Spotlight on Dual Diagnosis: The Academic Perspective

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Turku, Finland
Turku in the Southwest Finland
oldest city in Finland, founded in 1229

The first university in Finland, the Royal Academy of Turku, operated in the city 1640–1828

The University of Turku, founded in 1920, is a multidisciplinary academic community of 25,000 students and employees
Rated among the top 1% universities in the world
AMOUNT OF DUAL DIAGNOSIS PATIENTS IN PRACTICE

EVIDENCE-BASED TREATMENT OF DUAL DIAGNOSIS PATIENTS
Objectives

• What is register-based research?
  • Introduction of available datasets and register-based research procedures in Nordic countries

• Register-based research and dual diagnosis research
  • Pros and cons
  • Recent findings on dual diagnosis topics utilizing register-linkages

• Future directions
Register-based cohort studies in Nordic countries

• Denmark, Finland, Iceland, Norway and Sweden have nationwide registries containing virtually all individuals residing in Nordic countries

• All residents have personal identity numbers, allowing for linkages between different registries within each country

• Secondary use of data for epidemiological research
  • Data are collected most often primarily for administrative purposes
<table>
<thead>
<tr>
<th><strong>Examples of Finnish national registers</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>THL: Finnish Institute for Health and Welfare</strong></td>
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<tr>
<td>• Register of Primary Health Care Visits (Avohilmo)</td>
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<td>• Care Register for Health Care (specialized care)</td>
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<td>• Finnish National Infectious Diseases Register</td>
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<td>• Register on Induced Abortions and Sterilisations</td>
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<td>• Medical Birth Register</td>
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<td>• Register on Social Assistance</td>
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<td>• Child Welfare Register, etc…</td>
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<tr>
<td><strong>KELA: National Social Insurance Institution</strong></td>
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<tr>
<td>• Prescription drug register</td>
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<td>• Registers on Social Benefits</td>
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<td><strong>Statistics Finland</strong></td>
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<tr>
<td>• Cause-of-Death Register</td>
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<td>• Register of Completed Education and Degrees</td>
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<td>• Employment register</td>
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<td>• Pension register</td>
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<tr>
<td><strong>Other register keepers</strong></td>
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<tr>
<td><strong>Legal Register Centre</strong></td>
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<td>• Crime register</td>
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<tr>
<td><strong>Finnish Defence Forces</strong></td>
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<td>• Military service register</td>
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</tbody>
</table>
Quality registers

• Individualised, more detailed data during treatment within all healthcare production
  • patient symptom/problem profile
  • medical interventions
  • outcomes after treatment, etc.

• Finland: Psychiatric quality registers
  • Psychosis (national level)
  • Psychotherapy (Helsinki-Uusimaa area)
  • Opioid agonist treatment (Helsinki-Uusimaa Area)
• Data from patient records from various clinical operative systems in a consolidated "data lake"

• operates in connection with specialized health care services
  • Hospital District of Southwest Finland and Turku University Hospital
    • 28 municipalities, total of 470,000 residents
    • > 200,000 persons per year use these specialized health care services

• Researchers get access to the data at the Hospital District of Southwest Finland including Auria biobank
- Aid equipment data (since 2005)
  - **Demographics** (since 2004)
    - Gender, date of birth, date of death
    - Home municipality and hospital district
    - Mother tongue and occupation
  - **Diagnoses** (since 1992)
  - **Treatment tables** (since 2006)
    - E.g. height, weight, blood pressure
  - **Radiology** (since 1996)
    - Anamnesis and statements by radiologist
    - Scans
  - **Visits and in-patient treatment periods** (since 2004)
    - Location, specialty, mode of admittance, treatment start and end dates
    - Patient origin and transfer location
    - ICD10 diagnoses
  - **Laboratory tests**
    - Results (numerical) and patient specific reference ranges (since 2005)
    - Statements (since 2014)
  - Treatment costs (since 2012)
    - E.g. costs of procedures, treatment periods and visits
  - **Medications** (since 2010)
    - Medications prescribed during in-patient treatment periods
    - Cancer medications
    - Prescriptions (for out-patient use)
  - **Neurophysiological tests**
    - Anamnesis and statements by neurophysiologist
  - **Pathology** (since 1993)
    - Anamnesis and statements by pathologists
    - Snomed M and T classifications
    - Pathology diagnoses
    - Pathology tables
  - Patient and occupational safety deviations (since 2007)
  - **Patient narratives** (since 2004)
  - **Risk data** (since 2006)
    - Allergies, infectious diseases
  - **Hospital-acquired infections** (since 2005)
  - **Spirometry** (since 2006)
  - **Obstetrics**
    - Pregnancy (since 2008)
    - Childbirth (since 1995)
    - Neonatology (since 2008)
  - **Radiation treatment** (since 1997)
    - Fractions
    - Total dose
  - **Procedures** (since 1994)
    - Operations
    - Small procedures
    - Radiology procedures
Register-based research types

"Pure" register-based research
• Only register data is utilized
• Register-linkages between several (national) registers
• Biobank data is also considered as a register data
• No informed consent from individuals

Combining register data
• (General) population studies or patient samples
  • Questionnaires and interviews
  • health examination data incl. biological samples
• Informed consent required to link register data
Ethical aspects and data permissions

Pure register-linkage studies
• Ethical permission: variation between countries
  • Denmark, Finland: no ethical permission is needed for the data acquisition, providing all data are from registries only
  • Norway, Sweden, Iceland: ethical permissions are needed
• Approvals from the Data Protection Agency and institutions collecting the data
  • Finland: Social and Health Data Permit Authority Findata coordinates secondary use of register data
• When linking national level register data, identification data (e.g. PINs) are not usually available to the researchers
  • Keeping key codes may require special ethical approval with distinct arguments

Biobanks: individual permission is always required when collecting the samples

Linking register-data to questionnaire/interview data: individual permission is always needed
Prenatal Nicotine Exposure and Risk of Schizophrenia Among Offspring in a National Birth Cohort

Solja Niemelä, M.D., Ph.D., Andre Sourander, M.D., Ph.D., Heljä-Marja Surcel, Ph.D., Susanna Hinkka-Yli-Salomäki, Ph.Lic., Ian W. McKeague, Ph.D., Keely Cheslack-Postava, Ph.D., Alan S. Brown, M.D., M.P.H.

Objective: Cigarette smoking during pregnancy is a major public health problem leading to adverse health outcomes and neurodevelopmental abnormalities among offspring. Its prevalence in the United States and Europe is 12%–25%. This study examined the relationship between prenatal nicotine exposure (cotinine level) in archived maternal sera and schizophrenia in offspring from a national birth cohort.

Method: The authors conducted a population-based nested case-control study of all live births in Finland from 1983 to 1998. Cases of schizophrenia in offspring (N=977) were identified from a national registry and matched 1:1 to controls on date of birth, sex, and residence. Maternal serum cotinine levels were prospectively measured, using quantitative immunoassay, from early-to mid-gestation serum specimens archived in a national biobank.

Results: A higher maternal cotinine level, measured as a continuous variable, was associated with an increased odds of schizophrenia (odds ratio=3.41, 95% confidence interval, 1.86–6.24). Categorically defined heavy maternal nicotine exposure was related to a 38% increased odds of schizophrenia. These findings were not accounted for by maternal age, maternal or parental psychiatric disorders, socioeconomic status, and other covariates. There was no clear evidence that weight for gestational age mediated the associations.

Conclusions: To the authors’ knowledge, this is the first study of the relationship between a maternal smoking biomarker and schizophrenia. It provides the most definitive evidence to date that smoking during pregnancy is associated with schizophrenia. If replicated, these findings suggest that preventing smoking during pregnancy may decrease the incidence of schizophrenia.


1. Case identification from the The Care Register for Health Care

2. Control selection (1:1, matched with sex, age, and birth place) and identification of parents for cases and controls) from the Population Registry

3. For cases and controls, serum samples to measure cotinine from the Finnish Maternity Cohort Biobank

4. For cases and controls: Sociodemographic data from the Population Registry

5. Information on psychiatric diagnoses for parents and controls from the Care Register for Health Care

6. Pre- and perinatal data for cases and controls from the Medical Birth Register
**Background**

The association between cannabis use and the risk of psychosis has been studied extensively but the temporal order still remains controversial.

**Aims**

To examine the association between cannabis use in adolescence and the risk of psychosis after adjustment for prodromal symptoms and other potential confounders.

**Method**

The sample (n = 6534) was composed of the prospective general population-based Northern Finland Birth Cohort of 1986. Information on prodromal symptoms of psychosis and cannabis use was collected using questionnaires at age 15-16 years. Participants were followed up for ICD-10 psychotic disorders until age 30 years using nationwide registers.

**Results**

The risk of psychosis was elevated in individuals who had tried cannabis five times or more (a hazard ratio, HR = 4.5, 95% CI 3.0-13.9). The association remained statistically significant even when adjusted for prodromal symptoms, other substance use and parental psychosis (HR = 3.0, 95% CI 1.1-8.0).

**Conclusions**

Adolescent cannabis use is associated with increased risk of psychosis even after adjustment for baseline prodromal symptoms, parental psychosis and other substance use.

**Declaration of interest**

None.

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**Northern Finland 1986 Birth Cohort**

**Questionnaire data on substance use at age 15-16 years**

**National-level register-based outcomes: psychiatric diagnoses**

- The Care Register for Health Care (inpatient and outpatient)
- Register of Primary Health Care Visits
- Finnish Centre for Pensions: disability pensions
- Social Insurance Institution: medication reimbursement register

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**Frequent intoxication and alcohol tolerance in adolescence: associations with psychiatric disorders in young adulthood**

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Research Unit of Clinical Neuroscience, University of Oulu, Oulu, Finland. ¹Center for Life Course Health Research, University of Oulu, Oulu, Finland. ²Medical Research Center Oulu, Oulu University Hospital and University of Oulu, Oulu, Finland. ³Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN, USA. ⁴PEDRO Research Unit, Child Psychiatry, University of Oulu, Oulu, Finland. ⁵Clinic of Child Psychiatry, Oulu University Hospital, Oulu, Finland. ⁶Department of Psychiatry, University of Turku, Turku, Finland. ⁷Addiction Psychiatry Unit, Department of Psychiatry, Hospital District of Southwest Finland, Turku, Finland.

**ABSTRACT**

**Aims**

To assess the associations of intoxication frequency and number of drinks needed to become intoxicated in mid-adolescence with onset of psychiatric disorders in early adulthood. **Design, Setting and Participants**

Prospective cohort study in Northern Finland, with people from the Northern Finland Birth Cohort 1986 who self-reported adolescent alcohol use: 6,487 subjects (69.4% of the original sample). Data on alcohol use were collected using questionnaires at ages 15-16 years. **Measurements**

Outcomes were any non-organic psychosis, mood disorder, anxiety disorder, any substance use disorder (SUD) and all the studied psychiatric disorders in early adulthood gathered from nation-wide healthcare, pension and insurance registers. Number of drinks needed to become intoxicated was categorized into three classes: (1) no alcohol use or intoxication, and (2) low and (3) high alcohol tolerance (more than seven/mine drinks for females/male) groups. Similarly, intoxication frequency was divided into three classes: (1) never, (2) one to two times and (3) three or more times during the past 30 days. Information regarding gender, family type, other drug use, psychopathology using Youth Self-Report (YSR) total score and parental psychiatric disorders were used as covariates.

**Findings**

In the multivariable analyses, both low odds ratio (OR = 3.0, 95% confidence interval CI 1.3-6.7, P-value = 0.009) and high (OR = 4.4, 95% CI 1.4-11.1, P-value = 0.001) alcohol tolerance were associated with increased risk of SUD. More frequent intoxication was associated with increased frequency of SUD (OR = 3.9, 95% CI 2.0-7.3, P-value < 0.001) and mood disorder (OR = 1.6, 95% CI 1.1-2.3, P-value = 0.008). The latter was attenuated after adjusting with concurrent psychopathology (YSR) and other drug use. **Conclusions**

Both higher alcohol tolerance and frequent intoxication in adolescence appear to be associated with increased risk of future substance use disorder.

**Keywords**

Adolescent, alcohol tolerance, birth cohort, early adulthood, intoxication frequency, prospective psychiatric disorders, substance use disorder.
Conducting high-quality dual diagnosis research is very challenging:

- Difficult-to-reach population
- Only a small proportion of 2dg patients are eligible to RCTs due to stringent exclusion criteria

Remarkable knowledge gap as very limited evidence-based data are available

Lack of knowledge may increase stigma and hopelessness related to dual diagnosis patients
Risperidone versus other antipsychotics for people with severe mental illness and co-occurring substance misuse (Review)

Temminnèh HS, Williams T, Siegfried N, Stein D.J

Main results
We identified eight randomised trials containing a total of 1073 participants with SMI and co-occurring substance misuse. Seven of these contributed useful data to the review. There was heterogeneity in trial design and measurement. Risperidone was compared to clozapine, olanzapine, perphenazine, quetiapine and ziprasidone. Few trials compared risperidone with first-generation agents. Few trials examined patients with a dual diagnosis.

Authors' conclusions
There is not sufficient good-quality evidence available to determine the effects of risperidone compared with other antipsychotics in people with a dual diagnosis. Few trials compared risperidone with first-generation agents, leading to limited applicability to settings where access to second-generation agents is limited, such as in low- and middle-income countries. Moreover, heterogeneity in trial design and measurement of outcomes precluded the use of many trials in our analyses. Future trials in this area need to be sufficiently powered but also need to conform to consistent methods in study population selection, use of measurement scales, definition of outcomes, and measures to counter risk of bias. Investigators should adhere to CONSORT guidelines in the reporting of results.
PROS

• Large sample sizes, minimal attrition
• Long follow-up up to decades
• Possibility to assess rare but serious outcomes that cannot be investigated in RCTs, e.g. suicide or death
• Registry-based studies are generalizable to real-life patients in countries with similar healthcare systems

CONS

• Secondary use of data is not that simple
  • Data needs to be cleaned up before analyses
  • Data may be biased
    • Understanding of underlying limitations and possible errors in register data is crucial
• Confounding is a major issue
  • e.g. medication used for milder vs. severe forms of disease or disorder
Stratified Cox model is used in the within-individual analyses.

Each individual forms his/her own stratum.

Within each stratum, time periods from the same individual resulting (after time resetting) are used in comparisons.

- in a traditional Cox model, different individuals are compared.
Annual incidence of cannabis-induced psychosis, other substance-induced psychoses and dually diagnosed schizophrenia and cannabis use disorder in Denmark from 1994 to 2016

Carsten Hjorthej, Maria Oku Larsen, Marie Stefanie Kejses Starzer and Merete Nordentoft

1Copenhagen Research Center for Mental Health – CORE, Mental Health Center Copenhagen, Copenhagen University Hospital, Copenhagen, Denmark; 2Department of Public Health, Section of Epidemiology, University of Copenhagen, Copenhagen, Denmark; and 3Department of Epidemiology Research, Statens Serum Institut, Copenhagen, Denmark

Abstract

Background. Worldwide, cannabis is the most used illegal substance, and the use of cannabis has increased over the years. An increase in the level of tetrahydrocannabinol (THC) in cannabis has also been seen. It is currently unclear whether this has led to an increase in the incidence of cannabis-induced psychosis. We aimed to investigate (1) the development of incidence of cannabis-induced psychosis over time compared with other substance-induced psychoses and (2) the development of incident cases of cannabis-induced psychosis over time compared with dual diagnosis defined as schizophrenia and a cannabis use disorder.

Method. Data on psychiatric diagnoses were extracted from the Danish Psychiatric Central Research Register and summarized per year as both absolute incidence (number of cases) and incidence rates per 100,000 person years.

Results. The incidence rate of cannabis-induced psychosis increased steadily from 2.8 per 100,000 person years in 2006 to 6.1 per 100,000 person years in 2016. There was a corresponding increase in dual diagnosis with schizophrenia and cannabis use disorder, but a decrease in alcohol-induced psychosis. The data showed no trend in the other substance-induced psychosis investigated in this thesis.

Conclusion. The increase in cannabis-induced psychosis follows both the increase in the level of THC in cannabis, and the increase in cannabis use. The change in diagnostic practice does not appear to explain the increase in incidence of cannabis-induced psychosis.
Associations between substance use disorders and suicide or suicide attempts in people with mental illness: a Danish nation-wide, prospective, register-based study of patients diagnosed with schizophrenia, bipolar disorder, unipolar depression or personality disorder

Marie L. D. Østergaard, Merete Nordentoft, Carsten Hjorthøj

Mental Health Centre Copenhagen, Copenhagen University Hospital, Copenhagen, Denmark, and The Lundbeck Foundation Initiative Psyh, Copenhagen and Aarhus, Denmark

Figure 2. Cumulative risk of suicide in patients with different mental disorders with and without comorbid substance use disorders [Colour figure can be viewed at wileyonlinelibrary.com]
Morbidity and mortality in schizophrenia with comorbid substance use disorders

Markku Lähteenvuori | Albert Batallo | Jurjen J. Luykx | Ellenor Mittendorfer-Rutz | Antti Tanskanen | Jari Tiilamo | Heidi Taipale

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Funding Information
Academy of Finland, Grant/Award Number: 315969 and 305017, Emil Aaltonen Slättö; Stenom Lückstofteien Sällskab, Finnish Ministry of Social Affairs and Health, Niuvanniemi Hospital

Abstract
Objective: Schizophrenia is highly comorbid with substance use disorders (SUD) but large epidemiological cohorts exploring the prevalence and prognostic significance of SUD are lacking. Here, we investigated the prevalence of SUD in patients with schizophrenia in Finland and Sweden, and the effect of these co-occurring disorders on risks of psychiatric hospitalization and mortality.

Methods: 45,476 individuals with schizophrenia from two independent national cohort studies, aged <66 years at cohort entry, were followed during 22 (1996–2017, Finland) and 11 years (2006–2016, Sweden). We first assessed SUD prevalence (excluding smoking). Then, we performed Cox regression on risk of psychiatric hospitalization and all-cause and cause-specific mortality in SUD compared with those without SUD.

Results: The prevalence of SUD ranged from 26% (Finland) to 31% (Sweden). Multiple drug use (n = 4164, 48%, Finland; n = 3268, 67%, Sweden) and alcohol use disorders (n = 3846, 45%, Finland; n = 1002, 21%, Sweden) were the most prevalent SUD, followed by cannabis. Any SUD comorbidity, and particularly multiple drug use and alcohol use, were associated with 50% to 100% increase in hospitalization (aHR any SUD: 1.53, 95% CI = 1.46–1.62, Finland; 1.83, 1.72–1.96, Sweden) and mortality (aHR all-cause mortality: 1.67, 95% CI = 1.51–1.81, Finland; 2.17, 1.74–2.70, Sweden) compared to individuals without SUD. Elevated mortality risks were observed especially for suicides and other external causes. All results were similar across countries.

Conclusion: Co-occurring SUD, and particularly alcohol and multiple drug use, are associated with high rates of hospitalization and mortality in schizophrenia. Preventive interventions should prioritize detection and tailored treatments for these comorbidities, which often remain underdiagnosed and untreated.

Keywords
Schizophrenia, psychosis, addiction, substance use disorder, mortality
Cannabis-induced psychosis and subsequent schizophrenia-spectrum disorders: follow-up study of 535 incident cases

MIKKEL ARENDT, RABEN ROSENBERG, LESLIE FOLDAGER, GURLI PERTO and POVL MUNK-JØRGENSEN

Table 1  Patients treated for mental or behavioural disorders after index point (n=535)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Within 3 years</th>
<th>After 3 years</th>
<th>Total follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schizophrenia-spectrum disorder²</td>
<td>197 (36.8)</td>
<td>41 (7.7)</td>
<td>238 (44.5)</td>
</tr>
<tr>
<td>Persistent delusional disorder (F22)</td>
<td>18 (3.4)</td>
<td>4 (0.7)</td>
<td>22 (4.1)</td>
</tr>
<tr>
<td>Other or non-organic psychotic disorder (F28/F29)</td>
<td>5 (0.9)</td>
<td>3 (0.6)</td>
<td>8 (1.5)</td>
</tr>
<tr>
<td>Bipolar affective disorder</td>
<td>12 (2.2)</td>
<td>6 (1.1)</td>
<td>18 (3.4)</td>
</tr>
<tr>
<td>Acute and transient psychotic disorder</td>
<td>28 (5.2)</td>
<td>7 (1.3)</td>
<td>35 (6.5)</td>
</tr>
<tr>
<td>Cannabis-induced psychosis</td>
<td>78 (14.6)</td>
<td>1 (0.2)</td>
<td>79 (14.8)</td>
</tr>
<tr>
<td>Other drug-induced psychosis</td>
<td>11 (2.1)</td>
<td>2 (0.4)</td>
<td>13 (2.4)</td>
</tr>
<tr>
<td>Depression, anxiety or personality disorder</td>
<td>29 (5.4)</td>
<td>8 (1.5)</td>
<td>37 (6.9)</td>
</tr>
<tr>
<td>No treatment</td>
<td>85 (15.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>535 (100)</td>
<td></td>
<td></td>
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</tbody>
</table>

1. Patients are entered only once, in a hierarchical manner as described in the method section.
2. Schizophrenia (ICD–10 code F20), schizotypal disorder (F21) or schizoaffective disorder (F22).

Some people who experience substance-induced psychosis later develop an enduring psychotic disorder such as schizophrenia. This study examines the proportion of people with substance-induced psychoses who transition to schizophrenia, compares this to other brief and atypical psychoses, and examines moderators of this risk. A search of MEDLINE, PsychINFO, and Embase identified 50 eligible studies, providing 79 estimates of transition to schizophrenia among 40 783 people, including 25 studies providing 43 substance-specific estimates in 34 244 people. The pooled proportion of transition from substance-induced psychosis to schizophrenia was 25% (95% CI 18%–35%), compared with 36% (95% CI 30%–43%) for brief, atypical and not otherwise specified psychoses. Type of substance was the primary predictor of transition from drug-induced psychosis to schizophrenia, with highest rates associated with cannabis (6 studies, 34%, CI 25%–46%), hallucinogens (3 studies, 26%, CI 14%–43%) and amphetamines (5 studies, 22%, CI 14%–34%). Lower rates were reported for opioid (12%), alcohol (10%) and sedative (9%) induced psychoses. Transition rates were slightly lower in older cohorts but were not affected by sex, country of the study, hospital or community location, urban or rural setting, diagnostic methods, or duration of follow-up. Substance-induced psychoses associated with cannabis, hallucinogens, and amphetamines have a substantial risk of transition to schizophrenia and should be a focus for assertive psychiatric intervention.
SIP-Project: Prognosis of substance-induced psychosis

- National Swedish registers: data available 2018
- Finnish register data: to be applied in 2021
- Comparisons between FEP patients and sibling controls
- PIs
  - A/Prof Solja Niemelä, Department of Psychiatry, University of Turku
  - A/prof Heidi Taipale, Department of Clinical Neuroscience, Karolinska Institute, Stockholm, Sweden and Department of Forensic Psychiatry, University of Eastern Finland
- Collaborators/senior researchers
  - Professor Jari Tiihonen, Markku Lähteenvuo MD, PhD
- 4 PhD Students
  - SIP-relapses and conversion to psychotic disorders
  - Psychiatric and somatic morbidity, incl. sick pensions
  - Mortality
  - ADHD
  - Antipsychotic medication use

Figure 1. Formation of study cohort of substance-induced psychosis (SIP) and matching of other first-episode psychosis (FEP) controls for them.

- Persons treated due to SIP (F1X.5) during 2006-2016, N=11239
- Age at diagnoses limited to 16-65, N=484
- Working aged persons with SIP N=10755
- Persons with SIP N=7320
- Exclusion due to previous:
  - Psychotic disorders N=2793
  - Organic catatonic disorder, N=1
  - Mania/ Bipolar disorder N=515
  - Residual psychotic disorder N=126
- Matching 1:1 FEP controls according to age, gender and calendar year
- N=7320 persons with SIP and N=7320 control persons with FEP
Nordic SIP – researchers

- Finland: Solja Niemelä, Heidi Taipale
- Sweden: Heidi Taipale
- Norway: Jørgen Bramness, Eline Borger Rognli, Ina H. Heiberg
- Denmark: Carsten Hjortøj

1st manuscript:
The Finnish SUPER study on genetic mechanisms of psychotic disorders
Part of the Stanley Global Neuropsychiatric Genomics Initiative
Led by Professor Aarno Palotie
Institute for Molecular Medicine Finland (FIMM)

- 10,474 Finnish psychosis patients (55.2% schizophrenia, mean duration 22 years)
- Genotyped with genome-wide genotyping chip and exome sequenced
- Questionnaire and interview data incl. substance use and cognitive assessments
- Register-linkage data from 11 national registers

Dual diagnosis research team
- Solja Niemelä
- Professor Nina Lindberg (University of Helsinki)
- 3 PhD Students
Register-based data in dual diagnosis research: future directions

• Real-world effectiveness of pharmacological treatments in nationwide dual diagnosis cohorts

• Prediction of worst outcomes e.g. conversion to schizophrenia, death, overdoses, etc.
  • More detailed clinical data (e.g. use of BPRS) from "clinical data lakes"
  • Use of machine learning tools

• Linking brain imaging and biobank data to large observational datasets with e.g. psychosis symptomatology data
References


Practical information on Finnish healthcare data available from https://www.oulu.fi/cht/digihealthhub/healthdataguide
THANK YOU!

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