# INVITATION – PHD DEFENCE

## OSKAR HOUGAARD JEFSEN, MD

PhD student at Psychosis Research Unit, Aarhus University Hospital Psychiatry and CFIN **Oskar Hougaard Jefsen**, MD, is defending his PhD thesis entitled:

***Neurophysiological brain responses and school performance in adolescents at familial/genetic risk of severe mental illness***

**Friday 05 July 2024 at 9:00 AM**

In Auditorium G206-145 – find on map

Aarhus University Hospital, Entrance G

Palle Juul-Jensens Boulevard 99, 8200 Aarhus N

The defence is public, in English and expected to last 2 hours.
After the defence, Psychosis Research Unit will host a reception in front of the auditorium.

## ALL ARE WELCOME

**Assessment committee:**

- **Marta Garrido**, PhD, Professor of Psychology, Melbourne School of Psychological Sciences, The University of Melbourne, Australia.
- **Juanita Todd**, Professor of Psychology, The University of Newcastle, Australia.
- **Charlotte Ulrikka Rask**, Clinical Professor, Psychiatric Hospital for Children and Adolescents, AUH – Psychiatry (Chairperson of assessment committee)

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HEALTH – DEPARTMENT OF CLINICAL MEDICINE
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**Supervisors:**

- **Yury Shtyrov**, Professor, CFIN, Aarhus University
- **Martin Dietz**, Assistant Professor, CFIN, Aarhus University
- **Ole Mors**, Professor, Psychosis Research Unit, Aarhus University Hospital Psychiatry
- **Karl Friston**, Professor, Wellcome Centre for Human Neuroimaging, Institute of Neurology, University College London.

**About the PhD thesis:**

Schizophrenia (SZ) and bipolar disorder (BD) are severe mental disorders with a strong genetic component. While genetic studies have identified molecular pathways associated with SZ and BD, understanding how these relate to symptoms, cognitive processes and neurobiology remains challenging. To address this gap, our studies examine how familial and genetic risk for SZ and BD influence adolescent neurophysiological brain responses. Additionally, we investigate the impact of genetic risk of SZ and BD (and other disorders) on school performance in adolescence.

We acquired and analysed magnetoencephalographic (MEG) data from adolescents in The Danish High Risk and Resilience Study VIA, a register-based cohort. Using the roving auditory paradigm and 40 Hz auditory steady-state response (ASSR), known for revealing impairments in SZ and BD patients, we investigated the effects of familial and genetic (polygenic) risk of SZ and BD on auditory responses and cortical circuits using dynamic causal modelling (DCM). Additionally, we determined the association between polygenic risk of mental disorders and subject-specific school grades obtained in adolescence and early adulthood using nationwide-representative cohort data. To complement these studies, we conducted a meta-analysis of previous 40 Hz ASSR studies in patients with BD and a quality development project on the use of neurophysiological assessments (electroencephalography) in psychiatric settings.

Conventional MEG analysis revealed intact responses in adolescents at familial high risk of SZ or BD, suggesting that substantial impairments seen in patients and adult relatives depend on a fuller maturation of cortical circuits. DCM analyses, however, revealed changes in effective connectivity related to both familial and polygenic risk of SZ and BD, indicating potential for early detection of aberrant neurophysiology. Polygenic risk of SZ was associated with lower mathematics grades, but higher language grades, while polygenic risk of BD was associated with higher grades in both subjects, suggesting that genetic risk of SZ and BD can manifest both as impairments and strengths. In the clinical quality development project, EEG showed limited diagnostic utility in psychiatric settings with current methods. Despite the clinical potential of novel neurophysiological biomarkers, further research is needed before implementation.

**Contact**

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