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## **Socioeconomic status and food habits**

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**Background:** The association between health and socioeconomic status (SES) is well-known. Food habits influence the risk of non-communicable diseases. The aim was to compile scientific literature on the association between SES and food habits in Sweden from 2000 until now.

**Methods:** Based on a structured literature search relevant articles were identified. Also studies with other Nordic countries were included as well as multicenter studies that included Sweden as a center.

**Results:** Many different indicators of SES were used; the most used were length of education, occupational level, income and wealth. Food habits were assessed with different methods and classified after reported food stuffs, calculated intakes of nutrients and/or biomarkers of nutritional status.

A positive association between SES and healthy food habits was found. Education had the strongest association in many of the studies. There were gender differences, women eat healthier than men. The effect of migration is more difficult to interpret; the only two studies found from Sweden had diverging results. Food costs affect habits; those with the lowest income ate more of foods high in energy but low in nutrients and less of nutritious foods like vegetables and fish.

No Swedish study had examined the effect of the found differences in food habits across SES groups on risk of disease. Biomarkers are an important complement when studying the association between food habits and SES.

**Conclusion:** The association between food habits and SES might explain some of the differences found in health outcome between different SES groups.

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**Risk Factors for Discontinuation of Treatment for Neovascular Age-Related Macular Degeneration**

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*The authors have chosen not to publish the abstract*

**Like parent, like child? Intergenerational mortality associations in Finland**

Jan Saarela, Mikael Rostila

Large-scale studies on the issue of how offspring mortality relates to parental death are few. Most previous research has been concerned with minor offspring. The aim with this paper is to document intergenerational mortality correlations in Finland, and relate them to the sparse existing evidence from Sweden. An additional purpose of the paper is to assess if intergenerational mortality correlations depend on the cultural context, by comparing the two native and equal ethno-linguistic groups of the country, Finnish speakers and Swedish speakers. The data used come from the Finnish population register. They link random samples of index persons to their children and partners, and contain information on deaths from main causes, migration, and socioeconomic and demographic background variables of the children and their (step) parents. We follow these persons for more than two decades, starting in 1988, and observe in total 327,466 children. Discrete-time hazard models are used to estimate the effect of parental death on the offspring mortality risk in ages 18-50 years. Our results corroborate much of the previous findings from Sweden. Parental death is although found to increase the adult offspring mortality risk with well over ten per cent, which is a notably higher estimate than that for Sweden. The difference might be due to more traditional family values and family roles in Finland. The parental death effect tends also to be more pronounced for Swedish speakers than for Finnish speakers, which might be due to their lower risks of early death and higher union stability.

## **Data Management Plans: making the research project more efficient**

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Some international research funders claim that applications for research funding should include a data management plan (DMP). Probably, this will soon be a demand also from Swedish funders.

There are several advantages of data management planning. Using a DMP, it is easier at an early stage of the research project to make decisions for approach, collection, documentation and management of the data. The DMP can also help to structure the information already available, but scattered among different persons and in different documents.

The DMP is a document describing how the data are handled during and after the research project. The version submitted with the funding application is only a first draft and contains only the information that is possible to indicate at this point. Once the financing is completed, the DMP should be further developed by defining policies and procedures or by implementing the guidelines found in the research group, institution or university. The DMP is a dynamic document that can be developed and updated during the project. Research data that are well documented and available are easier to review, replicate and follow up.

The Swedish National Data Service (SND) has developed a checklist for DMP, which can help to identify the different parts of the data management relevant to the specific research. It is particularly suited to the conditions and legislation in Sweden. SND will in collaboration with research funders and other research infrastructures develop a Swedish online tool for DMP.

P5

**Prevalence, incidence and autoimmune comorbidities of celiac disease; A nationwide, population-based study in Denmark from 1977 to 2014**

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*The authors have chosen not to publish the abstract*

## **Home, Health and Disability along the Process of Ageing**

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**Background:** Pertaining to the ambition of NORDICEPI to bridge existing disciplinary gaps, the purpose is to present a mixed methods approach to research on home, health and disability along the process of ageing.

**Materials and Methods:** Starting in 2002, we have four databases based on different cohorts (total N= 2,667): 1) very old people in five EU countries, N=1,918; 2) younger old people in Skåne, N=371; 3) older adults with spinal cord injury in South Sweden, N=123; 4) people ageing with Parkinson's disease in Skåne, N=255. Survey methodology is being combined with qualitative data collection, cross-sectionally and longitudinally. Applying mixed methods designs, data is being analysed using statistical methods and qualitative state-of-the-art approaches.

**Results:** In a recent study, extrapolating results based on data on environmental barriers from N=1,021 private dwellings in Sweden to the national level, we showed that accessibility problems occurred already for senior citizens with few functional limitations, but more profound for those dependent on mobility devices. A series of studies on very old people's use and need of mobility devices in Sweden and Latvia displayed similarities and differences on the in-depth individual level as well as the policy level.

**Conclusion:** Our research program has produced results shedding new light on home and health dynamics in different cohorts of older people, in Sweden and several other EU countries. As research on ageing comes with challenges for longitudinal research, the mixed methods approach allows us to include also frail older people who would otherwise be lost to follow-up.

P7

**Influenza vaccine effectiveness during 2016-2017 influenza season: a hospital-based case-control study in Lithuania**

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*The authors have chosen not to publish the abstract on the web.*

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**Prescription of oral anticoagulants in ischemic stroke patients with atrial fibrillation – Riksstroke shows regional variations**

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*The authors have chosen not to publish the abstract on the web.*

## **Interhospital transfers and time to thrombectomy treatment in Swedish stroke patients 2014-2016.**

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**Background:** To restore blood flow after ischemic stroke, endovascular thrombectomy is recommended for eligible patients within 6 hours of stroke onset. Long distances to thrombectomy centers (TCs) can reduce the possibility for stroke patients to receive thrombectomy. We studied how patients were transferred to TCs and the impact on delay times in Sweden.

**Material and methods:** The study included all stroke patients registered in the Swedish Stroke register (Riksstroke), who received thrombectomy 2014-2016. The interhospital patient flow was studied with Sankeycharts and geographical variation illustrated with maps. We compared median delay times, from onset of stroke to initiation of thrombectomy, in relation to how they were transferred to the TC. Differences were tested using Mann-Whitney U test.

**Results:** A total of 1135 patients received thrombectomy at 6 TCs during 2014-2016. The number of patients treated at the different TCs varied substantially, ranging from 18 to 360. A total of 553 patients received thrombectomy at the hospital where they were first admitted, 993 patients were transferred to an TC within the same county, and 143 were transferred to another county. The median delay time was 205 min for patients treated at first hospital. Transferred patients had longer delay times, 227 min in patients transferred to a TC within county ( $p < 0.01$ ), and 315 min in patients transferred to another county ( $p < 0.01$ ).

**Conclusion:** There are regional variations in access and time to thrombectomy in Sweden. Long distances to a TC challenge a geographical equity of stroke care.

**Incidence of specialized service use for self-harm and psychiatric and neurodevelopmental disorders during adolescence is increasing: a population-based register linkage study of Finnish 1987 and 1997 birth cohorts**

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**Background:** Diagnoses of many adolescent mental health problems are proliferating. We address a lack of national time-trend studies on adolescent service use for a wide range of psychiatric outcomes.

**Methods:** We followed two population-based birth cohorts of all 59,472 and 58,802 individuals born in Finland in 1987 and 1997, respectively, from the 12th until the 18th birthday. The data were obtained retrospectively from Finnish nation-wide registers.

The primary outcome was time to incident specialized service use with a psychiatric or neurodevelopmental disorder diagnosis, treatment for self-harm, or suicide death (SSU). Additionally, we investigated 19 more specific classes of mental health outcomes.

Hazard ratios were estimated using Cox regression, adjusting for socio-economic factors: maternal smoking, maternal age, parents' education and social assistance benefits.

**Results:** The cumulative incidence of SSU was 15.0% (95% confidence interval (CI) 14.4%–15.6%) among females in the 1997 cohort, an increase of 5.2 percentage points (95% CI 4.8–5.6); among males, the increase was 2.7 percentage points into 8.9% (95% CIs 2.4–2.9, 8.5%–9.4%).

Adjusted hazard ratios of SSU, contrasting the cohorts, were 1.61 (95% CI 1.50–1.72) and 1.47 (95% CI 1.35–1.60) for females and males respectively. With the exception of schizophrenia, increased incidence was observed for all outcomes: hazard ratio estimates ranged from 1.15 to 6.11.

**Conclusions:** An increasing proportion of young people are coming to contact with specialized mental health related services during adolescence. Regardless of gender, this increase is evident across the varied spectrum of psychiatric and neurodevelopmental disorders and self-harm.

## Does intrauterine exposure to Paracetamol affect pubertal timing in the offspring? A Danish cohort study

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**Background:** This study is the first to investigate whether intrauterine exposure to Paracetamol is associated with timing of onset of puberty in boys and girls.

**Materials & methods:** We used data from the large puberty cohort, nested within The Danish National Birth Cohort, that includes 15,822 children (participation rate: 71%). Information on use of Paracetamol was systematically collected through three telephone interviews reported by mothers during pregnancy, and children provided information on their current stage of puberty every six months from baseline (11 years old) until they reached full sexual maturation. A wide range of pubertal development markers were reported such as Tanner stages. Data were analysed by a Tobit regression model for normally distributed interval-censored data.

**Results:** Our results suggest that intrauterine exposure to Paracetamol is associated with slightly earlier puberty in girls in a dose-dependent manner, especially with regard to onset of pubic and axillary hair growth. Exposure to Paracetamol for 3 – 12 weeks or more than 12 weeks during pregnancy were associated with -0.6 (95 % confidence interval=(-2.1;0.9)) and -2.8 (-5.0;-0.7) months earlier age at attaining axillary hair growth in girls compared to unexposed. In contrast, boys' timing of onset of puberty did not seem to be associated with intrauterine exposure to Paracetamol, although there was some evidence that exposure for more than 12 weeks might be associated with delayed pubic hair development.

**Conclusion:** Our findings suggest that intrauterine exposure to Paracetamol may exhibit sex and/or organ specific endocrine disruptive effects on timing of puberty.

## **Maternal diabetes mellitus and onset of puberty in offspring: A Danish cohort study**

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**Background:** The objective of this study was to investigate whether maternal diabetes mellitus during pregnancy affects timing of pubertal development in offspring.

**Materials and methods:** In this population-based cohort study, we used the Danish National Birth Cohort (DNBC), including additional follow-up of 15,822 of their children in the Puberty Cohort (participation rate 70.5 %). We had information on maternal diabetes mellitus from interviews during pregnancy, as well as information on pubertal development (including Tanner stages, menarche, ejaculation, voice break, acne and axillary hair) collected bi-annually as the children went through puberty. Furthermore, by linking this information to the health care registers available in Denmark, we were able to identify non-reported mothers with diabetes mellitus in the cohort. We analyzed the data by using a tobit regression model for normally distributed, interval-censored data.

**Results:** A total of 503 (3.2 %) children were exposed to maternal diabetes mellitus during pregnancy. We observed a tendency towards slightly earlier development of pubic hair and later breast development in girls of mothers with type 1 diabetes mellitus. Oppositely, in girls of mothers with type 2 diabetes mellitus, we observed tendencies of later pubertal maturation. In boys of mothers with type 1 or type 2 diabetes mellitus, we observed tendencies of earlier pubertal timing.

**Conclusions:** The findings suggest that maternal gestational diabetes mellitus have only little or no effect on the pubertal maturation in the offspring. However, maternal type 1 and type 2 diabetes mellitus during pregnancy may affect the pubertal development in the offspring.

## **Porphyria Cutanea Tarda and Cancer Risk: A Nationwide Cohort Study**

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Norwegian Institute of Public Health

Porphyria Cutanea Tarda (PCT) is a metabolic disorder of haem biosynthesis that originates in the liver. It has been suggested that a deficient haem biosynthetic system may increase cancer risk and especially primary liver cancer. However, previous studies have failed to confirm this risk. Our aim was to investigate the risk of cancer in people with PCT using a nationwide cohort design. The study sample consisted of PCT patients identified through the Norwegian Porphyria Centre, while patients with a cancer diagnosis were identified by linkage to the Cancer Registry of Norway and all-cause mortality by linkage to the Norwegian Cause of Death Registry. The results were compared with all Norwegian residents aged 18 years or older. All analyses were adjusted for age, sex and education. We found an excess risk of all cancer sites and, specifically, primary liver cancer, leukaemia, cervical cancer and pancreatic cancer in persons with PCT compared to the reference population. Although the relative risk was significant, the absolute risk was small. The increased risk of primary liver cancer is consistent with previous findings, however, the observed excess risk of leukaemia, cervical cancer and pancreatic cancer are new, and should be validated in other studies.

## **More information using individual exposure design instead of ecological design, a register based study**

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**Background:** Results from two study-design will be compared for population 1986. Strength and limitations with the two methods will be discussed in terms of ecological bias and statistical power.

**Material and methods:** A closed cohort was defined as all individuals living in the nine most contaminated counties in Middle and North-Sweden in 1986 in study one with ecological exposure at county, municipality and parish level. The second study include only three most contaminated counties with exposure at individual level. Fallout of 137Cs was retrieved as a digital map from the Geological Survey of Sweden, and demographic data from Statistics Sweden, cancer diagnosis and death date from the National Board of Health and Welfare. In ecological-design the exposure value at county, municipality and parish level provided by Swedish Radiation Safety Authority. In the second study individuals were assigned an annual 137Cs exposure based on their place of residence at 1986-2010.

**Results:** In the ecological study design no obvious exposure-response using IRR was revealed for five exposure categories at three geographical level. But using individual exposure data, the adjusted HRs (95% CI) were 1.03 (1.01-1.05) for intermediate exposure; and 1.05 (1.03-1.07) for highest exposure comparing to the reference. Variability on each aggregation level was estimated by sigma-2 (variance) value, increasing from county to the individual level.

**Conclusion:** Using individual exposure assessment revealed a weak exposure response trend, not seen in the ecological study design.

**Pregnancy complications in women of Russian, Somali and Kurdish origin and women in the general population in Finland.**

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University of Tampere

**Background:** We compared the prevalence of gestational diabetes (GDM), gestational hypertension (GHTN) and preeclampsia (PE) in the latest birth among women of Russian, Somali, Kurdish origin and women in the general population in Finland.

**Methods:** The study groups were selected from population-based samples of 18-64 year-old women. There were Russian (n=318), Somali (n=583) and Kurdish (n=373) origin and 243 women from the general population who had given a birth in Finland between 2004 and 2014. The data were obtained from the National Medical Birth Registry and the Care Register for Health Care. Data on GDM, GHTN and PE were extracted based on relevant ICD-10 codes. The main statistical methods were logistic regression analyses adjusted for age, parity, body mass index and socioeconomic status.

**Results:** The prevalence of GDM was 19.1% in Kurdish, 14.4% in Somali, 9.3% in Russian origin women and 11.8% in the general population ( $p < 0.001$ ). The prevalence of GHTN/PE was 5.4% in the general population, 3.8% in Somali, 3.1% in Kurdish and 1.7% in the Russian women ( $p = 0.10$ ). When adjusted for confounders, Kurdish women had two fold odds for GDM (OR 1.98; 95%CI 1.20-3.32) as compared to the general population, but the odds for GHTN/PE did not differ between the groups.

**Conclusion:** Kurdish origin differ from the women in general population for having higher odds for GDM whereas women of Somali and Russian origin did not differ from the general population. Similar studies with larger samples are required to confirm these findings and developing prevention strategies among high-risk groups.

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**Air pollution effects on preeclampsia-effects by size of particles and by sources**

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*The authors have chosen not to publish the abstract*

## **Acute effects of air pollution on mental health symptoms**

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**BACKGROUND.** Air pollution is one of the leading causes of mortality and morbidity worldwide, but little is known about how air pollution affects mental health. It is well-known that urban ambient particles can enter the brain through the bloodstream via inhaled air. Experimental studies, and a few epidemiological studies suggest that air pollution may cause acute exacerbation of mental disorders and even increase the rate of suicide attempts.

**METHODS.** We used data from Sahlgrenska University Hospital in Gothenburg, on the daily number of visits to the Psychiatric emergency unit and combined it with daily data on air pollution concentrations and temperature between 1 July 2012 and November 2016. We used a case-crossover design to analyze data with a distributed lag non-linear model (DLNM) to allow associations to vary smoothly along dimensions of air pollution concentrations and lags.

**RESULTS:** We observed a statistical significant Relative Risk (RR) of 1.02 (95% Confidence Interval, CI, 1.00 -1.04) associated with a 10  $\mu\text{g}/\text{m}^3$  increase in respirable particulate matter (PM<sub>10</sub>) the same day, in single-pollutant models. When adjusting for temperature and holidays, the RR remained 1.02 (95% CI: 1.00-1.04), but was no longer statistically significant. For NO<sub>2</sub> and Ozone, we observed no associations.

**DISCUSSION:** This finding could be interpreted as an indication that air pollution may exacerbate or cause mental health symptoms, even in areas with comparatively low levels of air pollution. However, we have no information on current or previous mental health diagnoses for the individuals in the study. In combination with the severe impact of mental health disorders on society and individuals and the need for knowledge on health effects by air pollution, our results are a strong warrant for future research in this area.

## Swimming ability among youth in the City of Malmö

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### Background

Swimming ability is a potentially life-saving skill. Also, swimming and other water based activities may improve physical and mental health throughout life. Although swimming is part of the primary school curriculum in Sweden low swimming ability has been reported, especially in schools with many children from migrant families. In Malmö each school has paid and organized their swimming education. In order to improve swimming ability the city of Malmö 2014 introduced compulsory swimming education (Skolsim) in all public schools, 2nd grade, organized and paid for by the local education authority. The impact of the intervention is evaluated in this study, which is a part of the EU-project Blue Health 2020 exploring the impact blue (i.e. water) environments can have on health and wellbeing.

### Method

Pre- and post-intervention data on swimming ability are used to evaluate the impact of the intervention. The impact is assessed by using a difference-in-difference approach, comparing areas with low and high swimming abilities before and after the intervention.

### Results

Data from 2011 show a striking difference in swimming ability among children in 5th grade in Malmö depending on where they live, with a low swimming ability in low socioeconomic (SES) areas and high proportions of immigrants (e.g. Rosengård 27%) and high swimming ability in areas with high SES areas and low proportions of immigrants (e.g. Limhamn-Bunkeflo 93%). Preliminary results show that between 1 August 2014 and 1 June 2015 2869 children in 2nd grade received swimming education through Skolsim. Follow up data on swimming ability in these children two years after receiving swimming education are available in August 2017.

### Conclusion

Although swimming ability is a part of the primary school curriculum the inequalities in swimming ability among children in Malmö have been extensive. Our on-going study will provide important evidence on if and how interventions may decrease inequalities in swimming abilities among school children.

**Ethnic differences in body mass index trajectories from 18 years to 3 months postpartum in a cohort in Norway**

Kåre R Richardsen, Christine Sommer, Line Sletner, Christin W Waage, Ibrahimu Mdala, Leila Torgersen, Anne Karen Jenum

**Ethnic differences in body mass index trajectories from 18 years to 3 months postpartum in a cohort in Norway**

Tarja I Kinnunen<sup>1</sup>, Kåre R Richardsen<sup>2</sup>, Christine Sommer<sup>3</sup>, Line Sletner<sup>4</sup>, Christin W Waage<sup>5</sup>, Ibrahimu Mdala<sup>5</sup>, Leila Torgersen<sup>6</sup>, Anne Karen Jenum<sup>5</sup>.

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**Background:** The study explored ethnic differences in changes in body mass index (BMI) from the age of 18 years until three months postpartum.

**Methods:** The population-based cohort study was conducted in primary care in Oslo, Norway. Participants were 811 pregnant women categorised into six ethnic groups (41% Western European, WE, the reference group). Data on body weight at 18 years and before the index pregnancy were self-reported in early pregnancy. Weight at three months postpartum and body height were measured. Multilevel generalized estimating equations (GEE) adjusted for age and current socio-economic status were performed.

**Results:** The analyses were stratified by parity due to ethnicity\*time\*parity interaction in the GEE model ( $p < 0.001$ ). Among nulliparous women, the mean BMI increase from 18 years to pre-pregnancy was 1.19 kg/m<sup>2</sup> lower in East Asian women than in WE women ( $p = 0.021$ ). Among parous women, the mean BMI increase in African women was 2.16 kg/m<sup>2</sup> higher by pre-pregnancy ( $p = 0.030$ ) and 4.52 kg/m<sup>2</sup> higher by postpartum ( $p < 0.001$ ) than in WE women. The mean BMI increase in South Asian women was 1.59 kg/m<sup>2</sup> higher by pre-pregnancy ( $p = 0.001$ ) and 1.80 kg/m<sup>2</sup> higher by postpartum ( $p = 0.001$ ) than in WE women. The mean BMI increase in Middle Eastern women was 1.83 kg/m<sup>2</sup> higher than in WE women by postpartum ( $p = 0.009$ ). The percentages of multiparous women were highest among African (37.1%), Middle Eastern (31.1%) and South Asian (25.5%) women.

**Conclusions:** Parous women of African, South Asian and Middle Eastern origin are more prone to long-term weight gain than parous WE women in Norway.

## **Smoking in pregnancy is associated with earlier pubertal development in sons and daughters: a cohort study**

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**Background:** We investigated the association between smoking in pregnancy and pubertal development in sons and daughters.

**Materials and methods:** This cohort study is based on the Puberty Cohort within The Danish National Birth Cohort holding puberty information on 15,822 Danish children (participation rate = 71%). Information on mothers' smoking during pregnancy was obtained by three telephone interviews, and information on pubertal development was collected half-yearly by web-based questionnaires from the child's age of 11 years until full sexual maturation. The outcome of interest was age at various pubertal milestones: Tanner Stage 2, 3, 4 and 5 (gonadal growth and pubic hair development in boys, and breast development and pubic hair development in girls) as well as voice break (boys) and age of menarche (girls). We used a Tobit regression model for interval censored data.

**Results:** Maternal smoking was associated with earlier gonadal growth, pubic hair development and voice break in boys in a dose-dependent manner. In comparison, maternal smoking was associated in a dose-dependent manner with earlier age at breast development and age at menarche, while pubic hair development was mainly unaffected in girls. Sons and daughters of heavy-smoking mothers (>10 daily cigarettes) matured approximately three months earlier than sons and daughters of non-smoking mothers.

**Conclusion:** We found that smoking in pregnancy was associated with earlier pubertal maturation in both sons and daughters.

## **A step towards delimitation of functional somatic syndromes? A latent class analysis to identify somatic symptom profiles in the general population**

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**Background:** The delimitation of functional somatic syndromes such as fibromyalgia and irritable bowel syndrome is inconsistent. We aimed to investigate somatic symptom profiles in the general adult population to give a new perspective on the delimitation of these syndromes.

**Materials and methods:** Information on 31 self-reported somatic symptoms classical for functional somatic syndromes was obtained from a population-based cohort study on 9656 adults (participation rate 33.6%) from the western part of Greater Copenhagen, Denmark (the DanFunD study). Latent class analysis was used to identify somatic symptom profiles. The profiles were further described by their relation with sociodemographic and health-related factors.

**Results:** The analyses showed eight different symptom profiles. The largest profile (49% of the population) had no symptoms. Three profiles were characterised by high probabilities of a few, specific symptoms: muscle and joint pain (17% of the population), gastrointestinal symptoms (6%), and general symptoms (13%). Three profiles had multiple but specific symptoms: musculoskeletal and general symptoms (7%); fatigue, musculoskeletal and gastrointestinal symptoms (3%); and cardiopulmonary, gastrointestinal and general symptoms (3%). The last profile was characterised by high probability of all the symptoms (2%).

**Conclusion:** Eight symptom profiles were identified and characterised by number and the particular symptoms. The profiles could be used to identify persons with symptom complexes in further epidemiological studies exploring pathophysiology, risk factors and prognosis of multiple symptoms. Their relation with functional somatic syndromes will be explored. Ultimately, the symptom profiles can contribute to a better understanding and delimitation of functional somatic syndromes.

### **Chronic disease and high cost use of health care services**

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**Background:** A prerequisite for reducing health care costs is to identify the chronic diseases that are most strongly associated with high cost users of health care services (HCU). In this study we examined the associations between twelve chronic diseases and HCU.

**Methods:** The study population consisted of 1,357,846 men and women aged 18 years or older living in the Capital Region of Denmark during 2012. Linkage of nation-wide Danish registries provided information on the costs due to hospital admissions, treatment in outpatient and specialist physician clinics, and at general practitioners in 2012 for each individual. Individuals among the 5% highest percentile of health care costs were defined as HCU. Twelve chronic diseases were defined based on ICD-10 codes from hospital admissions and visits in outpatient clinics from 2007-2011 and additionally on ATC-codes for medication purchase. The associations between the twelve chronic diseases and HCU were analysed using logistic regression adjusting for sociodemographic factors.

**Results:** High age, female sex, short education, low income and living alone were associated with HCU. Mental illness, cancer, rheumatoid arthritis, chronic obstructive pulmonary disease, heart disease, stroke, diabetes were associated with increased adjusted odds ratios (95% confidence intervals) of HCU of 5.0 (4.9;5.2), 4.1 (4.0;4.2), 2.9 (2.8;3.0), 2.7 (2.6;2.8), 2.5 (2.4;2.5), 2.2 (2.1;2.3), and 2.0 (2.0;2.1), respectively.

**Conclusion:** Our results show that patients with mental illness, cancer and rheumatoid arthritis, have the highest probability for being HCU in this population-based sample. Thus, prevention and treatment strategies targeting these patients might provide a considerable reduction in health care costs.

### **Comorbidity between pain and anxiety/depression - a population based cohort study**

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**Background and aims:** Mental illness and pain from various locations in the body is common and the comorbidity between the two is well known although the causality remains to be determined. Our aim is to study if patients with pain (here dorsalgia/abdominal pain) have an increased risk of developing mental illness (here depression/anxiety) and the reverse; the risk for patients with mental illness to develop pain, compared to the rest of the general population.

**Methods:** This prospective cohort study used the Skåne Healthcare Register, covering data on all types of care in the region of Skåne, southern Sweden (covering a total population of ~ 1.3 million). The cohort included all patients and their healthcare consultations in primary, specialized and inpatient care between 2007 and 2015.

**Results:** Individuals not diagnosed with mental illness or pain during 2004-2006, aged 18 or older, living in the region and who consulted physician or physiotherapist at least once were included in the study (n=678 352). 217 685 (30 %) had a pain diagnosis, 93 845 (14 %) had mental illness and 44 630 had both pain and mental illness (Figure 1). The risk of developing subsequent mental illness or pain seems to be evenly distributed over time after diagnosis. (Figure 2, 3).

**Conclusions:** We confirm the previously shown comorbidity and conclude that there is no time window of no risk during the first 9 years. We further plan using Poisson regression to calculate the incidence rate ratio, and adjust for sex, age and socioeconomic status.

**The Metabolic syndrome and Cancer project (Me-Can); results and plans after eleven years' collaboration using Swedish, Norwegian and Austrian cohort and registry data**

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**Background:** Me-Can was initiated in 2006 with the aim to investigate factors in or related to the metabolic syndrome, in relation to cancer risk. At the time, few prospective studies had been conducted on the topic.

**Materials and methods:** We pooled data from seven population-based cohorts in Sweden, Norway and Austria, and from their respective National Cancer and Cause of death registries. This resulted in data from around 580,000 individuals with 35,000 incident cancers and 13,000 deaths caused by cancer. Repeated measurement data in around 135,000 individuals enabled us to correct cancer hazard ratios by random error in exposure measurements. The collaboration has so far resulted in 27 publications (see [www.me-can.se](http://www.me-can.se)). In February 2017, an updated file comprising more than 800,000 individuals and 80,000 incident cancers was completed for new studies.

**Results:** Our studies have had large impact on the research field. We have found that levels in the higher end of blood pressure and plasma levels of glucose and triglycerides, but not total cholesterol, and of a metabolic score comprising equal weights from these factors and BMI, were related to an increased risk of total cancer and of several cancer forms. New studies are ongoing in which we investigate new topics, details, and use new methods, which may be presented at the NordicEpi conference.

**Conclusion:** The Me-Can collaboration using Nordic and Austrian data has been very fruitful and the collaboration will continue for several more years.

**Risk of neurological adverse events during treatment with tumour necrosis factor alpha-inhibitors for arthritis: a population-based cohort study**

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**Background.** Several case reports and small case series have indicated that various neurological disorders may be a serious adverse event following tumor necrosis factor alpha-inhibitors (TNFi) treatment. Accordingly, the aims of the present study are 1) to investigate the risk of a broad range of neurological adverse events among arthritic patients treated with TNFi and other biologics, and 2) to identify specific high-risk patient groups.

**Materials and methods.** A national register-based cohort study encompassing more than 57,000 arthritic patients registered in DANBIO between 2000 and 2016. Use and efficacy of TNFi and other biologics (coverage over 91%) used in the treatment of several rheumatologic disorders has been registered in DANBIO since 2000. The DANBIO cohort is linked to the Civil Registration System (information on dates of death or emigration) and the Danish National Patient Register (identification of all neurologic diagnoses from 1977 to 2016).

**Statistical analyses.** Hazard Ratio of overall and site-specific neurologic diagnosis among arthritis patients registered in DANBIO ever receiving TNFi treatment compared with non-treated patients will be calculated with adjustment for age, sex and calendar time. Other covariates of a priori interest: disease activity including CRP, tobacco smoking and glucocorticoid and conventional DMARD treatment. Additional sub analyses will include stratification by time since the start of TNFi treatment, gender, patient group, age of TNFi treatment start and type of TNFi. Moreover, we will examine whether patients with neurological diagnoses are especially sensitive to TNFi treatment.

**Results and conclusion.** Statistical analyses are currently in process.

## **Influence of socioeconomic factors on stage of cancer disease in Danish melanoma patients**

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### **Background**

The incidence of malignant melanoma has increased with over 4% during the past 25 years in Denmark. Socioeconomic differences in survival have earlier been found in this patient group and in order to reduce such disparities, knowledge is needed about where in the cancer trajectory these disparities occur.

The aim of the study is to investigate whether educational level, disposable income or cohabitating status is associated with cancer stage at time of diagnosis, and further to analyze the influence of comorbidity in these possible relations.

### **Material and Methods**

The study is based on register data from Danish nationwide administrative registers and a clinical database of malignant melanoma covering about 95 % of all melanoma cases in Denmark.

Associations between socioeconomic factors and stage of cancer are analysed with logistic regression in stepwise models including age, gender, and comorbidity as covariates. Relevant interactions will be checked between socioeconomic factors, age, gender and comorbidity.

### **Results**

Preliminary results point to an association between socioeconomic factors, gender and comorbidity on cancer stage. Living alone, lower income, shorter education, being man and comorbidity seem to be associated with a higher diagnosis stage.

Further analyses into the specific relations and possible interactions are ongoing.

### **Conclusion**

Preliminary results point to a group of patients at increased risk of a delayed diagnosis that lives without partner, have lower socioeconomic position, are men and have comorbidity. It is important to provide information about symptoms of malignant melanoma to this group and to raise awareness through general practitioners.

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**Arterial stiffness and incidence of diabetes mellitus: A population-based cohort study**

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*The authors have chosen not to publish the abstract*

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**Dispersion modelling for particles in air in Scania**

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*The authors have chosen not to publish the abstract on the web.*

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## **Maternal chronic diseases and risk of cerebral palsy in offspring**

Marianne Strøm, Mette Tollånes, Rolf Terje Lie, Ingeborg Forthun, Dag Moster

Maternal chronic diseases and risk of cerebral palsy in offspring

Marianne Strøm<sup>1,2</sup>, Mette C Tollånes<sup>3</sup>, Rolf Terje Lie<sup>1</sup>, Ingeborg Forthun<sup>1,2</sup>, Dag Moster<sup>1,2</sup>

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### Background

Cerebral palsy (CP) is a non-progressive developmental motor disability affecting approximately 2 per 1000 live born, with largely unknown causes. We investigated associations between various maternal chronic diseases in pregnancy and risk of CP in offspring.

### Materials and methods

We used data from the Medical Birth Registry of Norway on more than 2.7 million births during 1967-2013 to collect information on maternal chronic diseases diagnosed before or during pregnancy. By record linkage to national registries, we identified 6781 children with CP. We used log binominal regression models to estimate the risk of CP in the offspring by maternal disease status.

### Results

Maternal diabetes type 1 and type 2 was associated with a 2.4-fold excess risk (relative risk (RR) 2.4, 95% confidence interval (CI) 1.6-3.6) and a 2.8-fold excess risk (RR 2.8, 1.6-4.9), respectively, of CP in offspring. Crohn's disease implied a 2.5-fold increased risk (RR 2.5, 1.3-4.8) and multiple sclerosis a 2.2-fold excess risk (RR 2.2, 1.1-4.9).

### Conclusion

We found associations between several maternal chronic diseases and CP in offspring. Possible causal pathways may include inflammatory intrauterine responses, genetic mechanisms or use of medication.

### **Association between semen parameters and fatherhood – a follow-up study**

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**Background:** Due to lack of knowledge regarding the importance of semen parameters and their predictive value with respect to fatherhood, the present study aims to investigate this hypothesized association.

**Material and Methods:** Two hundred and four Norwegian men from the Oslo and Tromsö area were recruited and semen samples collected in 2001/2002. By linkage to the Medical Birth Register, information about fatherhood was obtained until 2015. Two main outcomes were investigated; had ever become father (yes vs no, i.e. also before 2001/2002) and become fathers after 2001/2002 (yes vs no, i.e. those who had become fathers before 2001/2002 were excluded). Standard semen parameters were dichotomized as normal vs abnormal according to the WHO reference values from 1999 and 2010, and for DNA Fragmentation Index (DFI) cut-off values of 20% and 30% were used.

**Results:** For the outcome “had ever become father”, men with higher fraction of progressive motility and higher sperm concentration, respectively, had more frequently become fathers. The combination of sperm motility and concentration was also associated (both parameters above WHO 1999 reference values; adjusted OR 5.6, 95% CI 1.8-18,  $p=0.004$ ) with a higher probability of becoming father. For the second outcome, i.e. “had become father for the first time after 2001/2002” the patterns were very similar as for the first outcome, i.e. “had ever become father”.

**Conclusion:** In spite of the relatively low number of participants, the study gives some support that men with normal semen quality, based on the WHO reference ranges more often became fathers.

## Non-exercise estimated cardiorespiratory fitness and risk of myocardial infarction: The HUNT study

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Non-exercise estimated cardiorespiratory fitness and risk of myocardial infarction: The HUNT study

**Objective:** To investigate the association of non-exercise estimated cardiorespiratory fitness (eCRF) with the risk of an acute myocardial infarction (AMI) in middle-aged and older people.

**Participants and Methods:** The study included 26,166 participants (51.5% women) from the Nord-Trøndelag Health Study (HUNT) study (1995-97), mean age of 55.7 years (range 38-99), without cardiovascular disease at baseline. Baseline eCRF was determined using non-exercise algorithms based on gender, age, resting heart rate, waist circumference, and self-reported physical activity; and further grouped into tertiles. Incident AMI was derived from hospital records and deaths from the Norwegian Cause of Death Registry. Cox regression models were used to calculate adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for the association between baseline eCRF and incident AMI.

**Results:** During a mean (SD) follow up of 13.3 (3) years, 1566 AMI events were recorded. In fully adjusted models comparing with the lower category of eCRF, women in the middle and upper eCRF groups had 25% (HR: 0.75, 95% CI: 0.59-0.96) and 55% (HR: 0.45, 95% CI: 0.30-0.71) lower risk of AMI, respectively. The corresponding number in men were 9% (HR: 0.91, 95% CI: 0.78-1.05) and 27% (HR: 0.73, 95% CI: 0.59-0.90).

**Conclusion:** Low eCRF is a risk factor for AMI in the general population, and the protective effect more pronounced among those in the highest tertile of eCRF. In a public health perspective, CRF should be an important target to reduce cardiovascular risk in middle-aged and older individuals.

**Trends in the incidence of heart failure (HF) among patients with acute myocardial infarction (AMI) in Denmark 2000-2009**Enxhela Sulo<sup>1</sup>, Torben Jørgensen<sup>2</sup>, Grethe Tell<sup>1</sup>, Merete Osler<sup>2</sup><sup>1</sup> Faculty of Medicine and Dentistry, University of Bergen<sup>2</sup> Research Center for Prevention and Health, Glostrup, Denmark**Background:** We explored trends of HF complicating AMI in Denmark 2000-2009.**Materials and Methods:** All incident (first) AMI cases without prior HF, identified in the National Danish Patient Registry were followed for an episode of HF occurring either during the AMI hospitalization (in-hospital) or within one year from discharge (post-discharge). Logistic and Cox regression models were used to explore HF trends; overall and by age group ('20-39', '40-59', '60-79' and '80+' years).**Results:** Of 80 229 patients [64.1% men, mean age 68.7 (SD, 13.5) years], 12.9% developed in-hospital HF. The odds of in-hospital HF declined on average 0.8% per year [odds ratio (OR), 0.992; 95% CI: 0.984-0.999]. Odds increased among patients < 60 years [significant in '40-59 years' group; (OR, 1.039; 95% CI: 1.017-1.061)] and decreased in '80+ years' group (OR, 0.957; 95% CI: 0.944-0.969).

Of 62 961 patients discharged without HF, 9.6% developed post-discharge HF. The risk hospitalization due to HF declined by 3.4% per year (HR, 0.966; 95% CI: 0.945-0.987), contributed by positive changes in patients 40+ years. When hospitalizations and outpatient contact were merged, no changes were observed in the risk of post-discharge HF.

Overall, 20.3% of patients developed in-hospital or post-discharge HF (any type HF). The risk increased in '40-59 years' group (HR, 1.036; 95% CI: 1.020-1.051) and declined in '80+ years' group (HR, 0.973; 95% CI: 0.964-0.983), leading to a 'null' effect in overall.

**Conclusions:** Marginal or no changes were observed in in-hospital and any type of HF respectively. The reduction in post-discharge HF requiring hospitalizations was offset by the increase in outpatients HF cases.

## **Informal care and sleep disturbance among caregivers in paid work: Longitudinal analyses from a large community-based Swedish cohort study**

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### Background

This study examines the cross-sectional and prospective relationship between informal caregiving and sleep disturbance among caregivers in paid work.

### Methods

21714 participants from four waves (2010-2016) of the Swedish Longitudinal Occupational Survey of Health were included in the analysis. Subjective sleep disturbance was measured with the Karolinska Sleep Questionnaire, a validated scale of sleep disturbance. Random-effects modelling was used to examine the association between self-reported informal caregiving (none, up to 5 hours per week, over 5 hours per week) and sleep disturbance. Socio-demographic and health confounders were controlled for and interactions between caregiving and gender included. The effect of taking up and ceasing informal caregiving on sleep disturbance and change in sleep disturbance was assessed.

### Results

Informal caregiving was associated with sleep disturbance in a dose-response relationship manner (compared to no caregiving, up to 5 hours of caregiving: beta = 0.10; 95% CI: 0.08; 0.13, over 5 hours: beta = 0.21; 95% CI: 0.15; 0.27), a result which was robust to inclusion of control variables, but varied by gender. Cessation of caregiving was associated with reductions in sleep disturbance (beta = -0.07; 95% CI: -0.11; -0.02).

### Conclusion

This study has found that providing informal care is an independent predictor of sleep disturbance. Even low intensity informal care provision was associated with subjective sleep disturbance among carers who were simultaneously in paid work. The findings highlight the importance of addressing sleep disturbance in caregivers, especially since population ageing is leading to more people providing informal care.

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**The role of housing-related control beliefs in the association between housing accessibility and independence in activities of daily living in younger old**

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*The authors have chosen not to publish the abstract on the web.*

## Gestational Hypertension and subsequent risk of cardiovascular disease

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### Background:

We aimed at exploring the association between gestational hypertension (GH) – alone or in combination with small for gestational age (SGA) infants and/or preterm delivery – and subsequent cardiovascular disease (CVD).

### Materials and methods:

We linked data from the Medical Birth Registry of Norway with the CVDNOR project and the Norwegian Cause of Death Registry. Hazard ratios (HR) and 95% confidence intervals (CI) were computed using Cox proportional hazard regression, comparing women with and without GH in the women's first and second pregnancy.

### Results:

In this register-based study we included all women with a first delivery during 1980-2009 (n=614,443) and followed them for (median, (IQR)) 14.3 (14.6) years. Women with GH were more likely to have preterm deliveries and SGA infants compared to women with no GH. There were 17,481 (3.0%) and 650 (5.8%) CVD events among women with no GH and women with GH, respectively. Comparing women with GH in their first pregnancy, the HR (95% CI) for CVD was 1.8 (1.6-2.0) for GH alone, and 2.7 (2.3-3.1) when GH occurred in combination with SGA and/or preterm delivery, compared to women with no GH. In sub-group analyses including women with at least two pregnancies (n=441,745) we found the highest CVD risk among women who had GH in combination with SGA and/or preterm in both first and second pregnancy (HR 4.64; 95% CI 1.93-11.16).

### Conclusion:

GH was associated with an increased risk of CVD, with the highest risk when GH was combined with SGA and/or preterm delivery in both pregnancies.

**Increased risk of congenital malformations in children born prior to paternal cancer diagnosis: national register study**Lars Rylander<sup>2</sup>, Aleksander Giwercman<sup>1</sup><sup>1</sup> Molecular Reproductive Medicine, Department of Translational Medicine, Lund University, Malmö, Sweden<sup>2</sup> The Unit for Environmental Epidemiology, Division of Occupational and Environmental Medicine, Lund University, Lund, Sweden**Background**

Previously observed increases of birth abnormalities for children born to male cancer survivors were believed to be due to the mutagenicity of cancer therapies. To examine if there is an underlying paternal factor, we investigated the risk of congenital malformations in children fathered by men prior to paternal cancer diagnosis.

**Methods**

This registry-based study sourced data from the Swedish Medical Birth Register and the Swedish Cancer Register. All children born in Sweden between 1994 and 2014 (n=2 108 569) and their fathers (n=1 181 491) were included. Paternal cancer diagnoses were retrieved from the Swedish Cancer Register. Similarly, the Swedish Medical Birth Register supplied congenital malformation diagnoses (ICD-9: 740-759 and ICD-10: Q00-Q99). Associations between paternal cancer and birth abnormalities of children born prior and after paternal cancer diagnosis, as well as those of healthy fathers, were investigated using binary logistic regression model, yielding odds ratio (OR) with 95% confidence interval (CI). All statistical tests were two-sided.

**Results**

Of the n= 32 393 children born to fathers diagnosed with cancer after offspring conception, 3.8 % (n=1240) had a congenital malformation, as compared to 3.5% for the children born to healthy fathers (OR = 1.07, 95% CI = 1.01 to 1.14, p=0.029). The children (n= 11 610) born to fathers who had previously had cancer, had a comparable increase though not statistically significant (OR =1.05, 95% CI=0.95 to 1.17, p=0.332, 3.7% vs 3.5%).

**Conclusions**

Children fathered by men who subsequently were diagnosed with cancer have an increased risk of congenital malformations. This risk is similar for children conceived after cancer diagnosis. Therefore, the increase cannot solely be attributed to cancer therapies.

P40

**Do physical activity and body mass index modify the association between chronic musculoskeletal pain and insomnia?  
Longitudinal data from the HUNT Study, Norway**

Eivind Schjelderup Skarpsno, Tom Ivar Lund Nilsen, Trond Sand, Knut Hagen, Paul Jarle Mork

The authors have chosen not to publish the abstract on the web.

## **LifeGene and EpiHealth: Swedish population-based cohorts covering the lifespan**

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LifeGene and EpiHealth are sister cohorts for research on a variety of questions in all medical and biobehavioral disciplines. LifeGene and EpiHealth utilize the same infrastructure and include most of the same measurements, sampling, and survey items. While the index populations target different age groups (LifeGene younger, EpiHealth older adults), the combined resource covers the entire lifespan. Over 55,000 individuals have participated in the baseline health screening (30,000 in LifeGene and 25,000 in EpiHealth), and 66,000 have responded to a baseline questionnaire (40,000 in LifeGene and 26,000 in EpiHealth). Physical measurements include blood pressure, anthropometric measures including bioimpedance, and spirometry. The EpiHealth cohort also has ECG and a cognitive measure. We also have urine, serum, plasma, DNA and clinical chemistries. The extensive surveys include themes on Lifestyle, Health behaviors and exposures, Socio-demography, Health History, and Mental Health among others. Some examples of how the cohorts can and are being used in various studies, alone and combined, will be presented.

## **Validation and agreement between asthma questionnaire and national registers**

Anna Hedman, Tong Gong, Cecilia Lundholm, Elin Dahlén, Vilhelmina Ullemar, Bronwyn Haasdyk Brew, Catarina Almqvist

**Background:** The aim of this study was to validate parental-reported asthma related questions against Swedish Registers. We also set out to establish agreement between parental-reported asthma and diagnosis or medication for different time windows.

**Materials and methods:** We linked a population-based twin cohort of 27 055 children aged 9-12 years to the Swedish Prescribed Drug Register, National Patient Register and the Primary care register. Parent-reported asthma was obtained from the cohort questionnaires, diagnoses and medication was retrieved from the registers. Sensitivity, specificity, positive predicted value and negative predicted value were computed. For the agreement between the questionnaire and the registers, Cohen's kappa was estimated.

**Results:** The sensitivity of the parental-reported 'ever asthma' against a register-based asthma algorithm was 71.8% and the PPV was 75.6. The PPV of the parental-reported doctor's diagnosis against any asthma diagnosis from the registers was 78.3. The highest agreement between parental-reported 'current asthma' and register-based asthma medication was seen at 18-months before the date of the interview with at least one dispensed medication applied to different time-windows. When adding a diagnosis to the same agreement the results did not substantially increase.

**Conclusion:** We found good sensitivity and PPV for parental-reported 'ever asthma' against a register-based asthma algorithm and high PPV for parental-reported doctor's diagnosis against asthma diagnosis from the register. An 18-month time window captured 'current asthma' agreement, and adding a diagnosis did not substantially increase our results. Valid screening instruments can improve epidemiological research to address various questions on risk factors and consequences of asthma.

P42

**Vitamin B6-related biomarkers and long-term stroke risk: the Hordaland Health Study**

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*The authors have chosen not to publish the abstract on the web.*

P43

**Social mobility and cause-specific mortality**

Sunnee Billingsley, Anna Bryngelson

*The authors have chosen not to publish the abstract*

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**Is the association between maternal stress and child atopy mediated by child stress?**

Anna Hedman, Emma Ohlin, Cecilia Lundholm, Henrik Larsson, Catarina Almqvist

*The authors have chosen not to publish the abstract on the web.*

## **Incidence and risk factors of depression onset in psoriasis: A nationwide study in Sweden**

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**Background:** It has been shown that psoriasis affects psychological well-being, but recent research brings into question the association between psoriasis and depression. Previous studies may have encountered challenges relating to sample size and sufficient control for confounding in order to adequately answer this question.

**Materials and methods:** 97,153 psoriasis patients were identified through a psoriasis diagnosis or calcipotriol prescription and matched to 1,388,943 controls using Swedish population-based registers. Subjects were followed from the date of psoriasis onset in 2005 or later until incident clinical depression diagnosis, death, or end of follow-up. Clinical depression was identified as diagnosis of a major depressive episode. Incidence rates of depression were calculated using a Poisson regression model and risk factors were analysed using a Cox proportional hazards model. Risk factors included disease severity, age, sex, comorbidities, education level, income, and marital status.

**Results:** Incidence of clinical depression diagnosis in psoriasis patients (controls) was 5.92 (4.23) cases per 1000 patient-years. The presence of psoriasis was found to be associated with the onset of clinical depression (hazard ratio=1.11,  $p<0.01$ ) even after controlling for other clinical factors and sociodemographic characteristics. However, psoriasis was not found to be associated with the prescription of antidepressants, which may be used to treat anxiety disorders or off-label in the management of pain.

**Conclusions:** In contrast to recent research, this study finds that psoriasis is independently associated with incident clinical depression. Future research should take into account the discrepancies between clinical diagnoses and antidepressant prescriptions as definitions for depression.

## **Born into Life – Maternal stress during pregnancy and fetal growth in a prospective Swedish birth cohort**

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The aim of this study was to investigate the associations between maternal stress during pregnancy and child birthweight by studying the links between perceived stress, salivary cortisol levels, and birthweight.

In a cohort of 92 women from the Born into Life study, Perceived Stress Scale (PSS) was administered and saliva samples were collected at gestational week 26-28. Saliva samples were analysed for cortisol levels. Birthweight measured after delivery was collected from medical records. Linear regression analyses were performed between PSS-scores or cortisol levels (morning, evening, decline) and birthweight respectively, with adjustment for gestational age. Pearson product-moment correlations were performed between PSS-scores and cortisol levels.

No significant associations were found between PSS-scores or cortisol levels and birthweight. The direction of the association between cortisol levels and birthweight indicated a trend where higher salivary cortisol levels yielded lower birthweight. This effect was attenuated after adjustment for gestational age. Morning cortisol levels ( $r=-0.31$ ,  $p=0.01$ ) and cortisol decline ( $r=-0.26$ ,  $p=0.03$ ) were negatively correlated to PSS-scores, but evening cortisol levels ( $r=-0.21$ ,  $p=0.09$ ) were not.

None of the measures of maternal stress during pregnancy were significantly associated with child birthweight, yet the strength of the trend of the negative association between cortisol levels and birthweight diminished after adjusting for gestational age, implying that gestational age may be shorter for children exposed to higher cortisol levels, thus leading to lower birthweight. The inverse correlation found between PSS-scores and cortisol levels may indicate other mechanisms than HPA-axis activity underlying previously described effects of maternal stress on child outcomes.

## **Grandmaternal smoking during pregnancy and the grandchild's birth weight, as mediated by maternal smoking**

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### **Background**

Smoking during pregnancy (SDP) is believed to reduce offspring birthweight. Recent studies have shown that the grandmother's SDP may also affect the grandchild's birthweight, suggesting that it causes epigenetic changes. However, maternal smoking during pregnancy may be a mediator and also interact with grandmaternal SDP.

Our aim was to estimate the effect of grandmaternal SDP on birthweight considering potential mediation and interaction effects of maternal SDP.

### **Materials and methods**

We included all children born by Dec 31st 2013, whose parents were born since 1982 and for whom maternal and grandmaternal SDP information was available (n=186 937 children with maternal and n=109 485 paternal grandmothers) in Swedish registers. We used VanderWeele's approach to mediation with interaction between exposure and mediator, i.e. a 4-way decomposition of the total effect<sup>1</sup>:

- 1) Controlled direct effect (CDE)
- 2) Reference interaction (IntRef)
- 3) Mediated interaction (MedRef)
- 4) Pure indirect effect (PIE)

### **Results**

The total effect of maternal grandmothers' SDP on their grandchildren's birthweight was slightly positive, while it was negative for paternal grandmothers. For maternal grandmothers' SDP important components were CDE (45 grams, 95%CI: 39; 45) and PIE (-24, 95%CI: -25; -22). For paternal grandmothers PIE was significant (-15, 95%CI: -17; -14), but not CDE. In both cases there were small significant interaction effects (-6 to -3).

### **Conclusions**

The effect of paternal grandmothers' SDP on birthweight was mediated by maternal SDP while there was also a direct effect in the opposite direction for maternal grandmothers' SDP, but only small interaction effects.

1 VanderWeele PMID 25000145

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**Falls among older people with intellectual disability compared to the general population**

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*The authors have chosen not to publish the abstract on the web.*

**Over coverage in registers and what we can do about it**

Juho Härkönen, Eleonora Mussino, Sven Drefahl

Over coverage, i.e. individuals registered but not living in a country, constitute essential sources of bias in both demographic and epidemiological studies. However, there is far from any common knowledge on how to deal with over coverage in research. Using zero income as an exclusion criterion has been proposed as a practical solution in studies with problems with over coverage. Whilst this is indeed a relatively straightforward way of estimating over coverage, less is known about its appropriateness. This project aims at evaluating the zero-income approach by comparing it with other measures of over coverage: activity in registers using a cross sectional perspective and activity in register using a longitudinal approach. The later approaches are inspired by methods previously used by Statistics Sweden (2015). Additionally from creating and comparing three different over coverage estimates, Latent Class Analysis is used to analyze which aspects are the strongest predictors of over coverage. We use Swedish register data and analyze the different estimates over time, from 1990 to 2012. Different models are used for native- and Swedish born, since these groups generally show high differences in over coverage. Preliminary results show how the zero-income approach estimates higher numbers of over coverage than activity by the register trace and how this gap has increased over time. On the other hand, income is one of the single strongest predictors of over coverage.

The project is part of the Finnish-Swedish collaboration TITA - Tackling Inequalities in Time of Austerity

## **Sociodemographic characteristics and road traffic noise in Oslo, Norway**

Norun Hjertager Krog, Ruby del Risco Kollerud, Karin Sygna, Geir Aamodt, Gunn Marit Aasvang, Jorunn Evandt, Bjørn Heine Strand, Olöf Anna Steingrimsdóttir, Else Karin Grøholt, Bente Oftedal

Norwegian University of Life Sciences  
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**Background.** Living conditions are known to contribute to social inequality in health; however, more knowledge is needed about the possible contribution of outdoor environmental exposures. Traffic noise is associated with adverse health outcomes such as sleep disturbances, psychological distress, and cardiovascular disease. Few studies internationally have examined the association between socioeconomic status and noise exposure, and the results are contradictory. As associations may vary between cultures and with geography, local studies are needed to disentangle the mechanisms in different countries and cities.

The aim of the study was to examine more broadly the associations between sociodemographic variables and residential road traffic noise exposure in Oslo, Norway.

**Materials and methods.** We used data from the Health and Environment in Oslo Study (HELMILO, 2009-10, n=13 019), Statistics Norway, and modelled estimates of residential road traffic noise levels (Lden) at most exposed facade. Individual level variables were income, education, immigrant status, type of housing, living alone/single parent, age and sex. Neighbourhood level variables were proportion of inhabitants with low income, low education, non-western immigrant status, living in apartment buildings and proportion living alone/single parents. We used linear mixed models with random neighbourhood for the analyses.

**Results.** We found significant differences in residential noise exposure according to sociodemographic characteristics in Oslo. The more socially disadvantaged individuals and neighbourhoods were exposed to higher noise levels.

**Conclusion.** The results demonstrate social inequalities in exposure to road traffic noise in Oslo, both at individual and neighbourhood level. Thus, noise exposure may contribute to social inequality in health.

## Perfluoroalkyl acids (PFAA) is associated with future cholesterol levels

### - results from a Swedish prospective cohort study

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**Background:** Perfluoroalkyl substances (PFASa) are synthetic chemicals that persist in environment and in humans. There is an association between high PFAS levels and high levels of lipoproteins from cross sectional studies. The causal pathway is unclear.

**Objectives:** In a 12 year follow up study investigate the association between baseline PFAS levels and later lipoprotein levels.

**Methods:** In a cohort of male farmers and non-farmers living in a rural area blood samples were collected at two occasions 12 years apart (baseline and follow-up). The blood was analysed for cholesterol levels (total, LDL ad HDL) and PFAS (PFOA, PFNA, PFHxS, PFOS, PFHpA, PFDA, PFDoDA and PFUNDA) at both times. Cross sectional association as well as baseline and 12 year later levels were analysed through linear regression.

**Results:** Increased cholesterol levels in a 12 year follow was confirmed in crude models, however when adjusting for baseline cholesterol levels little association remained.

Replicating cross sectional analysis at baseline and at follow up, we see no association between PFAS and cholesterol levels at baseline while high associations is seen at follow up. However when we adjust for baseline levels cholesterol in the cross sectional analyses at follow-up it is clear that baseline cholesterol again is the major driver for future cholesterol levels.

**Conclusion:** PFAS does not seem to cause later high levels of cholesterol. Moreover, our results indicate that previous strong associations seen between PFAS and cholesterol from cross-sectional studies is driven and possibly overestimated due to by prior levels of cholesterol.

## **HIV among pregnant women in Tanzania; are we meeting national guidelines?**

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**Background:** Prevention of mother-to-child transmission (PMTCT) is the key way to reduce HIV infection in infants and children, and national PMTCT guidelines identify risk factors for mother-to-child transmission during pregnancy and delivery; lack of follow-up as well as delivery complications/interventions. We studied adherence to these national guidelines over time.

**Materials and methods:** Registry-based study using birth registry data from Northern Tanzania. HIV-positive women were compared with HIV-negative women (n=33 346 deliveries) during four periods spanning changing national guidelines (2000-2003, 2004-2006, 2007-2011, 2012-2014). A set of outcomes concerning management and pregnancy complications were selected for analysis.

**Results:** We observed an increase in deliveries with known maternal HIV status and women receiving HIV treatment, and a decline in deliveries with positive maternal HIV status (p-values for trend <0.001). The proportion of women with less than four ANC visits increased to above 30 percent irrespective of HIV status. Use of routine folate/iron increased, corresponding to a decrease in anemia which was strongest in HIV-negative women. Proportion of elective CS and emergency CS remained unchanged for HIV-positive women (7.1% and 25.5%, respectively, in the last period). Use of invasive procedures declined in both groups of women. Mothers who were young, single, had low education, high parity or lived in the rural area more often had indicators of poor antenatal care.

**Conclusions:** Increasing adherence to national guidelines over time was found for many of the selected outcomes. Still, a high occurrence of insufficient ANC, anemia and emergency CS call for efforts to explore and identify barriers that hinder optimal care

## Psychiatric morbidity and GP attendance prior to HPV-vaccination and risk of referral to an HPV-centre

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**Background:** The study aims to examine the association between psychiatric morbidity and general practitioner (GP) attendance prior to HPV-vaccination and the risk of referral to an HPV-centre due to suspected adverse events.

**Materials and methods:** Register-based, matched case-control study. Cases were defined as women referred to an HPV-centre between 1.1.2015 and 31.12.2015 (n=1,496). Each case was matched with five controls on age, region and time of first vaccine registration. The total study population consisted of 8,976 women.

**Results:** Overall, referred women above 18 years, were more likely to have used psychiatric medication or to have been hospitalized due to a psychiatric disorder within five years prior to the first vaccine registration. Specifically, referred women were more likely to have used antipsychotics, antidepressants, ADHD medication or anxiolytics, and to have been hospitalized for affective disorders or anxiety, but not to have been hospitalized for schizoid, ADHD or eating disorders. In addition, they were more likely to have had talk therapy or psychometric test performed prior to vaccination. Referred women of all ages had higher use of GP before vaccination. Population attributable fraction analyses indicated that psychiatric medication, hospitalization due to a psychiatric disorder and use of talk therapy or psychometric test explained 13%, 10%, 11% and 12% of the referrals, respectively. Results did not change substantially when adjusted for potential confounders.

**Conclusions:** Women referred to HPV-centres due to suspected adverse events after vaccination more often had preexisting psychiatric conditions, psychological symptoms or frequent GP attendance prior to vaccination.