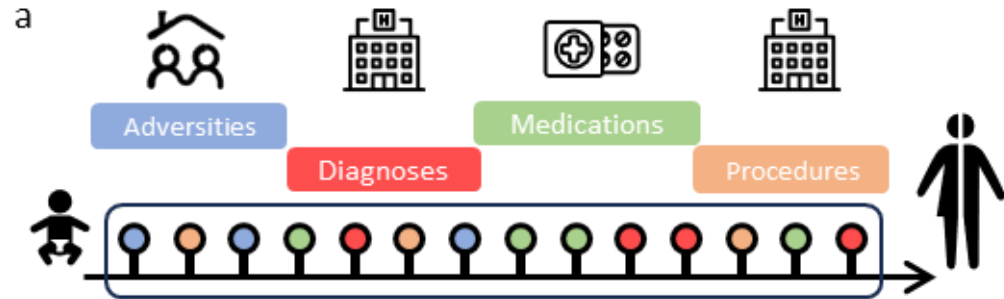
Second study aim

Identify complex patterns of life-course factors related to sleep problems

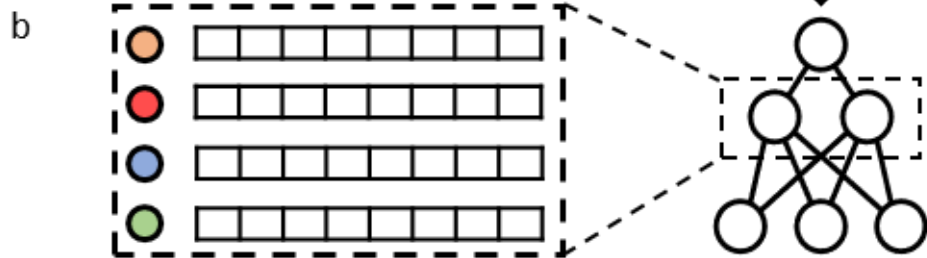
- Life-course data of 2.2M individuals from DANish LIFE course (DANLIFE)
- Machine learning and natural language processing techniques



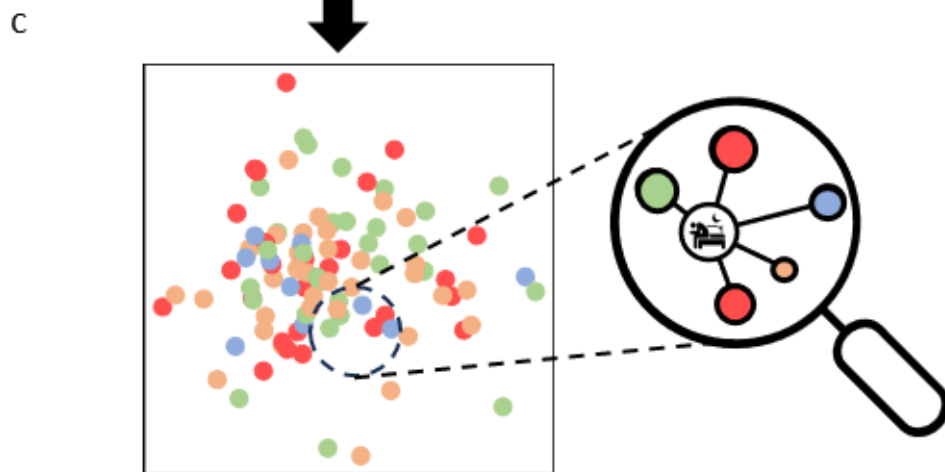
Identifying patterns of life-course factors related to sleep disturbances



Life course as a “sentence” of events

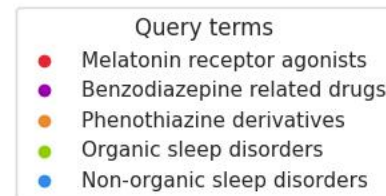
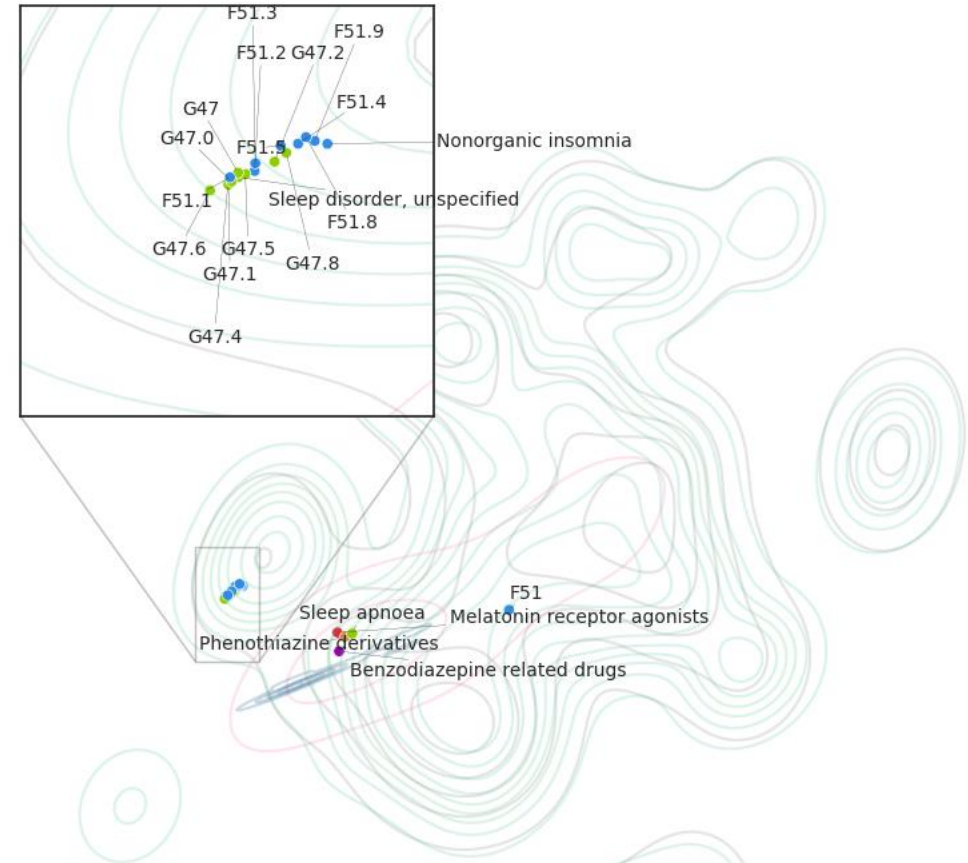
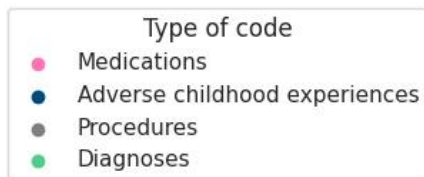
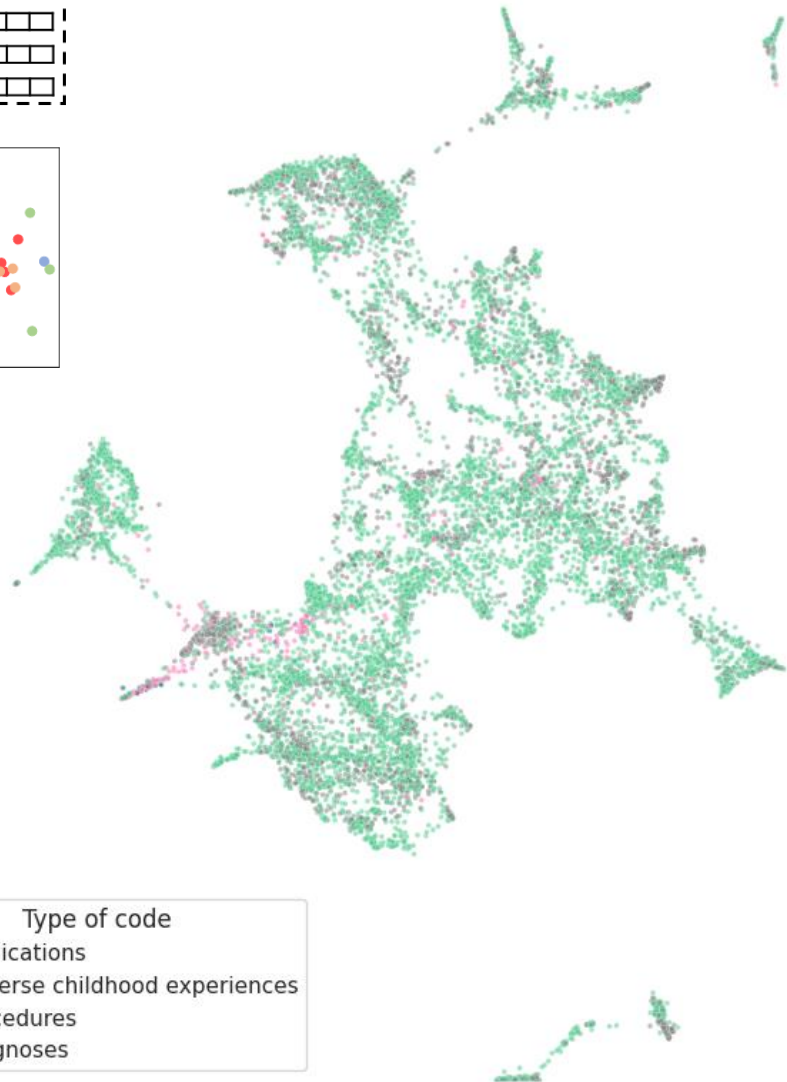
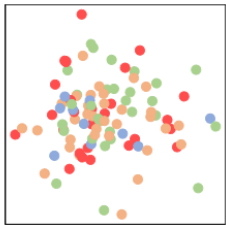
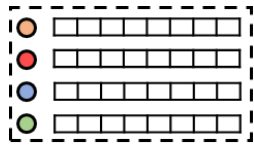


Learning life course embeddings (Word2vec)



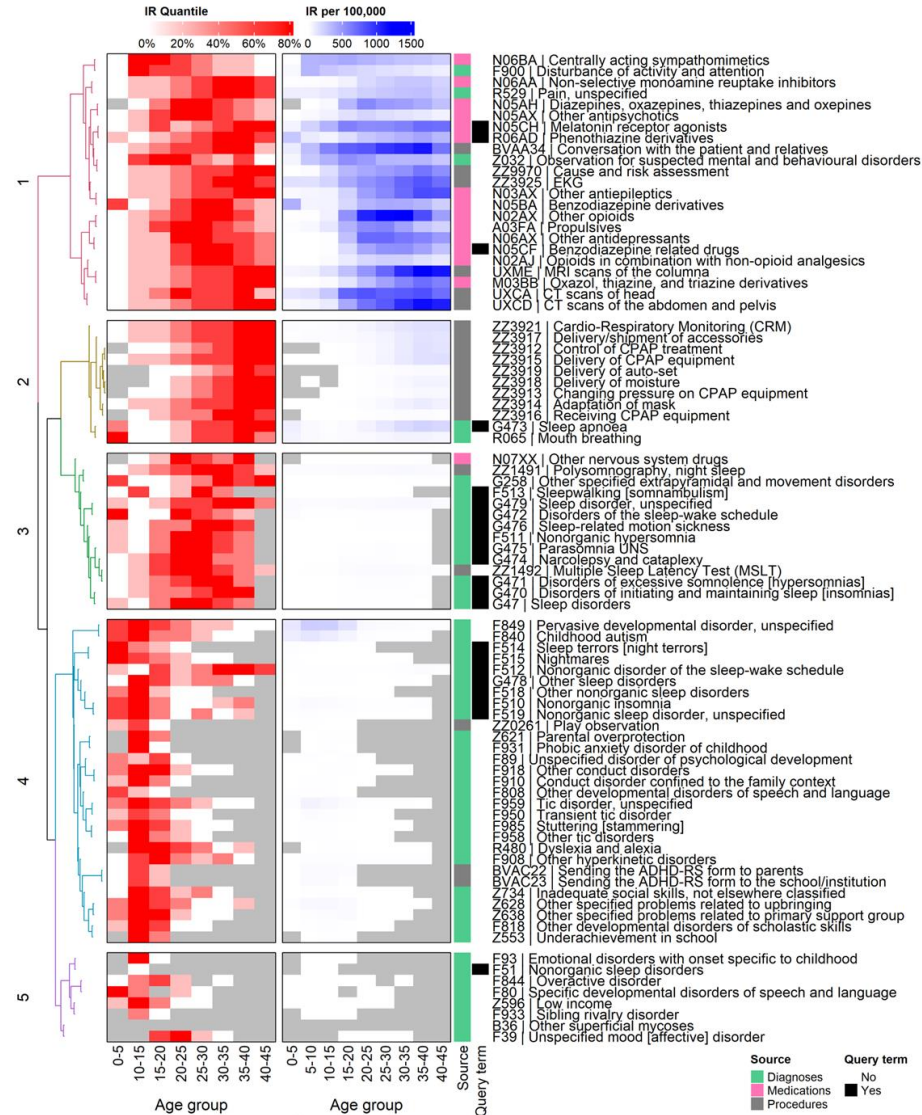
- ❖ Dimensionality reduction
- ❖ Hierarchical clustering of neighboring terms
- ❖ Network visualization

The landscape of sleep problems in young adults





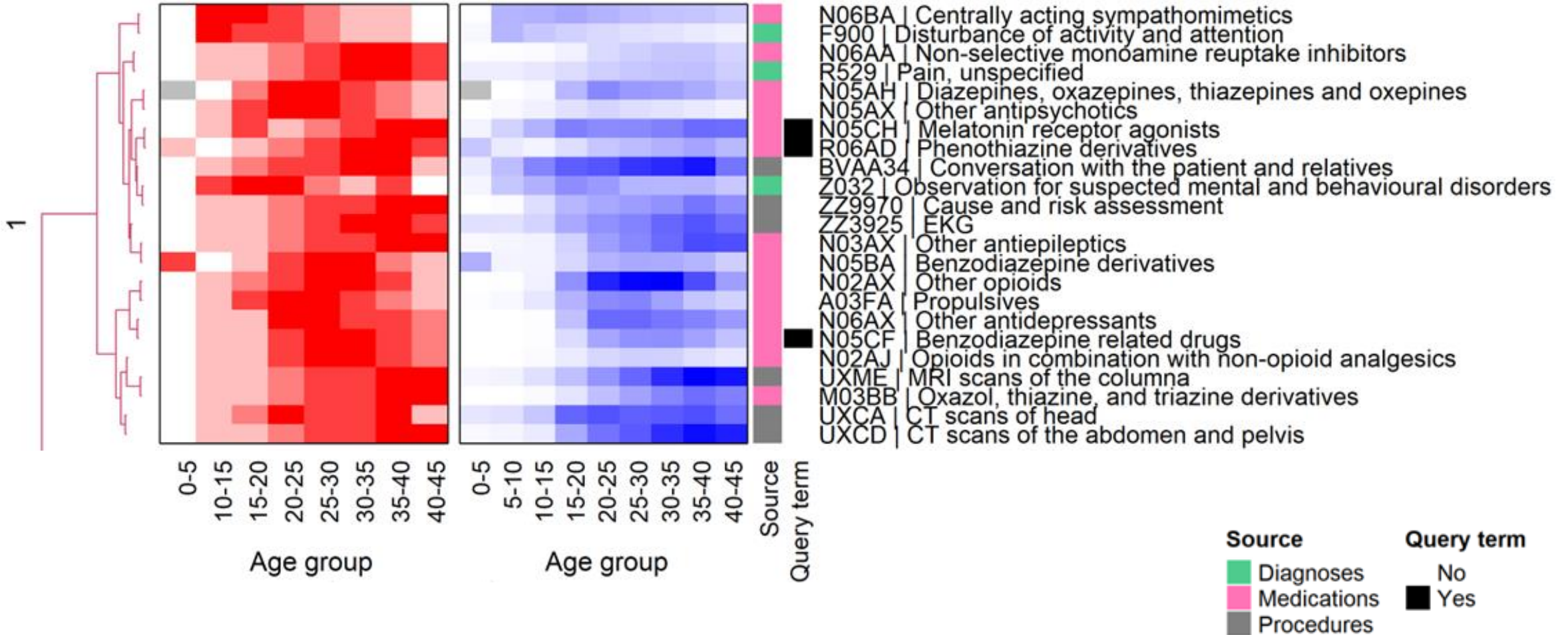
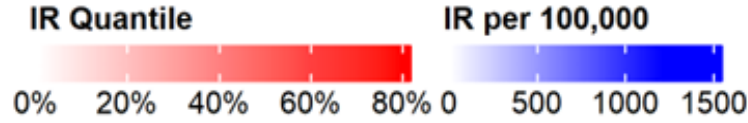
Clusters of related medical terms to sleep problems in young adults



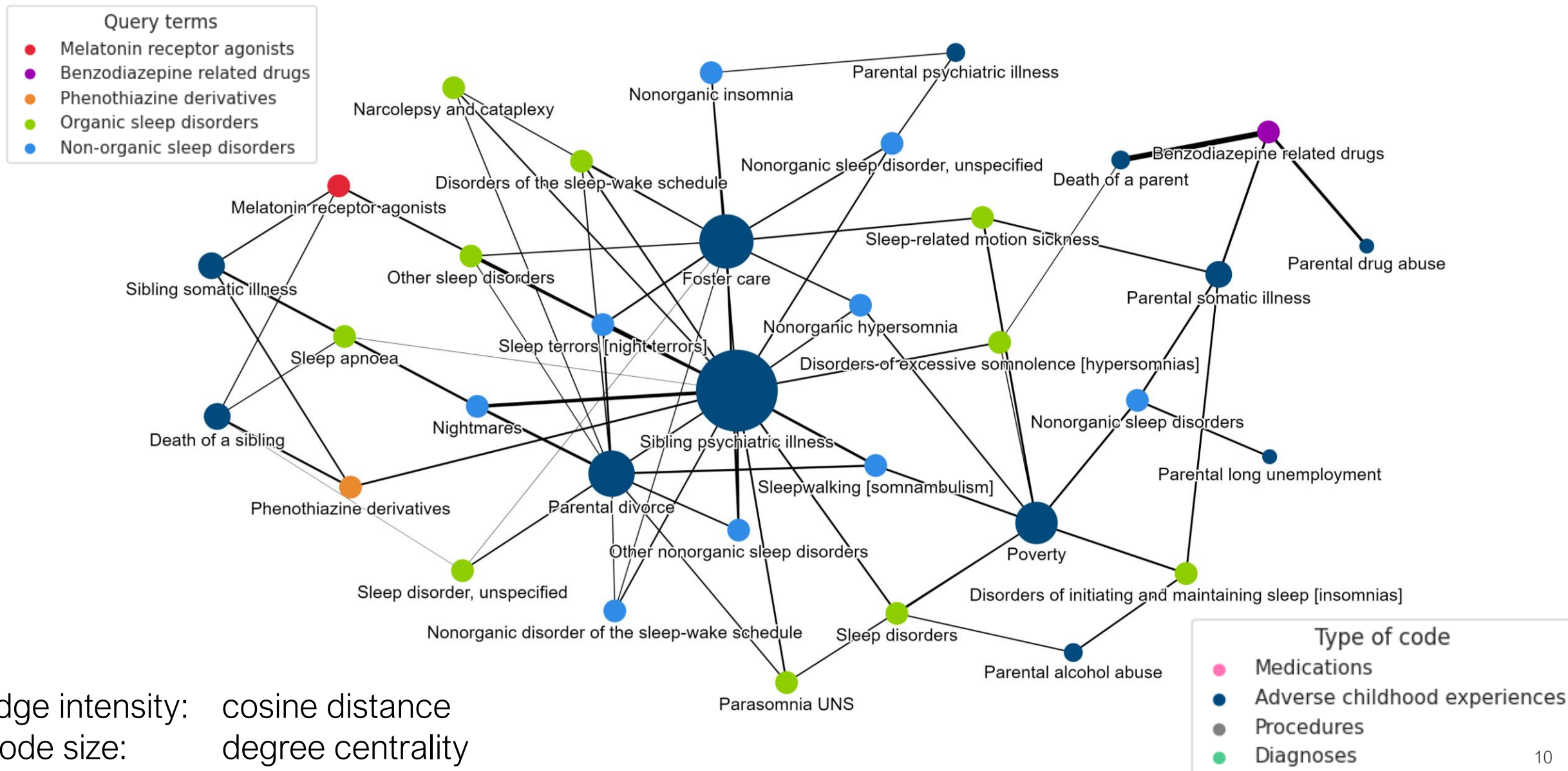
1. Sleep-related prescriptions clustering with pain and mood disorder treatments
2. Sleep apnea and respiratory problems
3. Hypersomnias (including narcolepsy), parasomnias (including somnambulism), and sleep-related movement disorders
4. Sleep terror, insomnia and sleep-wake rhythm disorders clustering with neurodevelopmental disorders
5. Non-specific sleep disorders associated with low-income indicators and mood disorders.



Clusters of related medical terms to sleep problems in young adults



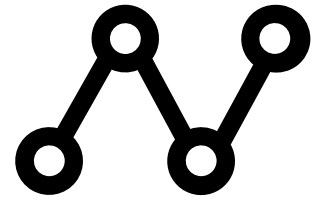
Network of childhood social adversity underlying sleep problems



Discussion

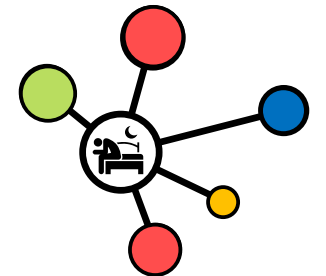
Concerning increase of sleep problems in the last decade among young adults living in Denmark

- From a third to almost half of young adults reported sleep problems
- 10-fold increase in melatonin use



Representation learning of life course factors to explore complex patterns of sleep problems across age groups

- Cluster of prescriptions for sleep problems, mood disorders and pain relevant in young adulthood
- Childhood social adversities, particularly sibling psychiatric illness and family disruptions, linked to multiple sleep disorders diagnoses





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