



Abstract number: I

## **Adverse cardiometabolic outcomes in men with sisters with polycystic ovary syndrome**

*Aleksandra Kanina*

*Karolinska Institutet*

**Background:** Pregnancy is a physiological and psychosocial transition phase presenting a window of vulnerability for mental health, specifically peripartum depression (PPD). A transdiagnostic factor for psychopathology is emotion regulation (ER), which is also suggested to play a role in PPD. In pregnant women, inadequate self-reported ER has been associated with increased rates of depression, and after birth, the use of regulation strategies was found to predict PPD symptoms. However, research on ER during peripartum is scarce and no study to date has examined longitudinal associations of ER with PPD symptoms.

**Objective:** Using data of the Mom2B Swedish national cohort, this study investigates ER and its associations with depressive symptoms across peripartum with the aim to assess whether ER abilities can predict PPD symptoms.

**Methods:** ER, assessed using the Deficits in Emotion Regulation Scale (DERS; 1xantepartum, 1xpostpartum), and depressive symptoms assessed using the Edinburgh Postnatal Depression Scale (EPDS; 2xantepartum, 4xpostpartum) are described for the whole sample. DERS differences between EPDS

trajectory groups are investigated using ANOVA model. Multiple linear regression models of DERS and covariates on EPDS are performed.

**Results:** Preliminary results show that DERS scores are stable across peripartum for all women. Higher DERS scores significantly predict enhanced depressive symptoms during and after pregnancy, even when controlling for important covariates. Notably, women reporting depressive symptoms postpartum have higher DERS scores already antepartum, and specific DERS subscales seem to be predictive of early or late postpartum depressive symptoms.

**Conclusion:** Decreased ER abilities were noted as risk factor for increased self-reported PPD symptoms; this study thus suggests that the DERS could be included in an early screening tool to identify women at risk for PPD. As effective ER can be learned, this presents opportunities for psychoeducation and/or intervention approaches to improve prognosis and reduce the burden of PPD on mother and child.

**Keywords:** polycystic ovary syndrome, siblings, obesity, diabetes, hypertension



Abstract number: 2

## **The role of oxytocin in the regulation of food intake and glucose homeostasis in females: preliminary results**

*Anna Willmann, Nina Röhm, Christian Benedict, Johannes Klaus, Manfred Hallschmid*

*University of Tübingen*

**Background:** Besides its physiological role in the female organism and its psychosocial effects, oxytocin has recently gained attention for its impact on eating behavior, body weight and glucose homeostasis. However, the metabolic profile of oxytocin has so far been primarily studied in male animals and humans, in which oxytocin administration acutely reduced food intake and improved glucose homeostasis.

**Objectives:** Against the background of preclinical studies on metabolic oxytocin effects in males that suggest a certain therapeutic potential of oxytocin delivery for metabolic disorders, we are currently investigating the acute effect of oxytocin on glucose metabolism and snack intake in females in dependence of their menstrual cycle phase and of hormonal contraception.

**Methods:** We are performing a randomized, double-blind, placebo-controlled study in fasting healthy biological women with a natural cycle or taking hormonal contraceptives, who are examined either in the mid-luteal or (late)

follicular phase, or who either take combined or progestin-only oral contraceptives. Each woman participates in two experimental sessions (24 IU oxytocin vs. placebo) that include a snack test to measure hedonic eating behavior, repeated blood sampling to assess cortisol, insulin, glucose and C-peptide concentrations, and questionnaires assessing appetite, hunger and mood.

**Results and Conclusion:** We hypothesize that (i) oxytocin vs. placebo acutely reduces appetite, attenuates snack intake and improves glucoregulation in females and that this effect (ii) is most pronounced during the late follicular phase and (iii) dampened by the intake of oral contraception, in particular progestin-only pills. We hope to gain valuable insights into oxytocin's role in the regulation of food intake and glucose homeostasis in women in dependence of their hormonal status, with a view to informing potential clinical applications.

**Keywords:** oxytocin, glucose metabolism, food intake, oral contraception, menstrual cycle



Abstract number: 3

### **Involvement in research on gender-based violence: participatory reflections on trauma-informed co-production**

*Anna Pérez-Aronsson, Georgina Warner and Elin Inge*

*Uppsala University*

Experiences of gender-based violence (GBV) poses a significant threat to women's mental health. Traumatic experiences such as GBV can have long-lasting effects on well-being and lead to guilt, shame and shattering of trust. Retraumatization can be experienced in service encounters, for example through lack of trustworthiness and exertion of power. Involving people with lived experience of trauma in research and service development is essential for trauma-informed services. This requires public involvement approaches that support those involved rather than reinforcing trauma.

To evaluate practices used to enable trauma-informed public involvement in a three-year long research project aiming to develop a psychosocial support service model for refugees in Sweden with experiences of GBV. The evaluated project was led by a partnership of academic researchers and public contributors; i.e. women with lived experiences of migration and GBV. Reflective notes from the process – including a logbook and recurrent formative self-evaluations – were analysed, using trauma-informed principles as an interpretive lens. This was a participatory analysis

of participatory reflections; researchers and public contributors contributed to creating the notes and to analysing them.

Preliminary findings show that monthly group meetings and frequent and inclusive communication through social media channels promoted trustworthiness, transparency, empowerment, safety and social support. Time and resource constraints caused challenges for upholding key involvement practices. Recurrent formative self-evaluations was useful to bring forth these issues and helped reinforce valued practices. Mutual sharing promoted trustworthiness and social support, and designing the research process in partnership contributed to empowerment and safety.

Trauma-informed public involvement warrants time for deep and purposeful trust-building. Frequent and inclusive communication, regular meetings, mutual sharing and shared decision-making can contribute to building trust and relationships needed for trauma-informed public involvement. Recurrent formative self-evaluations, including researchers as well as public contributors, can help reinforce valued involvement practices.

**Keywords:** trauma-informed, co-production, participatory research, gender-based violence, mental health, migrants

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# Advancing Women's Mental Health Research Across Disciplines

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Abstract number: 4

## Changes in grey matter volume of limbic structures in response to estradiol administration and emotion regulation

*Anna F. Denninger*

*University of Tübingen*

Mastering emotion regulation is crucial for improved social skills and mental health. Hormonal fluctuations, particularly in estradiol levels during the menstrual cycle, can impact emotion processing, with implications for emotion regulation, mental health, and even brain structure. Fluctuating estradiol levels seem to be tied to structural changes in regions rich in estradiol receptors, namely the anterior cingulate cortex (ACC), hippocampus and amygdala. Alterations in these limbic regions are linked to changes in emotion regulation, stress resilience, and susceptibility to depression and anxiety disorders. Understanding the interplay between estradiol, emotion regulation, and brain plasticity elucidate their role in maintaining mental health. To disentangle the effects of estradiol from fluctuations in other sex hormones like progesterone or testosterone on neural plasticity, we pharmacologically increased estradiol levels in a placebo-controlled, double-blinded design in naturally cycling young women (n=27) during their early follicular menstrual cycle phase when endogenous sex hormone levels are low. Structural magnetic resonance scans and emotion regulation abilities (down-regulation of negative

emotions, up-regulation positive emotions and general emotion regulation trait reappraisal) were assessed.

Our data revealed that reappraisal predicts right para-hippocampal volumes independent of estradiol increase. Moreover, rapid estradiol increase alongside emotion regulation abilities predicts increased grey matter volume (GMV) in limbic structures. Specifically, increased estradiol levels and better down regulation of negative emotions are associated with larger GMV of the right hippocampus, left para-hippocampus and right ACC. Increased estradiol levels and better up-regulation of positive emotions is related to increased right amygdala volume.

These findings imply that individual differences in emotion regulation abilities and hormonal status are tied to (para-)hippocampus, amygdala, and ACC volume. Consequently, our results highlight the neuroprotective role of estradiol and emotion regulation, possibly serving as resilience factors for emotional and mental health, especially during phases of hormonal transitions occurring throughout the life span of women.

**Keywords:** Estradiol, emotion regulation, brain volume

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Abstract number: 5

## Linking sex, polygenic risk for sex-biased disorders, and brain aging

*Arielle Crestol, Dennis van der Meer, Ann-Marie G de Lange, Hannah Oppenheimer, Ole A. Andreassen, Ingrid Agartz, Christian K. Tamnes, Claudia Barth*

*University of Oslo & Diakonhjemmet Hospital*

Sex differences are observed in the incidence, manifestation, and disease burden of several autoimmune, neurodegenerative, and mental disorders. Many of these sex-biased disorders are known to affect brain health. For example, multiple sclerosis, Alzheimer's disease, Parkinson's disease, depression, and schizophrenia have all been linked to older brain age relative to chronological age (brain age gap, BAG), derived using brain age prediction. Although the underlying mechanisms of these sex differences are not yet fully understood, the interplay between sex and genetics might impact disease-related sex differences due to the modulating role of sex on gene expression. However, there are limited studies on the effects of genetic risk for sex-biased disorders on BAG, and to our knowledge, there are currently no studies on genetic risk and sex interactions. Here, we will assess whether there are sex differences in the link between polygenic risk scores (PRS) for sex-biased disorders and white matter (WM) and grey matter (GM) BAG in middle to older-aged adults. We will use pre-calculated genome

wide association studies (GWAS) summary statistics to calculate PRS, and BAG will be calculated using data from the UK Biobank. Regression models will be fit to evaluate the interactive effects of PRS and sex on WM or GM BAG for each disorder. Regressions will be run in the entire sample, then in the disease group of interest, and finally in a healthy sub-sample. Analyses will be completed by July 2024. Understanding how genetic predispositions interact with sex to affect brain health can shed light on the underlying mechanisms of sex-specific vulnerabilities and pathophysiology. This knowledge can inform the development of tailored interventions to mitigate or manage these disorders more effectively. Overall, this study is an essential step towards advancing precision medicine, providing valuable insights into factors that can influence brain health across sexes.

**Keywords:** Sex differences, polygenic risk score, brain aging

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Abstract number: 6

### Social Media Use Across the Menstrual Cycle in Adolescent Girls

*Edita Karavidaj*

*University of Tübingen*

**Background:** Social media plays a central role in teenagers' life. Social media usage is more common among teenage girls compared to boys and findings indicate that it might play a significant role in the vulnerability of girls to psychopathology as they go through puberty. Pathological social media use in teenage girls has been linked with increased prevalence of internalizing symptoms such as depressive, anxiety, eating disorders, body image and self-esteem issues. In addition, with the onset of menstruation during puberty, girls experience monthly fluctuations of sex hormones, such as estradiol and progesterone which were linked with changes in mood and affective state. In the vulnerable period of the puberty coupled with onset of menstruation, there is a research gap in the way social media is used throughout the different phases of the menstrual cycle.

**Objective(s):** Key objective is to explore whether there is a specific period throughout the menstrual cycle when adolescent girls are most prone to pathological social media use.

**Methods:** Adolescent girls between 15 and 18 years old will be recruited, 35 with a natural

menstrual cycle and 35 using oral contraceptives. We will invite them three times to our clinic, the first session being the intake session and the next two being neuroimaging sessions. During the neuroimaging sessions, participants will undergo an anatomical scan, a resting state scan, a DTI scan, and a reward-task. During these sessions, blood will be drawn for hormonal assessment and questionnaires will be filled out. Ecological momentary assessment will be conducted through the m-Path app. Questionnaires will be filled out once per day, every day for a month. Surveys will be on mood, self-esteem, and social media use time and activity.

**Results:** The study is currently recruiting and collecting data. Preliminary results will be presented at the conference.

**Keywords:** social media, adolescent girls, menstrual cycle, EMA





Abstract number: 7

### Levonorgestrel Intrauterine Device and Depression: a Swedish register-based cohort study

*Elin Stenhammar, Per Wikman, Kristina Gemzell Danielsson, Helena Kopp-Kallner, Inger Sundström Poromaa*

*Uppsala University*

**Background:** The levonorgestrel intrauterine device (LNG-IUD) is traditionally viewed as a safe contraceptive with limited systemic effects. However, three recent studies have indicated an increased risk of depression subsequent to LNG-IUD use. This study aimed to examine the potential associated risk between LNG-IUDs and depression, and determine which women are at risk.

**Methods:** This longitudinal cohort study was based on data from seven Swedish national population-based registers. All Nordic-born women aged 15-24 years residing in Sweden between 2010 and 2017 were included. Cox regression was implemented to estimate the adjusted hazard ratio (AHR) for developing depression, defined as first depression diagnosis or redeemed prescription for antidepressant treatment. We adjusted for age, education level, parental country of origin, parental psychiatric health, previous hormonal contraceptive use and medical indications for contraceptive use.

**Findings:** 703 157 women were included in the analysis. The LNG-IUD was associated with 57% increased risk of depression [AHR 1.57 (95% CI 1.51-1.64)]. The greatest risk increase was seen in adolescent women [AHR 2.57, (95% CI 2.36-2.80)] and women who used the LNG-IUD as their first hormonal contraceptive method [AHR 1.63, (95% CI 1.50-1.78)]. The risk of depression decreased at the end of study period [AHR 1.43, (95% CI 1.36-1.51)], once the LNG-IUD became more widely accessible among nulliparous women.

**Conclusions:** Adolescent women who use the LNG-IUD as their first-ever hormonal contraceptive are at increased risk of developing depression. However, additional impact from confounding factors is likely as risk estimates decreased over the study period. Further research needs to determine if there is a causal relationship between LNG-IUDs and depression.

**Keywords:** Levonorgestrel intrauterine device, depression, hormonal contraceptives, pharmacoepidemiology

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Abstract number: 8

## **Sick of becoming a parent: The child penalty on parent's mental ill-health**

*Emma Fransson, Erik Grönqvist, Elisavet Iliadi,  
Stavros Iliadis and Erica Lindahl  
Uppsala University*

Men and women have different health behaviour: men are more representative in more severe health outcomes, and women are more representative in more behaviour-related outcomes. A remaining question is how this health-survival paradox relates to the child penalty on health. We study the impact of entering parenthood on a severe health outcome: the risk for inpatient care due to mental ill health. To relate to previous literature, we also use more behavioral related outcomes such as sickness absence and drug prescription due to mental ill health. Having a child increases the risk of having deteriorated mental health requiring inpatient hospital care for both men and women but the risk increases significantly more among men. Descriptive analysis suggests that this gender differences is reinforced with parenthood, but only in couples with traditional gender norms, suggesting that gender different health behaviour is reinforced by parenthood.

**Keywords:** Gender equality, Parenthood, Mental health



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Abstract number: 9

## Selective progesterone receptor modulation and brain activity at rest in patients with premenstrual dysphoric disorder

*Elisavet Kaltsouni*

*Uppsala University*

Ovarian hormones have been indicated to impact brain connectivity and mood. However, there is no consistent evidence on hormone-dependent functional connectivity and mental health. Alterations in resting state networks have been suggested as markers of affective disorders, but only preliminary evidence is provided on premenstrual dysphoric disorder, in which symptoms occur upon fluctuations of ovarian hormones. Recently, three-month low-dose selective progesterone receptor modulator (SPRM) administration has been associated with symptom relief and differential task-based brain reactivity during a reactive aggression condition. The present study sought to investigate the effect of this treatment on resting state functional connectivity (rs-FC) in patients with PMDD. Seed-based analyses were conducted, including seeds from candidate resting state networks along with the functional cluster affected by SPRM treatment. Within previously identified networks related with emotional and cognitive processing, rs-FC was compared between individuals with PMDD during the symptomatic luteal phase before randomization to treatment or placebo,

and during the end of the last treatment cycle. Seed-based rs-FC analyses yielded significant treatment by time effects on rs-FC between the left posterior superior temporal gyrus and the right insula cortex, between the posterior cerebellum and the left temporal pole, and between the right lateral visual network and left superior frontal gyrus. Decrease in visuo-frontal luteal phase connectivity was observed for the SPRM group and was positively correlated with delta change in mood symptom severity in the placebo group. Cerebellar and temporal connectivity increased for the SPRM treatment group, while temporo-insular connectivity decreased and was positively correlated with cortisol levels. These findings indicate that SPRM treatment influenced rs-FC, which could be a relevant mechanism behind symptom alleviation.

**Keywords:** brain; resting state; premenstrual; women

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# Advancing Women's Mental Health Research Across Disciplines

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Abstract number: 10

## **Mental health trajectories and dimensional phenotypes throughout pregnancy and postpartum in relation to prior premenstrual symptoms**

*Ella Schleimann-Jensen, Alkistis Skalkidou,  
Erika Comasco*

*Uppsala University*

**Background:** Premenstrual dysphoric disorder (PMDD) and peripartum depression (PPD) are two hormone-related mood disorders. Both disorders supposedly occur due to an increased sensitivity to the fluctuations of ovarian hormones, and PMDD might act as a risk factor for PPD. Well-powered studies investigating the association of the two disorders are needed, as well as investigations of the contribution of PMS/PMDD to trajectories and dimensional phenotypes of PPD.

**Objective(s):** The present study aimed to investigate the association between PMS/PMDD and PPD, also considering symptom severity and onset, as well as dimensional phenotypes of PPD.

**Methods:** Participants of two large, longitudinal pregnancy cohorts in Sweden were followed throughout pregnancy until one year postpartum, using the Edinburgh Postnatal Depression Scale (EPDS). Premenstrual symptomatology was retrospectively assessed sometime during pregnancy, along with other psychosocial

characteristics. Analyses were run using EPDS as the outcome, in both a continuous and dichotomized format (threshold  $\geq 12$ ), and PMS/PMDD as the main exposure.

**Results:** PMS, and even more markedly PMDD, were significantly associated to PPD during the whole peripartum period in both cohorts, with odds ratios up to 1.80 (early pregnancy) and 2.98 (late pregnancy), respectively for PMS and PMDD, after adjustment for confounders. The association was not different among the PPD trajectories related to onset and persistency of PPD symptoms, although PMS and PMDD were associated with dimensional phenotypes of PPD reporting more severe symptoms of depression, anxiety and anhedonia.

**Conclusions:** There is an association between PMS/PMDD and depressive symptoms during pregnancy and postpartum, and the association is related to dimensional phenotypes of moderate to severe symptoms of PPD.

**Keywords:** PMS, PMDD, PPD

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Abstract number: 11

## Separation between mothers and infants after birth- Reasons and mothers experiences

*Emilia Biskop Lindgren, Ylva Thernström Blomqvist, Barbro Diderholm, Alkistis Skalkidou, Maria Grandahl*

*Uppsala University*

**Background:** The importance of zero separation, with immediate skin-to-skin care as a main component, as the expected environmental requirement for better physiological outcomes for newborn infants are well described. Despite this, there is a gap between the knowledge of zero separation and existing practices in the care of newborn infants and their mothers.

**Objective:** To investigate, from the mother's perspective, reasons for, and experiences of, mother-infant separation directly after birth.

**Methods:** The sample is selected from the Mom2B cohort (N=>6500), a mobile application based ongoing national perinatal mental health cohort in Sweden. We included mothers (n=374) who had been separated from the infant after birth and who had completed the open-ended questions about separation. Thematic analysis was implemented.

**Results:** One overarching theme, "Lack of organizational structures that enable couplet care" referred to the healthcare system being

built in a way so that two individuals in need of care from different specialists could not stay together, even if the individuals in these cases were a newborn infant and their mother. The mother and infant were often separated even if only one of them was in need of care, due to routines or infrastructure.

**Conclusions:** Units need to collaborate, communicate, plan, and be aware of the negative effects of separation. An event can be perceived as separation by some, and not by others, it's important for caregivers to be attentive to this experience. Mothers' experiences of and reasons for separation point to structural obstacles within the healthcare system that need to be addressed, in order to minimise the burden of separation.

**Keywords:** mothers, newborn infants, neonatal care, separation

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Abstract number: 12

## How do young individuals understand and interpret questions which aim to measure anxiety?

*Emma Ahlqvist Lindqvist*

*Uppsala University*

**Background and Objective:** In the Swedish national public health survey of 2022, 73 % of the girls and 46 % of the boys aged 16-29 said that they had experience of worry and anxiety. These numbers are alarming. However, the prevalence of anxiety among young individuals in Sweden is grossly understudied. The statistics from the Swedish national public health survey are the result of a single question ("Do you have any of the following discomforts or symptoms: Worry or anxiety?") and a recent report reveals difficulties and disparities among young individuals in Sweden in understanding this question. There is a need to assess young individuals' anxiety more comprehensively. The Generalized Anxiety Disorder 7-item scale (GAD-7) is a well-established self-report questionnaire which in theory could measure anxiety in a comprehensive and valid way. However, there is a need to explore how young individuals in Sweden actually understand and interpret this questionnaire.

**Method:** A qualitative study will be conducted, using individual interviews with around 30 young individuals. The interviews will be inspired by the think aloud-method, where the participants will

be asked to share all their thoughts and feelings as they answer the GAD-7, with the purpose of capturing their spontaneous thoughts and reactions. The target population is young individuals aged 15-29 years in Sweden, representing different genders and sociodemographic backgrounds.

**Results and potential impact:** Interviews will be conducted during the spring and summer of 2024 with planned results in the late fall of 2024. This study will allow for enhanced knowledge of the complex phenomenon that is mental health by letting young individuals' own voices be heard. Further, this project will help us understand present and future reports of anxiety among young individuals in Sweden and might guide us to better measure as well as interpret statistics of anxiety.

**Keywords:** Anxiety, Measurement, Questionnaire, Think aloud

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## Advancing Women's Mental Health Research Across Disciplines

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Abstract number: 13

### Examining Longitudinal Effects of Emotion Regulation on Sleep Behavior in Middle Childhood

*Emma J. Heeman, Tina Sundelin, Johan Vegelius, Matilda A. Frick, Tommie Forslund, Andreas Frick, Lilja K. Jónsdóttir, & Karin C. Brocki.*

*Uppsala University*

The influence of emotion regulation (ER) on sleep in childhood has received increased attention. Questions remain regarding the respective roles of the ER dimensions reactivity and regulation, whether general or ER of distinct emotions exhibit specific associations and predictions, and if there are pathways from ER to sleep in middle childhood. We longitudinally investigated these questions by measuring child ER (general and of distinct emotions) with caregiver reports on the Emotion Questionnaire at children ages 36 and 72 months, and 9 years. Child sleep quality, sleep duration during school and weekend days, and sleep onset latency were obtained through caregiver reports at 9 years. Correlational analyses revealed the most consistent and strongest longitudinal associations between the ER dimensions and sleep quality in the expected direction, followed by notable associations with sleep duration. All correlational patterns between ER and the sleep characteristics showed signs of discontinuity, particularly noticeable at 72 months. Discontinuity was also reflected in the path analyses, showing unexpected effects of ER

on sleep at 72. Among the path models tested, the predictors general ER demonstrated the best fit for sleep quality, duration school, and SOL. Fear ER showed superior fit for sleep duration weekend. All exuberance ER models showed poor fit. In every model, most predictors exhibited direct effects on the sleep outcomes, and at least a couple of mediations between reactivity and regulation were found, except for the sadness – sleep duration weekend model. Our findings provide partial evidence for an influential role of ER in sleep health. Discontinuity in the findings is discussed in light of potential interaction with school routines, social jetlag, and sleep chronotype.

**Keywords:** Emotion Regulation, Sleep, Behavior, Childhood, Longitudinal



Abstract number: 14

## **Emotion regulation as predictor for peripartum depression: Data from prospective Swedish national cohort study Mom2B**

*Franziska Weinmar, Birgit Derntl, & Alkistis Skalkidou*

*University of Tübingen*

**Background:** Pregnancy is a physiological and psychosocial transition phase presenting a window of vulnerability for mental health, specifically peripartum depression (PPD). A transdiagnostic factor for psychopathology is emotion regulation (ER), which is also suggested to play a role in PPD. In pregnant women, inadequate self-reported ER has been associated with increased rates of depression, and after birth, the use of regulation strategies was found to predict PPD symptoms. However, research on ER during peripartum is scarce and no study to date has examined longitudinal associations of ER with PPD symptoms.

**Objective:** Using data of the Mom2B Swedish national cohort, this study investigates ER and its associations with depressive symptoms across peripartum with the aim to assess whether ER abilities can predict PPD symptoms.

**Methods:** ER, assessed using the Deficits in Emotion Regulation Scale (DERS; 1xantepartum, 1xpostpartum), and depressive symptoms assessed using the Edinburgh Postnatal

Depression Scale (EPDS; 2xantepartum, 4xpostpartum) are described for the whole sample. DERS differences between EPDS trajectory groups are investigated using ANOVA model. Multiple linear regression models of DERS and covariates on EPDS are performed.

**Results:** Preliminary results show that DERS scores are stable across peripartum for all women. Higher DERS scores significantly predict enhanced depressive symptoms during and after pregnancy, even when controlling for important covariates. Notably, women reporting depressive symptoms postpartum have higher DERS scores already antepartum, and specific DERS subscales seem to be predictive of early or late postpartum depressive symptoms.

**Conclusion:** Decreased ER abilities were noted as risk factor for increased self-reported PPD symptoms; this study thus suggests that the DERS could be included in an early screening tool to identify women at risk for PPD. As effective ER can be learned, this presents opportunities for psychoeducation and/or intervention approaches to improve prognosis and reduce the burden of PPD on mother and child.

**Keywords:** peripartum, emotion regulation, peripartum depression, maternal health





Abstract number: 15

## **Modeling brain sex in the limbic system to track female-specific processes**

*Gloria Matte Bon, Erika Comasco, Birgit Derntl, Tobias Kaufmann*

*University of Tübingen*

**Background:** Machine learning models that classify sex relying on structural neuroimaging data of the whole brain have been used to study sex differences in the brain, potentially overlooking regional specific effects. The limbic system, a key player in emotional processing, has been shown to undergo structural changes across different hormonal states.

**Objectives:** Here, we aim to investigate whether a limbic-based model for brain sex may provide estimates that are more sensitive to female-specific changes compared to a non-limbic model.

**Methods:** Using available open data, we trained a limbic and a non-limbic model in two sex-balanced samples (adults and children). We then externally validated our models in independent samples and investigated the association of the class probabilities obtained for each model with depression (MDD) (adults) and with age, pubertal developmental scores (PDS) and menarche onset (children).

**Results:** In adults, MDD diagnosis was associated with an increase in class probabilities for all

models, in the direction of a more female-like brain, compared to healthy controls. When analyzing the association within each sex, we found a significant increase in class probabilities only for the limbic model in females, while no significant associations were found in males. In children, the class probabilities were correlated with age, leading to better classification according to biological sex for older subjects. These results were confirmed in two independent longitudinal samples, as indicated by the increase in performances at follow-up compared to baseline. Furthermore, a significant association between class probabilities and PDS scores was found for the limbic but not for the non-limbic model in females, while no association was found in males. Finally, menarche onset between the two sessions was associated with greater changes between sessions only for the limbic estimates.

**Conclusion:** Overall, these results confirm the potential of limbic models to investigate female-specific changes in the brain.

**Keywords:** Machine learning, sex differences, neuroimaging, mental health, puberty



Abstract number: 16

**Testing Causal Links Between Estradiol, Brain Health, and Mental Health in Females – A Mendelian Randomization Study**

*Hannah Oppenheimer, Dennis van der Meer, Louise Schindler, Lars T. Westlye, Ann-Marie G. de Lange, Claudia Barth*

*University of Oslo & Diakonhjemmet Hospital*

Depression and Alzheimer's disease (AD) are twice as common in females compared to males, yet underlying reasons for prominent sex differences including the potential role of sex hormones in mental health and brain health are understudied. Some studies suggest links between higher estradiol levels and lower risk of depression and AD, as well as younger brain age relative to chronological age (brain age gap; BAG) as a proxy of brain health. However, results are inconsistent partly due to methodological challenges. Mendelian randomization (MR) can overcome some of these challenges (e.g., confounding and reverse causation) by using genetic variants to test for causal associations. We examined whether genetically-predicted estradiol levels and various proxies of lifetime estradiol exposure (i.e., reproductive span, age at menarche, age at menopause, number of childbirths, hormone replacement therapy use, oral contraceptive use, history of hysterectomy, and history of bilateral oophorectomy) are causally linked to depression, AD, and BAG in females, by conducting two-sample MR analyses

using female-specific summary statistics from previously published and newly run genome-wide association studies. No significant causal associations were found between estradiol levels or any of the proxies of lifetime estradiol exposure with depression, AD, or BAG, except for a significant association between age at menarche and depression ( $b = -0.09$ ,  $se = 0.04$ ,  $p = .02$ ). However, this association did not remain significant throughout robust MR methods. While the results do not support simple causal links between estradiol and depression, AD, and BAG, future studies should assess the relevance of time-varying effects, such as hormonal fluctuation periods, such as changes occurring throughout pregnancy. Few previous studies have conducted sex-specific MR analyses, thus, relationships between sex hormones, brain health, and mental health should be further explored using combined sex-specific and causal approaches.

**Keywords:** Female Health, Mendelian Randomization, Estradiol, Mental Health, Brain Health



Abstract number: 17

## Remission or persistence? A prediction tool to identify women at risk for long-term depressive symptoms postpartum

*Karin Gidén, Richelle Duque Björvang, Richard A White, Lisa Vinnerljung, Stavros I Iliadis, Alkistis Skalkidou, Emma Fransson*

*Uppsala University*

**Background:** Peripartum depression is a common complication with potential long-term adverse effects on the woman and her family. Approximately 30–50% of newly delivered women experience prolonged depressive symptoms at 6–12 months postpartum. Early prediction may facilitate preventive and treatment interventions.

**Aim:** To investigate correlates for and create a tool for predicting long-term symptomatology in women experiencing depressive symptoms at six weeks postpartum.

**Methods.** Data from the Biology, Affect, Stress, Imaging and Cognition study was used, to identify women who scored high ( $\geq 12$ ) on the Edinburgh Postnatal Depression Scale (EPDS) at six weeks postpartum ( $n=697$ ). Further, we collected data from medical records and included 40 variables based on earlier studies and clinical experience. A total of 654 women were included. Elastic net linear regression analysis was performed to

identify predictors of continued symptoms at six months postpartum. An equation predicting the EPDS score at six months postpartum based on weighted variables was developed.

**Results:** Attention deficit hyperactivity disorder/attention deficit disorder, depressive symptoms and anxiety during pregnancy, pregnancy complications, stressful events, history of depression and parity were predictive factors of prolonged depressive symptoms. Sleep for more than six hours per night in pregnancy week 17 and high education level were protective factors. A prediction tool with Area Under Curve 0.73 and Positive Predictive Value of 79–83% depending on chosen EPDS cut-off was developed for clinical use.

**Conclusions:** Our prediction tool offers a method to identify women at risk for persisting depressive symptoms postnatally, based on their significant depressive symptoms during the first weeks after delivery. Screening in order to identify these women can already start at the antenatal setting.

**Keywords:** postpartum depression, peripartum depression, EPDS



Abstract number: 18

**Loneliness and its association  
with subsequent mental health  
problems in young people***Karina Grigorian, Viveca Östberg, Jonas  
Raninen, Sara Brolin Låftman**Stockholm University*

Introduction: Given the overall prevalence of loneliness and its adverse implications for health, it is acknowledged as a global public health concern (Taylor et al., 2023). Multiple studies have demonstrated its detrimental effects on adolescent health across various countries (e.g., Stickleby et al., 2016; Lyyra et al., 2021). This impact may be particularly pronounced during the transition from adolescence to young adulthood—a period characterised by numerous social changes and recognised as vulnerable in terms of social relations (Lee et al., 2018). Although many studies investigated the relationship between loneliness and mental health, few studies have specifically focused on this transitional period, examining a wide range of indicators of mental health problems. Utilising data on mental health problems from both self-reports and register information can provide a more nuanced understanding of this relationship, representing a merit of the current study. The aim of this study is to examine the associations between loneliness and various subsequent mental health problems among young people, transitioning from late adolescence to young adulthood. In addition to exploring a diverse set

of indicators for mental health problems, the current study will examine changes in loneliness over time and its association with various mental health problems.

Methods: The data is derived from Futura01, a national Swedish cohort study that included adolescents attending grade 9 in 2017 (~15–16 years). Follow-up surveys were performed in 2019 (when respondents typically attended the second grade of upper secondary school; ~17–18 years) and 2022 (~20–21 years) (n=~2500). In the current study, self-reported information on loneliness, psychosomatic complaints, and depression and anxiety symptoms was utilised from two survey waves conducted in 2019 and 2022. Furthermore, this information was linked to registry data on in-patient and out-patient care (from 2021), medication use (from 2021) and sociodemographic characteristics.

**Keywords:** Loneliness, mental health, youth, young adults



Abstract number: 19

## **A Narrow View of Women's (Mental) Health? Fertility Practitioners Discuss Oocyte Donor Assessments at Swedish Public and Private Clinics**

*Matilda Lindgren, Maja Bodin, Evangelia Elenis, Ulrika Dahl*

*Uppsala University*

**Background:** In Sweden, oocyte donation can only occur for altruistic reasons. Additionally, donors need to be “completely healthy”, without underlying medical or psychiatric conditions. While both gamete donors and recipient parents go through a medical and psycho-social screening process, little is known about fertility practitioners reasoning regarding mental health status in assessments of oocyte donors.

**Objective(s):** This study aims to explore how fertility practitioners in Swedish public and private clinics discuss and reflect on assessments of mental health status in oocyte donors

**Methods:** The study draws on focus group discussions (N: 4) with fertility practitioners (N: 19) at four private and public clinics in different regions of Sweden. Invited participants received oral and written information about the purpose of the study before booked for a group discussion. All group discussions took place during work hours and were moderated by a researcher, using a semi-structured interview

guide. Interview transcripts were analysed using reflexive thematic analysis. Discussions around mental health assessments were highlighted and coded using an inductive analytical approach.

**Results:** Mild and moderate mental health conditions were described as common reasons to exclude donor candidates. These assessments were also discussed as potentially problematic and challenging to communicate. Here, participants referred to having to exclude many otherwise “high-functioning” individuals due to past struggles. Furthermore, participants could be critical of their own assessments and discuss how what society regards as “healthy” or “normal” changes over time.

**Discussion:** Following these results, we encourage more discussions around who these assessments are made for and what they might result in. To what extent are screenings performed to protect donors or to strengthen clinical success and output? And could it be argued that these screenings contribute to a narrow view on health, in particular female mental health

**Keywords:** fertility practitioners, clinical decision-making, oocyte donors, mental health screening, medically assisted reproduction

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# Advancing Women's Mental Health Research Across Disciplines

WOMHER International Graduate Conference 2024

Abstract number: 20

## **The effects of estrogen receptor genotype on developmental trajectories to depression and anxiety in women**

*Mirac N Musaoglu, Susanne Olofsdotter,  
Vanessa Nieratschker, Erika Comasco*

*University of Tübingen*

Estrogen is an ovarian hormone that crosses the blood-brain barrier and regulates mood and anxiety through neuromodulatory and neuroprotective actions on the brain. Estrogen levels increase during puberty and may contribute to emerging sex differences in the prevalence of mental disorders after this developmental period. Variations in the estrogen receptor gene, which affect the sensitivity and efficacy of estrogen, have been linked to depression and anxiety disorders in females across different age groups. The current study aims to investigate the role of two functional ESR1 single nucleotide polymorphisms on early-life trajectories to internalizing symptoms in women.

Female adolescents (N=1036) were genotyped for rs2234693 and rs9340799 variations in ESR1 and questionnaires on anxiety (SCAS) and depression (DSRS) symptoms, as well as early life events (CASE), parenting (PASCQ) and personality (BFI), were collected from adolescents at two time points corresponding to ages 14.4 and 17.4 and from parents at one time point. Linear regression models and

nonparametric permutation tests were used to analyze gene-environment interactions as predictors of internalizing disorders. A path analysis model was fitted to examine links between genetic and environmental factors in developmental trajectories to depression and anxiety.

The preliminary findings revealed no significant direct or indirect effects of ESR1 genotype on depression and anxiety in adolescent girls. The path analysis model showed distinct contributions of early life events and personality, particularly neuroticism, to psychopathologic outcomes. Further analyses will explore the impact of ESR1 genotypes on internalizing symptomatology in young adult women, with results expected by the conference. The preliminary findings highlight the importance of environmental factors and personality on early internalizing trajectories and further findings of this study have the potential to provide better insights into role of estrogen receptor gene-environment interactions in anxiety and mood disorders in women.

**Keywords:** estrogen receptor, mood, anxiety, gene-environment interactions



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# Advancing Women's Mental Health Research Across Disciplines

WOMHER International Graduate Conference 2024

Abstract number: 21

## **Oxytocin's role in reward processing in dependence of the menstrual cycle and oral contraception: preliminary results of an fMRI study**

*Nina Röhm, Anna Willmann, Sara Fritsche, Christian Benedict, Johannes Klaus, Nils B. Kroemer, Manfred Hallschmid*

*University of Tübingen*

**Background:** The hypothalamic neuropeptide oxytocin is best known for its physiological effects in the female organism and for its psychosocial impact. Oxytocin receptors are abundant in brain regions that process reward, e.g., in the ventral tegmental area. Fittingly, oxytocin administration modulates the processing of (food-related) rewards, but these more recent studies have largely focused on young, healthy men. The need for respective investigations in females is highlighted by the fact that oxytocin interacts with sex hormones such as estradiol.

**Objectives:** In our project of the International Research Training Group 2804 on Women's Mental Health Across the Reproductive Years, we are currently assessing at the University of Tübingen if intranasal oxytocin modulates behavioral effort allocation when different rewards are at stake (food or money), and investigate underlying neural processes, in naturally cycling women and women taking oral

contraceptives.

**Methods:** In a randomized, cross-over study, females receive 24 IU oxytocin and, respectively, placebo 45 minutes before performing an effort allocation task, which imposes response and opportunity costs in gaining rewards or avoiding losses, during functional magnetic resonance imaging (fMRI) with a 3 Tesla Siemens scanner. We examine women with a natural menstrual cycle either in the (late) follicular or mid-luteal phase, as well as women taking combined or progestin-only oral contraceptives (n = 30 per group).

**Results and conclusion:** We hypothesize that oxytocin vs. placebo decreases effort exertion (and snack intake) and that this effect is (i) stronger for food-related compared to monetary rewards, (ii) more pronounced during the follicular vs. luteal phase, and (iii) dampened by progestin-only contraceptives. Furthermore, we hypothesize that oxytocin vs. placebo enhances the activity of reward-processing brain regions. We expect our study, which we expect to complete in early 2025, to provide new insights into the relationship between oxytocin signaling, reward processing and sex hormones.

**Keywords:** Oxytocin, reward, motivation, fMRI, oral contraceptives, menstrual cycle



Abstract number: 22

## **Postpartum depression through a preclinical lens: The effects of an IL-1R antagonist on antidepressant efficacy**

*Romina Garcia de Leon, Wansu Qiu, Amanda Namchuk, Stephanie E. Lieblich, Liisa.A.M. Galea*

*University of Toronto*

The greatest risk of first-time depression during a female's lifetime is during the postpartum, called postpartum depression (PPD). Many biomarkers associated with MDD are seen in the postpartum, indicating possible mechanisms of increased risk during this period. Selective serotonin reuptake inhibitors (SSRIs) remain the most prescribed medication for postpartum depression. However, few people with PPD achieve remission with SSRIs. Moreover, children of mothers with PPD experience an increased risk of depression. Our lab established the first preclinical models of PPD, one of which administers high levels of the stress hormone, corticosterone (CORT) during the postpartum. In this PPD model, dams display depressive-like endophenotypes. Reduced SSRI efficacy, in the CORT-induced model of PPD was commensurate with increased hippocampal levels of the proinflammatory cytokine IL-1 $\beta$ , indicating this may be an important target to boost SSRI efficacy. Our central hypothesis is that antidepressant efficacy in the postpartum is mediated by inflammatory signalling.

High CORT or OIL vehicle was administered to the dams on postpartum days (PD) 2-23 along with fluoxetine (FLX) and/or anakinra (KIN), an IL-1R antagonist or vehicle (saline). Maternal care behaviours are recorded (PD2-8) and passive coping in the forced swim test (FST) on PD22 and 23. All dams were euthanized at postnatal day 23 to examine markers of neuroplasticity. Hippocampal brain slices were stained for perineuronal nets (WFA+ cells) a marker of neuroplasticity inhibition, and doublecortin (DCX+ cells) a marker of immature neurons.

Results indicate that dams treated with KIN failed to rescue passive coping behaviours but did rescue deficits in hippocampal perineuronal nets (PNNs). We hypothesize that we will see similar effects in hippocampal DCX expression. Findings indicate that IL-1 $\beta$  may serve as a potential target for increasing antidepressant efficacy in PPD.

**Keywords:** Postpartum depression, Immune system, Antidepressant efficacy, Glucocorticoids, Depression, Neuroplasticity, Neurogenesis

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# Advancing Women's Mental Health Research Across Disciplines

WOMHER International Graduate Conference 2024

Abstract number: 23

## **Negative emotionality in relation to epigenetics of estrogen signaling during puberty.**

*Selin Tuzcu, Mirac Nur Musaoglu, Birgit Derntl, Erika Comasco, Vanessa Nieratschker*

*University of Tübingen*

Puberty leads to the higher prevalence of mental illnesses in females compared to males. The susceptibility to mental illnesses in females could be caused by an interaction of different factors such as hormonal fluctuations, neurodevelopment, and epigenetics during puberty. This research aims to elucidate the interplay of these factors shaping sex differences in affective disorders post-puberty.

To examine the impact of puberty and epigenetic alterations on negative emotionality (i.e., stress and startle response), this cross-sectional study enrolls healthy participants, consisting of two cohorts of girls: 100 pre-pubertal (aged 8-10 years) and 100 post-pubertal (aged 15-17 years). Stress response is analyzed at the neuronal level using the Montreal Imaging Stress Task (MIST), encompassing physiological, hormonal, and affective levels across puberty. The study also examines prepulse inhibition and the acoustic startle response using electromyography (EMG) to gauge responses to aversive stimuli and sensorimotor gating mechanisms. Additionally, cortisol levels, sex hormones, and genes related

to the estrogen signaling pathway and neuronal estrogen-responsive genes like BDNF will be monitored.

Three measurements utilizing the MIST with adolescents have been conducted, while EMG measurements are yet to commence. The poster to be presented at the WOMHER Conference will showcase data collected from pre- and post-pubertal comparisons of stress reactivity and startle response in relation to hormones and DNA methylation, with a specific focus on BDNF methylation data from saliva samples.

**Keywords:** epigenetics, puberty, estrogen signaling



Abstract number: 24

**Body image in women  
diagnosed with breast cancer: a  
meta-analysis and systematic  
review***Serenay Yazici Sarikaya, Rui Wang, Ann-Christin Kimmig, Anna Wikman and Birgit Derntl**University of Tübingen*

**Background:** Breast cancer is the most commonly diagnosed cancer among women. Its treatment has adverse effects on women's lives, affecting psychological well-being, physical and psychosexual health, emotional well-being, as well as body image. Recognizing the significance of body image for breast cancer patients is important, it can potentially contribute to a deterioration in overall quality of life.

**Purpose:** This study aims to comprehensively assess scientific evidence and synthesize findings to clarify the impact of breast cancer on body image (BI) in patients undergoing or having undergone treatment for breast cancer, based on the following research questions: 1) What disparities exist in BI perception between breast cancer patients (BCP) and healthy women (HC)? 2) How does breast cancer affect changes in BI over time and/or before and after treatment? 3) What is the impact of mastectomy (MX) and breast-conserving therapy (BCT) on BI in BCP?

**Methods:** Following a literature search in various

databases, 3904 articles were identified by Uppsala University Library. The systematic review and meta-analysis were conducted according to the guidelines outlined in the PRISMA2020 statement.

**Results and Conclusion:** The study included 33 studies for the meta-analysis and 16 studies eligible for the systematic review. BCP exhibited significantly greater BI concerns compared to HC ( $p=0.022$ ,  $n\text{-studies}=6$ ,  $n\text{-BCP}=469$ ,  $n\text{-HC}=479$ ). Moreover, post-treatment BCP experienced greater BI concerns than before treatment ( $p=0.004$ ,  $n\text{-studies}=12$ ,  $n\text{-PRE}=1356$ ,  $n\text{-POST}=1241$ ). Additionally, no significant difference in BI was observed for treatment length (6 vs 12 months) among BCP undergoing treatment ( $p=0.366$ ,  $n\text{-studies}=5$ ,  $n\text{-6 MONTHS}=811$ ,  $n\text{-12 MONTHS}=750$ ). The type of surgery (MX vs BCT) demonstrated no significant difference in BI ( $p=0.565$ ,  $n\text{-studies}=13$ ,  $n\text{-MX}=688$ ,  $n\text{-BCT}=1084$ ). The findings emphasize breast cancer's substantial impact on BI, with a stable impact across variations in surgical techniques and treatment durations. Future research may delve into diverse medical treatments, long-term effects, metastasis, and psychosocial dynamics, including psychosexual health, impacting BI.

**Keywords:** Breast cancer, Body image, Meta-analysis, Systematic review

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# Advancing Women's Mental Health Research Across Disciplines

WOMHER International Graduate Conference 2024

Abstract number: 25

## **Modelling the female brain – How computational psychiatry can help us understand women's mental health across the (Life)Cycle**

*Theresa S. Horn, Andreas Frick, Birgit Derntl,  
and Peter Dayan*

*Max Planck Institute for Biological  
Cybernetics; University of Tübingen*

Female brains are exposed to significant hormonal fluctuations every month, though these changes are sometimes influenced by hormonal treatments, and eventually decrease after the menopausal transition. These monthly fluctuations have obvious physiological and metabolic correlates. However, they are also associated with notable differences in facets of behaviour such as decision-making, and duly with systematic variation in the neural substrates of this behaviour. This prominently includes the operation of dopaminergic neuromodulation, which is involved in learning, as well as in risk and reward sensitivity. Although these behavioural characteristics and their neural underpinning are the precise targets of much computational psychiatry, they have yet to be investigated with hormonal precision in females.

In this project we will fill this gap by collecting longitudinal data from women in different life phases; neuroimaging and hormonal data will be collected from the same participants in collaborating studies. We will administer well-established cognitive tasks that assess risk and

reward sensitivity, and that are designed to allow repeated data collection. Based on previously shown interactions of female sex hormones with dopaminergic learning signals, we expect to observe changes in performance within the monthly cycle as well as across different life phases. We will then extend existing computational models of the resulting behaviour to allow us to test and refine hypotheses about the impact of female sex hormones and menstrual cycle phases on the latent drivers of choice. With this study, we hope not only to provide insights as to how hormonal changes could give rise to changes in risk and reward sensitivity, but also to give researchers in the field of women's mental health a new methodology to evaluate and better understand hormonally-induced behavioural differences.

**Keywords:** women's mental health, reinforcement learning, computational psychiatry, neuromodulation, behavioural modelling



Abstract number: 26

**How the use of combined oral contraceptives affects the ovarian reserve***Ulrike Bernig, Madeleine Kördel, Melanie Henes**University of Tübingen*

**Background:** Ovarian Reserve (OR) is generally assessed by antral follicle count (AFC) and Anti-Muellerian Hormone (AMH) and informs about a woman's reproductive lifespan and menopausal timing. Combined oral contraceptive (OC) use was found to suppress the hypothalamo-pituitary axis resulting in lower FSH and LH and hence reduced follicular activity.

**Objectives:** This study aims to examine how OR parameters differ in users of OC and naturally cycling (NC) women. Moreover, it seeks to investigate how the initiation, termination or long-term use of OC affects the OR.

**Methods:** A longitudinal design is used including two measurements that are three months apart. Out of 27 recruited participants 18 have participated in the first measurement so far. Women who want to start taking OC ( $n = 12$ ), women who want to stop using OC ( $n = 4$ ), and long-term OC-users ( $n = 2$ ) are examined. During both measurements a blood sample is collected to determine AMH, and a transvaginal ultrasound is performed to determine ovarian volume and AFC. Measurements are done before

and during OC use (OC starters) and during and after the termination of OC use (OC stoppers). Long-term users are in their active pill intake weeks at both measurements. Participants are on average 24.1 years old ( $SD = 3.43$ ). The mean BMI is 23.3  $kg/m^2$  ( $SD = 2.85$ ). 69% of OC users take an androgenic OC type.

**Preliminary Results:** As of now, the results from the first measurement show no significant differences between the three study groups for the OR parameters AMH, AFC and ovarian volume.

**Conclusions:** Measurements before, during and after OC intake provide an understanding of time-related changes in OR associated with OC use.

The study remains ongoing. So far, no relevant differences have been observed between the three groups. Further evaluations are awaited, and results will be presented at the congress.

**Keywords:** oral contraceptives, ovarian reserve, AMH, AFC, ovarian volume





Abstract number: 27

**Antibiotic or gastric acid inhibitor use during pregnancy and postpartum depression**

*Unnur Gudnadottir, Njeri Kamau, Romina Fornes, Minh Hanh Nguyen, Steven Callens, Emma Fransson, Lars Engstrand, Robin Bruyndonckx, Nele Brusselaers*

*Karolinska Institutet*

**Background:** Postpartum depression is one of the most common non-obstetric postnatal complications. The microbiome (and gut-brain axis) as well as inflammation may be involved in the mechanism, and the effect of microbiome modulating drugs during pregnancy is not well studied.

**Objective(s):** We aimed to assess if antibiotic or gastric acid inhibition use during pregnancy affect the risk of postpartum depression (clinical diagnosis and/or antidepressant use up to one year after childbirth).

**Methods:** This population-based cohort study used first singleton pregnancy resulting in a live birth in Sweden from 2006-2016. Women with history of depression were excluded. Multivariable logistic regression models were used to assess the impact of antibiotics and gastric acid inhibitors and other risk factors, presented as odds ratios (ORs) with 95% confidence intervals (CI).

**Results:** Overall, 29% of all 10 666 women with postpartum depression were exposed to antibiotics and 6.2% to gastric acid inhibitors, compared to respectively 21% and 3.2% of 613 205 women without postpartum depression. Antibiotic use during pregnancy was associated with postpartum depression (OR 1.43, 95% CI 1.37-1.49), particularly for quinolones and other antibacterials (including nitroimidazole derivatives). Gastric acid inhibition was associated with an even higher risk than antibiotics, (OR 2.04, 95% CI 1.88-2.21). Both antibiotics and gastric acid inhibitors suggested higher risk with increased dose in a dose-response analysis.

**Conclusions:** The use of antibiotics and gastric acid inhibition drugs during pregnancy appeared to be associated with a higher risk of postpartum depression. However, it's important to consider that other predisposing factors could contribute to this increased risk, even after excluding individuals with a history of depression

**Keywords:** Microbiome; Postnatal depression; Antibiotics; Gastric acid inhibition; Pregnancy.



Abstract number: 28

**Maternal-fetal cardiac coupling  
during late pregnancy**

*Volha Auchynnikava, Katrin Sippel, Lorenzo Semeia, Sara Y. Brucker, Anna-Karin Wikström, Hubert Preißl*

*University of Tübingen*

**Background:** Maternal emotional state has been linked to the changes in maternal and fetal heart rate (HR), heart rate variability (HRV) and maternal-fetal cardiac coupling (MFCC). These measures reflect the status of the autonomic nervous system and might predict the neuromaturation of the fetus. The objective of the study is to assess the changes in MFCC during the third trimester of pregnancy under different stress conditions, e.g. metabolic and psychological. Additionally, a systematic review with meta-analysis will be performed to assess the current state of the research regarding the influence of prenatal stress on maternal and fetal HRV and MFCC.

**Methods:** MFCC was investigated using magnetocardiography recordings from 35 pregnant women, 32 – 38 weeks of gestation (62 datasets, including 30 recordings in resting state and 32 recordings during the fetal audio stimulation). To quantify the strength of MFCC a cross-correlation (CC) analysis between maternal and fetal RR intervals tachograms was performed. To investigate the relation between the gestational age (GA) and the strength of the

coupling, the correlation between the GA and CC coefficients in resting state and during the fetal audio stimulation was evaluated.

For the systematic review a literature search was carried out in PubMed and Web of Science databases. The review is conducted according to the PRISMA guideline.

**Results:** A negative correlation ( $p = 0.038$ ) was found between CC and GA in resting state. No relationship was found between CC and GA during the fetal audio stimulation.

The results of the systematic review with meta-analysis will be available in September 2024.

**Conclusions:** MFCC in resting state was found to decrease with advancing GA from 32 to 38 GA. These preliminary findings build the ground for further investigations of the effect of maternal stress on MFCC. In further studies additional coupling measures will be evaluated.

**Keywords:** Maternal-fetal cardiac coupling, prenatal stress, fetal development



Abstract number: 29

**Exploring and validating the association between allopregnanolone and peripartum depression trajectories***Ylva S.E. Walldén**Uppsala University*

**Background:** Peripartum depression impacts women globally, impairing quality of life and functioning. Two studies investigated the association between the neuroactive steroid allopregnanolone and depressive symptoms peripartum. In the first study, mid-pregnancy allopregnanolone levels were studied in relation to peripartum depression trajectories, with depression history included as a potential modifier of effect. A second study sought to validate and extend results by investigating allopregnanolone levels and depressive symptoms at multiple timepoints peripartum. The moderating role of early life stress on the relationship between allopregnanolone and depressive symptoms was tested.

**Methods:** Participants for study 1 (n=252) and 2 (n=250) were included from the BASIC (Biology, Affect, Stress, Imaging and Cognition) cohort. Adverse childhood experiences were assessed with the Lifetime Incidence of Traumatic Events (LITE) questionnaire. Allopregnanolone concentrations were analysed using radioimmunoassay (study 1) and mass

spectrometry (study 2). Peripartum depression (PPD) symptoms were assessed via the Edinburgh Postnatal Depression Scale (EPDS). Scores of  $\geq 13$  (pregnancy) or  $\geq 12$  (postpartum) were considered above clinical cut-off.

Allopregnanolone was measured at pregnancy week 17 (study 1), or week 17, 38 as well as postpartum week 8 (study 2).

**Results:** Study 1: Every one nmol/l increase in allopregnanolone was associated with 7% higher odds of belonging to the persistent depression trajectory (OR 1.07, 95% CI 1.01-1.14). History of depression did not modify this effect. No association was found with allopregnanolone in pregnancy only-depression or postpartum depression.

Study 2: analyses ongoing.

**Conclusions:** Study 1: Persistent depression and allopregnanolone were dose-dependently associated, suggesting specificity in the role of allopregnanolone among peripartum depression trajectories.

**Significance:** The role of steroid hormones in women's mental health across the lifespan is understudied. Increased insight into individual risk factors for peripartum depression is necessary to better identify and treat women with peripartum depression.

**Keywords:** allopregnanolone, antepartum depression, peripartum depression, postpartum depression



Abstract number: 30

**Developmental differences in  
reward-learning and functional  
connectivity**

*Zsófia Karlócai, Johan Vegelius, Ebba Widegren, Johan Lundin Kleberg, Barry Karlsson, David Fällmar, Johanna Mårtensson, Karin Brocki, Nils Kroemer, Malin Gingnell, Andreas Frick*

*University of Tübingen*

**Aims:** Adolescence is a critical period characterized by increased sensation-seeking, risk-taking, and sensitivity to rewards, alongside neural and behavioral changes. Research suggests that alterations in functional connectivity within and between cortical and subcortical areas optimize interregional communication, impacting reward processing and decision-making. Hormonal changes, notably gonadal hormones, significantly influence adolescent behavior and brain development. This study aims to understand adolescent behavior through a reward learning paradigm while investigating underlying neuronal and hormonal developmental changes.

**Methods:** Employing a probabilistic reward-learning task and fMRI resting-state imaging, we examined 34 adolescents (aged 13-17 years) and 28 adults (aged 30-40 years), evaluating behavior,

hormonal levels, and functional connectivity. Utilizing a hierarchical Bayesian framework, we simultaneously modeled reinforcement learning (behavior) and functional connectivity in the reward circuit (neural data), efficiently estimating subject-specific behavioral parameters and exploring their relationships with functional brain connectivity. Finally, we compared the hierarchical model with a win-stay lose-switch model.

**Results:** Adolescents exhibited higher learning rates ( $\alpha$ ) and inverse temperatures ( $\beta$ ) compared to adults. Analysis revealed the anterior cingulate cortex (ACC) as a pivotal region, in connection with learning rate. Hormonal levels did not significantly impact the relationship between behavioral parameters and connectivity.

**Conclusion:** This study provides foundational insights into the complex interplay among reward processing, brain connectivity, and developmental changes during adolescence. Adolescents demonstrated distinct decision-making mechanisms characterized by lower integration of feedback and decreased exploratory behavior compared to adults. The ACC emerged as a critical region encoding decision-making costs, highlighting differences in decision-making processes between adolescents and adults.

**Keywords:** developmental differences, resting-state connectivity, reward-learning