



Association of maternal attention deficit hyperactivity disorder and preterm birth: a cohort study

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Objective Attention deficit hyperactivity disorder (ADHD) affects 3–7% of women of childbearing age. Whether ADHD is associated with an increased risk of preterm birth is unclear.

Design National register-based cohort study.

Setting Sweden.

Population Nulliparous women giving birth to singleton infants 2007–2014 ($n = 377\ 381$).

Methods Women were considered to have ADHD if they had been dispensed at least one prescription for ADHD medication, i.e. a central nervous system stimulant or non-stimulant drugs for ADHD, prior to, during or after pregnancy (2005–2014). Women with ADHD were compared with women without ADHD in regard to prevalence, severity and mode of onset of preterm birth. Logistic regression models were used, estimating adjusted odds ratios (aOR) with 95% confidence intervals (CI). Adjustments were made for maternal age and country of birth (model 1), and in addition for body mass index (BMI), education, alcohol or substance use disorders, and pre-gestational medical and psychiatric co-morbidity (model 2).

Main outcome measures Preterm birth (<37 weeks).

Results During the study period, 6327 (1.7%) women gave birth and had ADHD according to our definition. These women had a higher rate of preterm birth compared with women without ADHD (7.3 versus 5.8%, aOR model 2: 1.17; 95% CI 1.05–1.30). ADHD was particularly associated with very (<32 weeks) preterm births, and associations were seen with both spontaneous and medically indicated onsets.

Conclusions Women with ADHD (i.e. who had been dispensed ADHD medication at any time in 2005–2014) had an increased risk of preterm birth.

Keywords Attention deficit hyperactivity disorder, premature birth.

Tweetable abstract Women with ADHD have a higher risk of preterm birth but most of it is due to modifiable risk factors.

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Introduction

Attention deficit hyperactivity disorder (ADHD) is a complex neuropsychiatric disorder affecting 3–7% of women of childbearing age.^{1–6} Women with ADHD are more often teenage mothers, smokers, obese and with a risk-taking sexual behaviour associated with higher rates of sexually transmitted infections.^{7–9} Further, women with ADHD to a greater extent report behavioural and psychosocial problems such as substance abuse, low education and

unemployment,^{2,10,11} reflecting a social burden with potential serious consequences for the mother and the family.

Preterm birth occurs in approximately 5–15% of all pregnancies and is associated with both infant and maternal morbidity and mortality. The risk of adverse maternal and neonatal outcomes increases with decreasing gestational age of preterm births.^{12–15} The aetiology of preterm birth is multifactorial and maternal demographic, social and behavioural aspects are involved; there is also a genetic influence with an intergenerational recurrence risk.^{16–19}

Preterm births can either have a spontaneous onset or be medically indicated due to maternal or fetal conditions. Spontaneous preterm births have a strong association with maternal and intrauterine infections and inflammation.⁷ Conditions generating medically indicated preterm births such as hypertensive disorders, diabetes and intrauterine growth restriction are also associated with increased inflammation.¹⁴ There are inconsistent results regarding inflammatory markers and the expression of immune-related genes in ADHD, but an increased inflammatory state in ADHD has been suggested.⁶ Thus, ADHD and preterm birth share both psychosocial and inflammatory risk factors and features.

Earlier research on the risk of preterm birth in women with ADHD is scarce and has focused on risks associated with ADHD medication during pregnancy.^{2,20,21} Few studies have investigated women with ADHD not taking ADHD medication,^{22,23} but studies indicate a higher risk of preterm birth in ADHD women without ongoing treatment. However, the studies lack adjustments for several important confounders, such as substance use and psychiatric co-morbidity. Further, severity of preterm birth and modes of onset of preterm birth have not been distinguished among women with ADHD. An increased knowledge of ADHD and risk of preterm birth would be a guide when counselling and planning pregnancy surveillance in women with ADHD, from both an obstetric and psychiatric perspective.

The aim of this large population-based cohort was to investigate the association between ADHD and preterm birth of different severity and onset, while considering maternal characteristics, baseline co-morbidity and ongoing ADHD medication during pregnancy.

Methods

This cohort study used data from national health and population registers held by the National Board of Health and Welfare and Statistics Sweden. The Medical Birth Register, the Swedish Prescribed Drug Register and the National Patient Register were linked, using each woman's personal identity number, to the Register of the Total Population and the education register held by Statistics Sweden. For each individual, the Medical Birth Register provided information about pregnancy, labour and perinatal outcomes from prospectively collected, standardised antenatal, obstetrical and neonatal medical records.^{24,25} The Prescribed Drug Register provided documentation of amount, dosage and substance name, registered using the World Health Organization's Anatomical Therapeutic Chemical Classification (ATC) codes, of prescribed and dispensed medical therapeutics for the cohort. Diagnoses based on the codes of the International Classification of Disease version 10

(ICD-10) were retrieved from the National Patient Register, which encompasses all inpatient and specialised outpatient records in Sweden, including visits to psychiatrists.²⁶ The register of the total population provided data on country of birth and the education register gave the highest level of education obtained for each woman in the study population.²⁷ The unique personal identity number assigned to a Swedish citizen at birth or immigration enabled linkage between the registers.

Study population and exposure

The study population included 377 491 nulliparous women with a singleton birth between 1 January 2007 and 31 December 2014 in Sweden. Pregnancies without known gestational length at birth were excluded ($n = 110$). Only nulliparous women were included, to increase the homogeneity of our study population, as well as to avoid including the same woman more than once in the cohort. Women were considered to have ADHD if they had been dispensed at least one ADHD medication, i.e. a central nervous system stimulant or non-stimulant drugs for ADHD (ATC code N06BA), prior to, during or after pregnancy (recorded in the Prescribed Drug Register from July 2005 until December 2014). Medication during pregnancy included ADHD medication dispensed at any time during pregnancy (date of conception to date of birth). According to Swedish national guidelines, stimulant and non-stimulant medications are restricted for treatment of ADHD after a clinical and psychiatric evaluation by teams of psychiatrists and psychologists and are reserved for cases where other supportive interventions have failed.²⁸ Furthermore, ADHD is a neuropsychiatric disorder with onset in childhood, and medication after the index pregnancy indicates that the condition existed before pregnancy.

Covariates

The Medical Birth Register provided information on maternal age at delivery (categorised as <20 , $20-34$ or ≥ 35 years), body mass index (BMI) calculated from weight and height as recorded at first antenatal visit and categorised as underweight (<18.50 kg/m²), normal to overweight ($18.50-29.99$ kg/m²) or obese (≥ 30.00 kg/m²). Daily smoking at first antenatal visit was recorded as yes, regardless of quantity. Information on country of birth (categorised as Nordic countries, European Union or other), and educational attainment, dichotomised into ≤ 12 and >12 years, was collected from Statistics Sweden for all women.

Pre-gestational disorders were retrieved based on pre-defined checkboxes, with data recorded at first antenatal visit to maternal healthcare, and included hypertension, diabetes, epilepsy, asthma, inflammatory bowel disease, systemic lupus erythematosus and renal disease, based on diagnostic codes O10 (hypertension) and O240–O243 (diabetes), as noted by

the doctor in charge at discharge from hospital after delivery. Other psychiatric disorders included any of the following ICD-10 codes, recorded in the National Patient Register before pregnancy: depression (F32), bipolar disorder (F30–F31), psychotic disorders (F20–F29) and unstable emotional personality disorder (F603). By restriction to ICD-10 codes, only psychiatric disorders diagnosed by medical doctors at an in- or outpatient specialised psychiatric clinic were included, omitting mild to moderate cases of depression and anxiety managed in primary care. Alcohol or substance use disorders prior to pregnancy were defined as codes F10–F19 registered in the National Patient Register. Stillbirth was recorded in checkboxes, from 22 gestational weeks, in the Medical Birth Register.²⁹

Outcome

Preterm birth was defined as delivery of an infant <37 weeks of gestation. Gestational length of birth was recorded in completed weeks. In 92% of pregnancies, expected date of delivery was based on a first or early second trimester ultrasound.³⁰ In the remaining pregnancies, expected date of delivery was based on date of embryo transfer, date of last menstrual period reported at the first antenatal visit or a postnatal assessment. Preterm birth severity was categorised into moderate preterm (32–36 gestational weeks) or very preterm (22–31 gestational weeks) birth. Onset of birth, recorded in a standardised manner by

midwives at the delivery wards using checkboxes, was categorised into spontaneous preterm birth including pre-term labour or premature rupture of the membranes (ICD-10 code: O42) or medically indicated preterm birth including vaginally induced onset of labour and pre-labour caesarean delivery. Information on onset of labour was missing in 230 (0.1%) preterm births.

Statistical analyses

Absolute and relative frequencies of maternal background and pregnancy characteristics were described for women with ADHD and women without ADHD. Bivariate analysis between groups was performed using Pearson's chi-square test. Distribution of age, BMI and difference in days between estimated date of delivery according to ultrasound and last menstrual date were checked visually and considered to be normally distributed. Unequal variance was observed; thus, the Welch test was used to assess mean differences between groups. A two-sided P -value <0.05 was considered significant. Logistic regression models were performed to determine associations between ADHD, covariates and preterm birth expressed as adjusted odds ratios (aOR) with 95% confidence intervals (CIs). Covariates included in adjusted models were based on a theoretical framework and directed acyclic graphs³¹ suggesting age and country of birth to estimate the 'total effect' (i.e. sets that close all biasing paths and

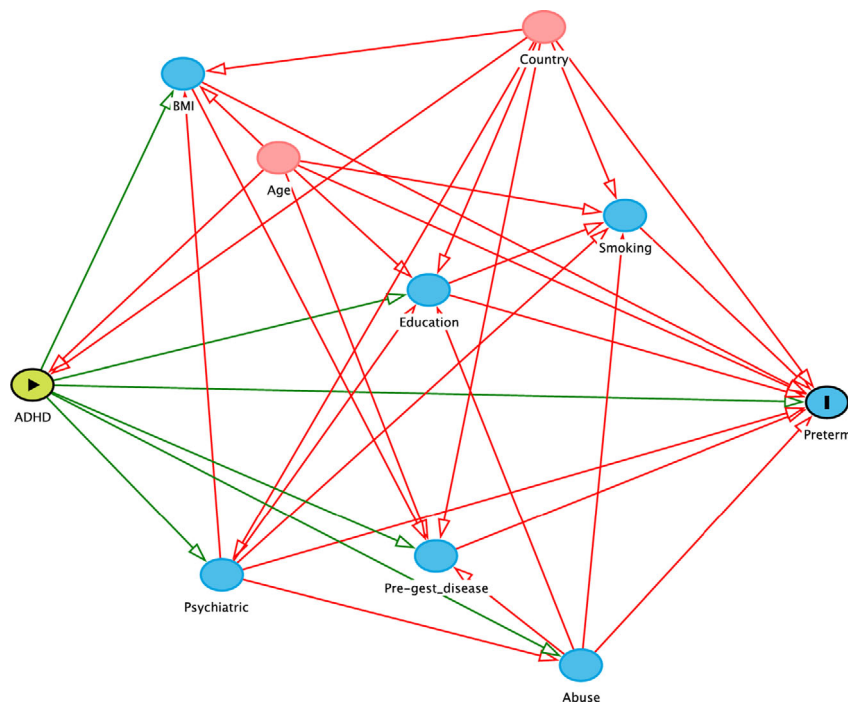


Figure 1. Directed acyclic graph. Adjustment sets for estimating the total effect of ADHD on preterm birth: age, country of birth. Adjustment sets for estimating the direct effect of ADHD on preterm birth: age, country of birth, BMI, education, pre-gestational disease, psychiatric and substance use disorder (www.dagitty.net).

Table 1. Background characteristics for nulliparous women with and without attention deficit hyperactivity disorder (ADHD) ($n = 377\,381$)

	ADHD		P-value
	No $n = 371\,054$	Yes $n = 6327$	
Age (years) mean [SD]	28.46 [5.10]	24.95 [5.50]	<0.001
Missing $n = 1$			
Age, n (%)			
<20	10 528 (2.8)	975 (15.4)	<0.001
20–34	315 414 (85.0)	4954 (78.3)	
≥35	45 111 (12.2)	398 (6.3)	
Early pregnancy BMI (kg/m ²) mean [SD]	24.18 [4.40]	25.01 [5.08]	<0.001
Missing = 26 284 (7.0%)			
BMI, n (%)			
<18.50	10 480 (3.0)	198 (3.4)	<0.001
18.50–29.99	300 070 (86.9)	4709 (81.3)	
≥30.00	34 754 (10.1)	886 (15.3)	
Early pregnancy smoking, n (%)	20 852 (5.8)	1650 (27.4)	<0.001
Missing = 14 683 (3.9%)			
Country of birth, n (%)			
Nordic	294 777 (79.4)	5900 (93.3)	<0.001
European Union	13 024 (3.6)	86 (1.4)	
Other	63 253 (17.0)	341 (5.4)	
Education, n (%)			
Missing = 4256 (1.1%)			
≤12 years	159 554 (43.5)	4896 (78.3)	<0.001
> 12 years	207 319 (56.5)	1356 (21.7)	
Pre-gestational disease*, n (%)	39 028 (10.5)	1216 (19.2)	<0.001
Hypertension	2426 (0.7)	40 (0.6)	0.833
Diabetes	2403 (0.6)	71 (1.1)	<0.001
Other psychiatric disorders**	3701 (1.0)	827 (13.1)	<0.001
Alcohol or substance use disorders, n (%)	3122 (0.8)	927 (14.7)	<0.001
Stillbirth	1032 (0.3)	13 (0.2)	0.276
Missing = 514 (0.1%)			
Ultrasound-based estimated date of birth	341 047 (91.9)	5856 (92.6)	0.063
Gestational length at birth, (weeks) mean [SD]	39.41 [2.01]	39.18 [2.15]	<0.001

Data presented as absolute (n) and relative (%) frequencies or means with standard deviation [SD]. P -values calculated using chi-square and Welch tests.

*Includes hypertension ($n = 2468$), diabetes ($n = 2474$), epilepsy ($n = 2064$), asthma ($n = 30\,140$), inflammatory bowel disease ($n = 2992$), systemic lupus erythematosus ($n = 498$) and renal disease ($n = 1769$).

**Includes any diagnosis, from a psychiatric clinic, of depression, bipolar disorder, schizophrenia, delusional disorder, other psychotic disorders or unstable emotional personality disorder.

leave all causal paths open) of ADHD on preterm birth (model 1), and age, BMI, country of birth, education, pre-gestational disease and other psychiatric, alcohol or substance use disorders to estimate the 'direct effect' (i.e. sets that close all biasing paths and mediation paths) of ADHD on preterm birth (model 2) (Figure 1). Thus, model 1 was based on true confounders (affecting both exposure and outcome) estimating the association between ADHD and preterm birth regardless of mediation. Multinomial logistic regression was used to analyse severity of preterm birth (very preterm, moderate preterm, with term birth as reference) and onset of preterm

birth (spontaneous preterm birth, medically indicated preterm birth, with term birth as reference). In a second step, we stratified women with ADHD into those with and those without ADHD medication during the index pregnancy and estimated risks with odds ratios for preterm birth, using women without ADHD (i.e. those without ADHD medication before, during or after pregnancy) as the reference group.

The Ethical Review Board in Uppsala approved the study. There was no public or patient involvement of study design or interpretation of results. Centre for Clinical Research, Falun, Sweden supported the study.

Results

In total, 6327 (1.7%) nulliparous women were dispensed ADHD medication before, during or after pregnancy, i.e. defined as women with ADHD in our study. Women with ADHD were younger, more often obese, more often smokers, and had a lower educational level. Higher rates of psychiatric co-morbidity (13.1 versus 1.0%, $P < 0.001$) and substance use disorders (14.6 versus 0.8%, $P < 0.001$) prior to pregnancy were observed among women with ADHD compared with women without ADHD (Table 1). No difference in rates of stillbirth between women with and without ADHD was recorded (0.2 and 0.3%, respectively). There was no difference between the groups with regard to whether estimated date of delivery was based on ultrasound or not. The gestational week of delivery was shorter for women with ADHD than for women without (mean 39.2 versus 39.4 gestational weeks, $P < 0.001$) (Table 1).

In all, there were 22 118 preterm births (5.9%), the majority of which were moderate preterm (84%) and with spontaneous onset (65%). Preterm birth was more common in women with ADHD than in women without the disorder (7.3 versus 5.8%) (Table 2). Maternal age < 20 years and ≥ 35 years at delivery and Swedish origin were associated with preterm birth (Table S2). After adjusting for maternal age and country of birth (model 1), women with ADHD had 30% increased odds for preterm birth compared with women without ADHD. After further adjustment for potential mediators such as BMI, education, pre-gestational disease, psychiatric co-morbidity, alcohol or substance use disorders (model 2), the association remained, but was attenuated (aOR 1.17, 95% CI 1.05–1.30). ADHD was associated with both moderate (32–36 weeks) and very (<32 weeks) preterm birth, with the strongest association observed with very preterm birth (aOR model 2: 1.41, 95% CI 1.09–1.82).

Compared with women without ADHD, women with ADHD had 19 and 51% higher odds for spontaneous and medically indicated preterm birth, respectively, after adjusting for maternal age and country of birth (Table 3). After further adjustments (model 2), the associations were attenuated and were no longer significant for medically indicated preterm birth.

Among women with ADHD (i.e. those who had a dispensed ADHD medication prior, during or after pregnancy), 483 (7.6%) had been dispensed psychostimulant or non-stimulant treatment during the index pregnancy, assumed to have ongoing medication. Among women with ADHD, those with ongoing medication during the index pregnancy were more often teenagers with concomitant psychiatric and substance use disorders compared with those without ongoing medication (Table S1). Compared with women without ADHD, women with ADHD and ongoing medication ($n = 483$) during pregnancy seemed to have a higher association with preterm birth (aOR model 1: 1.58, 95% CI 1.15–2.16), than women without medication during pregnancy ($n = 5845$) (aOR 1.28, 95% CI 1.16–1.41).

Discussion

Main findings

First-time mothers with ADHD had an increased likelihood of giving birth preterm, particularly very preterm, compared with women without ADHD. The higher rates of preterm birth observed could partly, but not fully, be attributed to underlying co-morbidities and socio-economic factors. We found associations with both spontaneous and medically indicated preterm birth.

Strengths and limitations

Strengths of the study include the population-based setting and the large study sample with aggregated data from several

Table 2. Association between attention deficit hyperactivity disorder (ADHD) and severity of preterm birth

	Any preterm (<37 weeks)			Moderate preterm (32–36 weeks)			Very preterm (<32 weeks)		
	n (%)	Adjusted OR (95% CI)		n (%)	Adjusted OR (95% CI)		n (%)	Adjusted OR (95% CI)	
		Model 1	Model 2		Model 1	Model 2		Model 1	Model 2
No ADHD $n = 371\ 054$	21 656 (5.8)	1.00	1.00	18 243 (4.9)	1.00	1.00	3413 (0.9)	1.00	1.00
ADHD $n = 6327$	462 (7.3)	1.30 (1.18–1.43)	1.17 (1.05–1.30)	379 (6.0)	1.25 (1.12–1.39)	1.13 (1.00–1.27)	83 (1.3)	1.60 (1.29–2.00)	1.41 (1.09–1.82)

CI, confidence interval; OR, odds ratio.

Adjusted ORs and 95% CIs were retrieved by the use of nominal logistic regression, in which severity of preterm birth was the outcome and explanatory variables were: Model 1: ADHD, age and country of birth (included in model $n = 377\ 380$). Model 2: ADHD, age, country of birth, BMI, education, alcohol or substance use disorders, pre-gestational disease and other psychiatric disorder (included in model $n = 347\ 233$).

Table 3. Association between attention deficit disorder (ADHD) and spontaneous and induced preterm birth

	Spontaneous preterm			Medically indicated preterm		
	<i>n</i> (%)	Adjusted OR (95% CI)		<i>n</i> (%)	Adjusted OR (95% CI)	
		Model 1	Model 2		Model 1	Model 2
No ADHD <i>n</i> = 371 161	13 940 (3.8)	1.00	1.00	7492 (2.1)	1.00	1.00
ADHD <i>n</i> = 6330	284 (4.6)	1.19 (1.05–1.34)	1.15 (1.01–1.31)	172 (2.8)	1.51 (1.29–1.76)	1.18 (0.99–1.40)

CI, confidence interval; OR, odds ratio.

Missing information of onset on labour among preterm births *n* = 230.

Adjusted ORs and 95% CIs were retrieved by nominal logistic regression, in which onset of preterm birth was the outcome and explanatory variables were: Model 1: ADHD, age and country of birth (included in model, *n* = 377 150). Model 2: ADHD, age, country of birth, BMI, education, alcohol or substance use disorders, pre-gestational disease and other psychiatric disorder (included in model *n* = 347 073).

national health registers with almost complete coverage, containing information about maternal characteristics and socio-demographic factors. Further, antenatal and delivery care is standardised and free of charge in Sweden, minimising the possibilities of residual confounding. Information on ADHD exposure was based on dispensed—not only prescribed—ADHD medications, prior to, during or after pregnancy. Covariate adjustments were based on a theoretical framework of directed acyclic graphs models³¹ that permits estimates of both a total burden and a direct association of the underlying ADHD condition with preterm birth.

However, our study is not without limitations, and unmeasured confounders and mediators limit the interpretation of a true causal relation between ADHD and preterm birth. Socio-economic information was restricted to level of education with no information on income level, occupation, family situation or paternal factors. Infants born very preterm and with a low birthweight are at increased risk of ADHD,⁴ and there is a genetic influence and intergenerational recurrence risk of preterm birth with familial aggregation and heredity,¹⁶ which could explain the observed association between preterm birth and ADHD. Further, in this register-based cohort study, the ADHD case definition was based on dispensed medication for the treatment of ADHD rather than on ICD-10 diagnosis, which likely underestimates the prevalence of ADHD. According to Swedish guidelines, medication is reserved for cases where other supportive interventions have failed,²⁸ indicating that our cohort consists of more severe cases of ADHD. Hypertension and epilepsy are contraindications for ADHD medication and stimulant drugs can be indicated for narcolepsy; hence misclassification of exposure cannot be ruled out. Further, we could not control for sexually transmitted diseases or vaginal infections. Accurate dating of pregnancy is crucial in evaluating preterm births. No information was available regarding

the time point in pregnancy when ultrasound dating was performed, but there was no difference in the proportion of ultrasound-based estimated dates of delivery between the groups.

Interpretation

The higher rate of social vulnerability, i.e. teenage mothers and lower degree of education, observed among women with ADHD in our study is in line with prior work.^{2,8} Low socio-economic status is an established risk factor for preterm birth, potentially mediated by changes in the immune and neuroendocrine system and by factors such as obesity, disturbed vaginal microbiome, and internal and external stress.^{17,18} Further, women with ADHD had psychiatric comorbidity and substance use disorders to a greater extent than women without ADHD, and antenatal substance use, including smoking and alcohol use, is associated with preterm birth and low birthweight.³²

To our knowledge, we are the first to report associations between ADHD and preterm birth categories of different severity and onset. We found a more than 40% increased risk of very preterm (<32 weeks) birth among women with ADHD, even after considering concomitant risk factors including alcohol or substance use disorders and psychiatric co-morbidity. The absolute numbers in this study were low (83/6327), yielding imprecise estimates, but births at these low gestational ages are associated with both maternal and neonatal complications with potential long-term health consequences and economic burden.^{14,15} Further, we found ADHD to be associated with both spontaneous and medically indicated preterm birth. The association between ADHD and preterm birth was weakened after additional adjustments for BMI, education, and medical and psychiatric co-morbidity, indicating that these partly avoidable risk factors mediate the association.

A recently published meta-analysis was carried out of eight population-based cohort studies from Northern Europe, USA and Australia investigating a broad spectrum of maternal and neonatal outcomes following exposure to ADHD medication during pregnancy.³³ The meta-analysis reported no increased risk for preterm birth (pooled relative risk [RR] 1.05, 95% CI 0.97–1.14). However, they concluded that the studies were very heterogeneous with respect to study populations, outcome measures and potential confounders and the meta-analysis did not include studies of pregnancies in women with concomitant substance abuse. In our study, the vast majority of women with ADHD had not received ADHD medication during the index pregnancy (92.4%), and when we restricted our population to women without medication during pregnancy, the association with preterm birth remained. Therefore, the increased risk for preterm birth cannot be attributed to ADHD medication during pregnancy per se, but instead to the underlying disorder and its co-morbidities. Women with ADHD have higher rates of sexual risk-taking, sexually transmitted infections, teen pregnancies and induced abortions.^{2,8} In Danish population-based settings, Hærvig et al. found higher rates of spontaneous and induced abortions among women with ADHD medication during pregnancy.² Bro et al. reported an increased risk of spontaneous abortions among women with ADHD, regardless of medication status, concluding that there may be confounding by indication.²³

Conclusion

Women with ADHD (defined as having dispensed ADHD medication before, during or after pregnancy) have a higher likelihood of preterm birth, including both moderate and very preterm birth, with both spontaneous and induced onset. Although a causal relation between ADHD and preterm birth has not been established, this finding merits attention given the social vulnerability observed at baseline among first-time mothers with ADHD. Targeted interventions to reduce avoidable risk factors for preterm birth before pregnancy, such as contraception counselling to avoid teenage pregnancies, weight surveillance to optimise early pregnancy BMI, and identification of substance use disorders are highlighted. Further, increased counselling and surveillance during pregnancy for women with ADHD might attenuate the association and consequences of preterm birth.

Disclosure of interests

Dr Wikman, Dr Skalkidou and Dr Wikström declare no conflict of interest. Dr Hesselman reports grants from Systembolaget alkoholforskningsråd, outside the submitted work. Dr Skoglund reports non-financial support from the Member Scientific Council at the Swedish Medical Products Agency, personal fees from the Advisory board and Speaker Shire/Takeda, and personal fees from Lecturer

Nordic Drugs, outside the submitted work, and is the Medical Director of SMART Neuropsychiatric Clinic, Stockholm. Dr Kopp Kallner reports personal fees and other from Bayer, personal fees from MSD, personal fees from Exeltis, personal fees from Mithra, personal fees from Natural Cycles, personal fees from Gedeon Richter, personal fees from Preglem, outside the submitted work. Dr Sundström Poromaa reports personal fees from Gedeon Richter, personal fees from Shire/Takeda, personal fees from Bayer AG, personal fees from Peptonics AB, outside the submitted work. Completed disclosure of interest forms are available to view online as supporting information.

Contribution to authorship

A-KW, IS-P and AS conceived the study and acquired the data. IS-P, CS and AW managed the primary dataset. SH and A-KW planned and performed the analysis and wrote the first draft, with critical and technical input from AW, CS, HK-K, IS-P and AS.

Details of ethics approval

The Ethical Review Board in Uppsala, Dnr 2017/031, date of approval 15 March 2017.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. Background characteristics for women with ADHD according to medication during pregnancy ($n = 6327$).

Table S2. Association between maternal and pregnancy characteristics and preterm birth. ■

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