Epilepsia®

Prevalence of self-reported emotional, physical, and sexual abuse and association with fear of childbirth in pregnant women with epilepsy: The Norwegian Mother, Father, and Child Cohort Study

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Abstract

Objective: This study was undertaken to examine the prevalence of self-reported experiences with abuse in pregnant women with epilepsy and the association between having experienced abuse and childbirth expectations, particularly the fear of childbirth.

Methods: We performed a cross-sectional study of women with and without epilepsy enrolled in the Norwegian Mother, Father, and Child Cohort Study 1999–2008. Data on epilepsy diagnosis; antiseizure medication (ASM) use; emotional, physical, and sexual abuse; and childbirth expectations were collected from questionnaires completed during gestational Weeks 17–19 and 30.

Results: Our study population included 295 women with ASM-treated epilepsy, 318 women with ASM-untreated epilepsy, and 93 949 women without epilepsy. A total of 115 women (47%) with ASM-treated and 132 women (57%) with ASM-untreated epilepsy reported any emotional, physical, or sexual abuse, compared to 25 100 women (32%) without epilepsy. The adjusted odds ratios (aORs) for having experienced any abuse were 1.8 (95% confidence interval [CI] = 1.4–2.3) and 1.8 (95% CI = 1.4–2.2) for ASM-treated and ASM-untreated epilepsy, respectively. A total of 29 women (11%) with ASM-treated and 34 women (11%) with ASM-untreated epilepsy reported having been raped, compared to 3088 women (4%) without epilepsy (aORs = 2.8 [95% CI = 1.8–4.1] and 2.9 [95% CI = 2.0–4.2], respectively). In nulliparous women with ASM-untreated epilepsy, having experienced abuse was associated with fear of childbirth; 22 women (31%) with abuse experiences reported fear of childbirth compared to five women (7%) with no experience of abuse (aOR = 5.4 [95% CI = 1.7–17.2]). This association was not seen in multiparous women or in women with ASM-treated epilepsy.

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Significance: More women with epilepsy reported emotional, physical, and sexual abuse than women without epilepsy. Such experiences may be associated with childbirth expectations.

KEYWORDS

anticonvulsants, antiseizure medication, MBRN, MoBa, violence

1 | INTRODUCTION

Although most women with epilepsy have uncomplicated pregnancies and deliver healthy babies, challenges to management include increased risk of pregnancy complications; peripartum psychiatric disorders, such as postpartum depression; and increased morbidity and mortality compared to women without epilepsy.[1,2] Most women with active epilepsy require antiseizure medication (ASM) during pregnancy to avoid epileptic seizures.[1,2] Prenatal exposure to certain ASMs such as valproate, phenobarbital, phenytoin, carbamazepine, and topiramate is associated with an increased risk of congenital malformations.[3] Exposure to valproate and possibly phenobarbital has been associated with increased risk of impaired neurocognitive and behavioral development.[4] Thus, women with ASM-treated epilepsy may have more concerns during pregnancy than women without epilepsy. Appropriate management and counseling before conception, during pregnancy, and in the postpartum period are essential for optimal outcomes.[1,2]

People with epilepsy have increased rates of anxiety and depressive disorders compared to the general population.[1,5] One study found that people with epilepsy report more sexual abuse and more discrimination than the general population.[6] Sexual abuse, domestic violence, and discrimination were associated with anxiety and depressive disorders in this group.[6] Abuse is defined as any attempt to control the behavior of another person and includes any direct or indirect emotional, physical, or sexual maltreatment.[7] In studies from the general population, having experienced abuse, particularly in childhood, is associated with psychiatric disorders; pregnancy complications, such as low birth weight and preterm delivery; and fear of childbirth.[7–11] Furthermore, fear of childbirth is associated with psychiatric disorders, including anxiety and depression, as well as sociodemographic factors, parity, and previous birth experience.[12–14]

Studies examining the association between epilepsy and experiences of abuse, as well as childhood expectations, are scarce and usually include few participants.[6,15,16] One study found increased fear of childbirth during pregnancy in nulliparous women with epilepsy compared to women without epilepsy, but not after they had given birth.[17] We previously reported an increased frequency

Key Points
- Almost one in two pregnant women with epilepsy have reported emotional, physical, or sexual abuse, compared to one in three pregnant women without epilepsy
- One in 10 pregnant women with epilepsy reported having been raped, compared to one in 25 pregnant women without epilepsy
- Fear of childbirth was not increased in women with epilepsy compared to women without epilepsy
- Nulliparous women with ASM-untreated epilepsy and experiences of abuse had increased fear of childbirth
- Fear of childbirth did not differ between women with epilepsy with and without epileptic seizures during pregnancy

of peripartum depression and anxiety in women with epilepsy compared to women without epilepsy enrolled in the Norwegian Mother, Father, and Child Cohort Study (MoBa).[18] Self-reported physical or sexual abuse was a risk factor for peripartum depression or anxiety.[18]

The aim of this study was to examine the prevalence of self-reported emotional, physical, and sexual abuse and childbirth expectations in pregnant women with epilepsy. We also examined the association between having experienced abuse and childbirth expectations, particularly fear of childbirth.

2 | MATERIALS AND METHODS

2.1 | Study population

We included all women with and without epilepsy enrolled in MoBa with data available from the Medical Birth Registry of Norway (MBRN).[19] If a woman contributed to MoBa with more than one pregnancy, only her first pregnancy was included. MoBa is an ongoing, population-based, prospective pregnancy cohort study conducted by the Norwegian Institute of Public Health and linked to

the MBRN, a national health registry containing information on all births in Norway with compulsory reporting.[19] Participants in MoBa were recruited from all over Norway during 1999–2008, and the overall participation rate was 41%.[19] Women completed questionnaires twice during their pregnancy; the first at inclusion during gestational Weeks 17–19, and the second during gestational Week 30. The questionnaires collected detailed information on the women's medical and social background, ASM use, experiences with abuse, and childbirth expectations. The MoBa biobank[20] enabled us to analyze plasma ASM concentrations in maternal samples during pregnancy and from the umbilical cord right after birth to validate ASM use. The current study was based on version 10 of the quality-assured MoBa data files.

2.2 | Epilepsy diagnosis and ASM use

We identified women with epilepsy based on self-reported information from the MoBa questionnaires and diagnostic data from the MBRN as registered by the family doctor or midwife. Similarly, data on ASM use was collected from the MoBa questionnaires and the MBRN. In the first questionnaire, the women reported whether they had or had ever had epilepsy by ticking the option "epilepsy." They could furthermore answer whether this was present before pregnancy or during pregnancy. Women who reported epilepsy in MBRN only and with no report of ASM use in MBRN or MoBa were excluded, as the epilepsy diagnosis was considered uncertain (Figure 1). Women with epilepsy were divided into ASM-treated and ASM-untreated groups. Women with ASM-treated epilepsy reported epilepsy and ASM treatment during pregnancy in MoBa or MBRN. Women with ASM-untreated epilepsy reported epilepsy in MoBa, but no ASM use during the pregnancy.

We previously validated the epilepsy diagnosis in MoBa by performing a retrospective survey (50% response rate) with questions on epilepsy type, any epileptic seizure(s) during pregnancy or childbirth, and ASM use, by analyzing the ASM concentrations in maternal plasma ($n = 226$) and umbilical cord blood ($n = 196$), and by examining the hospital records for women residing in western Norway (51% consented, $n = 40$).[21,22] According to the hospital records, 53% of the women used ASMs, which was in 100% agreement with the self-reported ASM use in MoBa.[21,22] Among women with ASM-untreated epilepsy, only one woman reported epileptic seizures during the 2 years prior to the pregnancy.[22] None of the women had psychogenic nonepileptic seizures according to the hospital records.[22] The epilepsy diagnosis could not be verified in the hospital records for two of the women with ASM-untreated epilepsy due to incomplete data.[22] In the retrospective survey, 119 of 121 (98%) women with ASM-treated and 129 of 133 (97%) women with ASM-untreated epilepsy confirmed the epilepsy diagnosis previously reported in MoBa.[21] Based on the hospital record examination and the retrospective survey, women with ASM-untreated epilepsy generally represented women with inactive epilepsy, as only 19 women reported any epileptic seizures during the 5 years prior to the pregnancy in the retrospective survey. The characteristics of the women with ASM-treated epilepsy in MoBa were similar to the Norwegian women included in the International Registry of Antiepileptic Drugs in Pregnancy database.[21]

2.3 | Abuse experiences

During gestational Week 30, the women answered four questions regarding emotional, physical, and sexual abuse[11,23–25] that were modified from the validated NorVold Abuse Questionnaire[26]: "Has someone over a
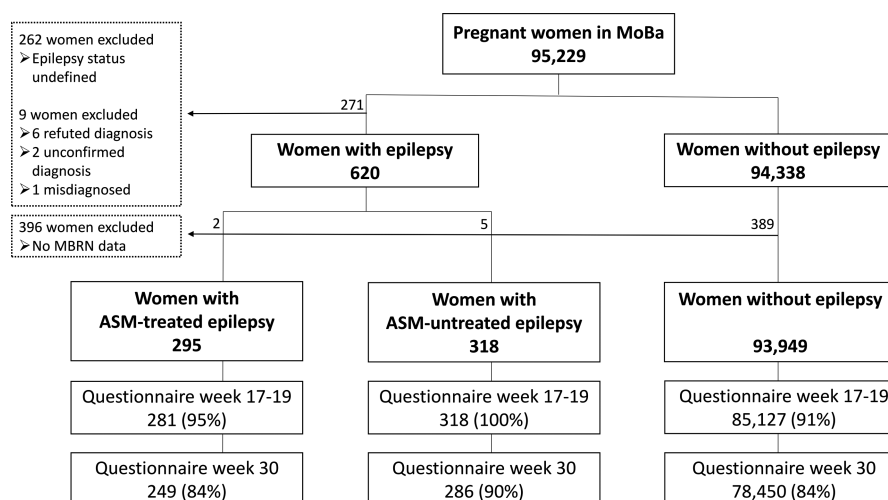
FIGURE 1 Flowchart of case inclusion. ASM, antiseizure medication; MBRN, the Medical Birth Registry of Norway; MoBa, the Norwegian Mother, Father, and Child Cohort Study

long period of time systematically tried to subdue, degrade, or humiliate you?" "Has someone threatened to hurt you or someone close to you?" "Have you been subjected to physical abuse?" "Have you been pressured to sexual activities?" The response options were "No, never," "Yes, as a child," "Yes, as an adult," and "Yes, during the past year." It was possible to choose more than one option. We grouped positive answers into three dichotomous variables by abuse subcategory: emotional abuse (first two questions), physical abuse (third question), and sexual abuse (fourth question). These subcategories were further divided into "abused as a child" and "abused as an adult." We defined childhood abuse as any experience with emotional, physical, or sexual abuse as a child.[11,24,27] Women who answered "No, never" constituted the reference group of no abuse experience. The women answered one question regarding a previous experience of rape on the questionnaire during gestational Weeks 17–19[28,29]: "Have you ever been pressured or forced to have sexual intercourse during this pregnancy, the last 6 months before pregnancy, or earlier?" The positive response option was "Yes, raped." Women who answered "No, never" were categorized as having not experienced rape.

2.4 | Childbirth expectations

Data on childbirth expectations were based on the women's agreement with eight statements from the questionnaire during gestational Week 30[11,25,28]: (1) "I do not want to give birth as naturally as possible without painkillers or intervention," (2) "I am really dreading giving birth," (3) "I want to have enough medication so that the birth will be painless," (4) "I want to have an epidural if the midwife agrees," (5) "I want to have an epidural regardless," (6) "If I could choose I would have a cesarean section," (7) "I think the woman herself should decide whether or not to have a cesarean section," and (8) "I worry all the time that the baby will not be healthy or normal." The response options were (a) "agree completely," (b) "agree," (c) "agree somewhat," (d) "disagree somewhat," (e) "disagree," and (f) "disagree completely." We dichotomized the answers based on response options (a, b) and (c–f), and then categorized them into four dichotomous variables regarding childbirth expectations: prefer pain relief (Items 1, 3–5), fear of childbirth (Item 2), prefer cesarean section (Items 6 and 7), and worry for the baby (Item 8).

2.5 | Covariates

Relevant covariates were collected from the MoBa questionnaires and the MBRN[11,23,27]: maternal age; parity

(number of previous pregnancies lasting >12 weeks); twin or triplet pregnancy; previous cesarean section; socioeconomic status as a compound, continuous variable with 0–4 points based on low maternal education (≤9 years of schooling = 1 point), low paternal education (≤9 years of schooling = 1 point), low household income (total household income < 60% of the national median in the child's birth year = 1 point), and noncohabiting mother (current marital status reported as either "divorced/separated," "single," or "widow" = 1 point); maternal body mass index (BMI; kg/m^2) before pregnancy; anxiety or depression symptoms as a compound, continuous variable with 0–2 points based on self-reported anxiety or depression diagnosis with our without medication use before pregnancy (1 point) and self-reported anxiety or depression diagnosis with or without medication use during pregnancy or anxiety or depression symptoms (>1.75 on the Hopkins symptom checklist[30]) during gestational Weeks 17–19 (1 point); alcohol consume ≥1 per month during the first trimester or any substance abuse (cannabis, amphetamine, ecstasy, cocaine, or heroin) during the last months before pregnancy or during the first trimester; smoking during pregnancy; and any significant adverse life event (≥1 of the following: work problems, financial problems, divorce or end of a relationship, conflicts with family member or friend, serious illness or injury, traffic accident, house fire, robbery, loss of someone close to you, or other significant adverse life event) during the 12 months prior to pregnancy.

2.6 | Statistical analysis

We used IBM SPSS Statistics version 27 for statistical analyses. Women with ASM-treated and ASM-untreated epilepsy were compared to the control group of women without epilepsy by estimating adjusted odds ratios (aORs) and 95% confidence intervals (CIs) using logistic regression models adjusted for potential confounding factors. We examined the association between epilepsy and experiences of abuse adjusted for maternal age and socioeconomic status. The association between epilepsy and childbirth expectations was examined separately in nulliparous and multiparous women, as childbirth expectations have previously been shown to depend on parity.[12,13] Whenever childbirth expectation was the dependent variable, we adjusted for maternal age, socioeconomic status, parity (multiparous only), previous cesarean section (multiparous only), twin or triplet pregnancy, BMI before pregnancy, anxiety or depression symptoms, alcohol use of ≥1 drink per month during the first trimester or substance abuse during the last months before pregnancy or during the first trimester, smoking

during pregnancy, and any significant adverse life event during the 12 months prior to pregnancy. We performed interaction analyses to examine whether epilepsy and experiences of abuse had a synergistic association with fear of childbirth. Subanalyses within each of the two epilepsy groups and within the control group without epilepsy were performed to examine childbirth expectations, including fear of childbirth in women with and without experiences of abuse, and to examine experiences of abuse and childbirth expectations in women with epilepsy with and without epileptic seizures during pregnancy or childbirth. Effect estimates in which the 95% CIs did not include one- or two-sided p-values < .05 were considered significant.

2.7 | Ethics

The establishment of MoBa and the initial data collection were based on a license from the Norwegian Data Protection Agency and approval from the Regional Committees for Medical and Health Research Ethics. The MoBa cohort is currently regulated by the Norwegian Health Registry Act. All data and material in MoBa are collected with informed consent from the participants. The current study was approved by the Regional Committees for Medical Research Ethics (reference number 2011/1616).

3 | RESULTS

The study population consisted of 295 women with ASM-treated epilepsy, 318 women with ASM-untreated epilepsy, and 93 949 women without epilepsy (Figure 1). The clinical and sociodemographic characteristics are shown in Table 1.

3.1 | Prevalence of abuse

Women with epilepsy more often reported experiences of abuse than women without epilepsy (Table 2). A total of 115 women (47%) with ASM-treated epilepsy and 132 women (47%) with ASM-untreated epilepsy reported any emotional, physical, or sexual abuse, compared to 25 100 women (32%) without epilepsy (aOR = 1.8 [95% CI = 1.4–2.3] and 1.8 [95% CI = 1.4–2.2], respectively; Table 2). Rape was reported by 29 women (11%) with ASM-treated epilepsy and 34 women (11%) with ASM-untreated epilepsy, compared to 3088 women (4%) without epilepsy (aOR = 2.8 [95%

CI = 1.8–4.1] and 2.9 [95% CI = 2.0–4.2], respectively; Table 2). Any childhood abuse was reported in 70 women (29%) with ASM-treated epilepsy and 94 women (38%) with ASM-untreated epilepsy, compared to 14 461 women (19%) without epilepsy (aOR = 1.8 [95% CI = 1.4–2.5] and 2.1 [95% CI = 1.6–2.8], respectively; Table 2). Women with epilepsy more often experienced more than one abuse subcategory (Table 2). A total of 18 women (7%) with ASM-treated epilepsy and 24 women (8%) with ASM-untreated epilepsy reported having experienced all three abuse subcategories compared to 3315 women (4%) without epilepsy (aOR = 2.1 [95% CI = 1.3–3.5] and 2.3 [95% CI = 1.5–3.6], respectively; Table 2).

3.2 | Childbirth expectations

A higher proportion of nulliparous and multiparous women with ASM-treated epilepsy preferred pain relief and a higher proportion of nulliparous women with ASM-treated epilepsy preferred cesarean section compared to women without epilepsy (Table 3). Fear of childbirth did not differ between nulliparous women with and without epilepsy (Table 3). Multiparous women with ASM-treated epilepsy had less fear of childbirth compared to multiparous women without epilepsy in the adjusted models (aOR = .6 [95% CI = .3–.95]; Table 3).

3.3 | Association between abuse and childbirth expectations

Among women without epilepsy, preference for cesarean section, worry for the baby, and fear of childbirth were more frequently reported in women who self-reported experiences of abuse than in women with no abuse experience (Figure 2 and Table S1). Among women with ASM-untreated epilepsy, 22 women (31%) with abuse experiences reported fear of childbirth compared to five (7%) women with no abuse experience (aOR = 5.4 [95% CI = 1.7–17.2]; Figure 2 and Table S1). There was a significant interaction between ASM-untreated epilepsy and having experienced abuse (adjusted $n = 140$, $p = .01$) on the risk of fear of childbirth in nulliparous women. In contrast, we did not find any convincing associations between having experienced abuse and childbirth expectations in women with ASM-treated epilepsy. There was no interaction between having experienced abuse and epilepsy on the risk of fear of childbirth for this group (Table S1 and Figure 2).

TABLE 1 Clinical and sociodemographic data in women with and without epilepsy

	Women with ASM-treated epilepsy, *n* = 295	Women with ASM-untreated epilepsy, *n* = 318	Women without epilepsy, *n* = 93 949
Age, years, mean (SD)	29.1 (4.9)[*]	29.0 (5.0)[**]	29.8 (4.7)
Parity, mean (SD)[a]	.82 (.96)	.74 (.93)	.80 (.90)
Nulliparous, *n* (%)			
No	155 (53)	157 (49)	51 137 (54)
Yes	140 (47)	161 (51)	42 812 (46)
Previous cesarean section, *n* (%)			
No	265 (90)	296 (93)	86 511 (92)
Yes	30 (10)	22 (7)	7438 (8)
Twin or triplet pregnancy, *n* (%)			
No	290 (98)	308 (97)	92 173 (98)
Yes	5 (2)	10 (3)	1776 (2)
Low maternal education, *n* (%)[b]			
No	261 (88)	286 (90)	78 083 (83)
Yes	11 (4)	20 (6)[**]	2533 (3)
Missing	23 (8)	12 (4)	13 333 (14)
Low paternal education, *n* (%)[b]			
No	239 (81)	263 (83)	73 095 (78)
Yes	17 (6)	23 (7)[**]	4065 (4)
Missing	39 (13)	32 (10)	16 789 (18)
Low total household income, *n* (%)[c]			
No	216 (73)	249 (78)	73 124 (78)
Yes	40 (14)[*]	32 (10)[**]	6464 (7)
Missing	39 (13)	37 (12)	14 361 (15)
Noncohabiting mother, *n* (%)			
No	268 (91)	297 (93)	82 528 (88)
Yes	13 (4)[*]	17 (5)[**]	2154 (2)
Missing	14 (5)	4 (1)	9267 (10)
SES sum score [0–4 points], mean (SD)[d]	.29 (.58)[*]	.29 (.58)[**]	.18 (.47)
Missing, *n* (%)	14 (5)	0 (0)	8855 (9)
BMI before pregnancy, mean (SD)	25.0 (4.9)[*]	24.8 (4.5)[**]	24.1 (4.3)
Missing, *n* (%)	23 (8)	8 (3)	10 532 (11)
Anxiety/depression before pregnancy, *n* (%)[e]			
No	255 (86)	279 (88)	78 197 (83)
Yes	26 (9)	39 (12)[**]	6930 (7)
Missing	14 (5)	0 (0)	8822 (9)
Anxiety/depression during pregnancy, *n* (%)[f]			
No	228 (77)	266 (84)	74 574 (79)
Yes	53 (18)[*]	52 (16)[**]	10 553 (11)
Missing	14 (5)	0 (0)	8822 (9)
Anxiety/depression sum score [0–2 points], mean (SD)[g]	.28 (.56)[*]	.29 (.57)[**]	.21 (.49)
Missing, *n* (%)	14 (5)	0 (0)	8822 (9)

(Continues)

TABLE 1 (Continued)

	Women with ASM-treated epilepsy, $n = 295$	Women with ASM-untreated epilepsy, $n = 318$	Women without epilepsy, $n = 93\,949$
Alcohol ≥1 drink/month during the first trimester or substance abuse last months before or during pregnancy, n (%)			
No	263 (89)	300 (94)	80 013 (85)
Yes	14 (5)	9 (3)	2874 (3)
Missing	18 (6)	9 (3)	11 062 (12)
Smoking during pregnancy, n (%)			
No	234 (79)	262 (82)	79 694 (85)
Yes	59 (20)[*]	56 (18)	13 020 (14)
Missing	2 (1)	0 (0)	1235 (1)
Adverse life event, n (%)[h]			
No	186 (63)	214 (67)	64 626 (69)
Yes	62 (21)[*]	68 (21)[**]	13 361 (14)
Missing	47 (16)	36 (11)	15 962 (17)
≥1 epileptic seizure(s), n (%)[i]			
No	103 (35)	135 (42)	NA
Yes	37 (13)	11 (3)	NA
Missing	155 (53)	172 (54)	NA

Abbreviations: ASM, antiseizure medication; BMI, body mass index; NA, not applicable; SES, socioeconomic status.

[a]Number of previous pregnancies of >12 weeks of gestation. Values from 0 (nulliparous) to 4, where 4 means 4 or more.

[b]≤9 years of schooling.

[c]<60% of the national median in the child's birth year.

[d]For the regression analysis. Compound, continuous variable with 0–4 points based on low maternal education, low paternal education, low total household income, and noncohabiting mother.

[e]Self-reported anxiety or depression diagnosis with or without medication use before pregnancy.

[f]Self-reported anxiety or depression diagnosis with or without medication use during pregnancy or anxiety/depression symptoms defined as mean score > 1.75 on the Hopkins Symptom Checklist during gestational Weeks 17–19.

[g]For the regression analysis. Compound, continuous variable with 0–2 points based on anxiety/depression diagnosis with/without medication use before pregnancy and anxiety/depression diagnosis with/without medication use or anxiety/depression symptoms during pregnancy.

[h]Any significant adverse life event during the 12 months prior to pregnancy.

[i]Any type of epileptic seizure during pregnancy or childbirth. From retrospective validation questionnaire (50% response rate); see text.

*p-values < .05; women with ASM-treated epilepsy were compared with women without epilepsy using chi-squared test for independence or Fischer exact test.;

**p-values < .05; women with ASM-untreated epilepsy were compared with women without epilepsy using chi-squared test for independence or Fischer exact test.

3.4 | Epileptic seizures

The prevalence of abuse did not differ between women with epilepsy with and without epileptic seizures during pregnancy (Table 4). In women with ASM-untreated epilepsy, nine (82%) women with epileptic seizures reported a preference for pain relief compared to 42 (33%) women with no epileptic seizures ($p = .002$). There were no other differences in childbirth expectations between women with and without epileptic seizures (Table 4).

4 | DISCUSSION

We found a markedly increased prevalence of self-reported emotional, physical, and sexual abuse in women with epilepsy compared to women without epilepsy. More women with epilepsy also reported that they had been raped compared to women without epilepsy. Having experienced abuse was associated with increased fear of childbirth in nulliparous women with ASM-untreated epilepsy, but not in women with ASM-treated epilepsy. More women with ASM-treated epilepsy preferred pain relief and cesarean section compared to women without epilepsy. Otherwise, women with epilepsy did not have more adverse childbirth expectations than other women.

Almost one in two women with epilepsy reported experiences of abuse compared to one in three women without epilepsy. More than one in 10 women with epilepsy reported that they had been raped, a threefold risk increase compared to women without epilepsy. Two previous studies support our findings.[15,16] Both studies compared

TABLE 2 Self-reported prevalence of abuse in women with and without epilepsy

Abuse subcategory	Women with ASM-treated epilepsy, n = 244		Women with ASM-untreated epilepsy, n = 284		Women without epilepsy, n = 77 839	
	Abuse experiences, n (%)[a]	aOR (95% CI)	Abuse experiences, n (%)[a]	aOR (95% CI)	Abuse experiences, n (%)[a]	aOR [reference]
Any abuse subcategory[b]	115 (47)	1.8 (1.4–2.3)*	132 (47)	1.8 (1.4–2.2)*	25 100 (32)	1.00
Childhood abuse[c]	70 (29)	1.8 (1.4–2.5)*	94 (38)	2.1 (1.6–2.8)*	14 461 (19)	1.00
Emotional abuse[d]	91 (37)	1.7 (1.3–2.3)*	111 (39)	1.8 (1.4–2.3)*	20 563 (26)	1.00
Abused as a child	50 (20)	1.8 (1.3–2.5)*	75 (26)	2.3 (1.7–3.1)*	10 686 (14)	1.00
Abused as an adult	53 (22)	1.7 (1.2–2.3)*	61 (21)	1.6 (1.2–2.2)*	12 723 (16)	1.00
Physical abuse[d]	39 (16)	1.8 (1.3–2.7)*	51 (18)	2.0 (1.5–2.8)*	8193 (11)	1.00
Abused as a child	25 (10)	2.2 (1.4–3.5)*	31 (11)	2.3 (1.5–3.4)*	4295 (6)	1.00
Abused as an adult	17 (7)	1.5 (.9–2.5)	27 (10)	2.0 (1.3–3.1)*	4427 (6)	1.00
Sexual abuse[d]	46 (19)	1.9 (1.4–2.7)*	57 (20)	2.0 (1.5–2.7)*	9088 (12)	1.00
Abused as a child	30 (12)	2.1 (1.4–3.2)*	40 (14)	2.3 (1.6–3.3)*	5393 (7)	1.00
Abused as an adult	18 (7)	1.7 (1.01–2.7)*	27 (10)	2.1 (1.4–3.2)*	4253 (5)	1.00
One abuse subcategory[b]	72 (30)	1.8 (1.4–2.5)*	69 (24)	1.5 (1.1–2.0)*	15 671 (20)	1.00
Two abuse subcategories[b]	25 (10)	1.5 (.995–2.4)	39 (14)	2.1 (1.5–3.0)*	6114 (8)	1.00
Three abuse subcategories[b]	18 (7)	2.1 (1.3–3.5)*	24 (8)	2.3 (1.5–3.6)*	3315 (4)	1.00
Experience of rape[e]	29 (11) [N = 276]	2.8 (1.8–4.1)*	34 (11) [N = 312]	2.9 (2.0–4.2)*	3088 (4) [N = 84 095]	1.00

Note: Women with ASM-treated epilepsy and women with ASM-untreated epilepsy were compared with women without epilepsy, respectively, by using adjusted logistic regression models. Variables in the adjusted models: maternal age and socioeconomic status (compound, continuous variable with 0–4 points based on low maternal education [≤9 years of schooling], low paternal education [≤9 years of schooling], low total household income [<60% of the national median in the child's birth year], and noncohabiting mother).

Abbreviations: aOR, adjusted odds ratio; ASM, antiseizure medication; CI, confidence interval.

[a]Based on four questions from questionnaire during gestation Week 30; see text. Missing data among women who responded to the questionnaire: n = 5 in women with ASM-treated epilepsy, n = 2 in women with ASM-untreated epilepsy, and n = 611 in women without epilepsy did not answer any of the questions.

[b]Emotional, physical, or sexual abuse.

[c]Emotional, physical, or sexual abuse as a child.

[d]Abused as a child or as an adult or abused last year.

[e]Based on one question from questionnaire for gestational Weeks 17–19. Missing data among women who responded to the questionnaire: n = 5 in women with ASM-treated epilepsy, n = 6 in women with ASM-untreated epilepsy, and n = 1032 in women without epilepsy did not answer the question.

*Effect estimates in which the 95% CIs did not include one were considered significant.

TABLE 3 Childbirth expectations in nulliparous and multiparous women with and without epilepsy

Childbirth expectations[*]	Women with ASM-treated epilepsy		Women with ASM-untreated epilepsy		Women without epilepsy	
Nulliparous	*n* = 122		*n* = 147		*n* = 36 262	
	n (%)	aOR (95% CI)	*n* (%)	aOR (95% CI)	*n* (%)	aOR [reference]
Prefer pain relief	67 (55)	1.9 (1.3–2.7)[*]	56 (38)	.8 (.6–1.2)	14 577 (40)	1.00
Fear of childbirth	24 (20)	1.01 (.6–1.6)	27 (18)	.8 (.5–1.3)	6530 (18)	1.00
Prefer cesarean section	33 (27)	2.0 (1.3–3.0)[*]	21 (14)	.9 (.6–1.4)	5486 (15)	1.00
Worry for the baby	22 (18)	1.4 (.9–2.3)	26 (18)	1.2 (.8–1.9)	4506 (13)	1.00
Multiparous	*n* = 125		*n* = 139		*n* = 41 622	
	n (%)	aOR (95% CI)	*n* (%)	aOR (95% CI)	*n* (%)	aOR [reference]
Prefer pain relief	59 (48)	1.7 (1.2–2.5)[*]	46 (34)	1.1 (.7–1.5)	14 112 (34)	1.00
Fear of childbirth	21 (17)	.6 (.3–.95)[*]	32 (24)	1.1 (.8–1.7)	8945 (22)	1.00
Prefer cesarean section	32 (26)	1.4 (.9–2.2)	32 (24)	1.5 (.99–2.3)	7163 (17)	1.00
Worry for the baby	20 (16)	1.4 (.8–2.3)	17 (13)	1.1 (.7–1.9)	4596 (11)	1.00

Note: Women with ASM-treated epilepsy and women with ASM-untreated epilepsy were compared with women without epilepsy stratified for nulliparity using adjusted logistic regression models. Variables in the adjusted models: maternal age, previous cesarean section (multiparous only), parity (multiparous only), twin or triplet pregnancy, socioeconomic status sum score (compound, continuous variable with 0–4 points based on low maternal education [≤9 years of schooling], low paternal education [≤9 years of schooling], low total household income [<60% of the national median in the child's birth year], and noncohabiting mother), alcohol ≥1 drink/month during the first trimester or substance abuse in last months before or during pregnancy, smoking during pregnancy, any significant adverse life event during the 12 months prior to pregnancy, body mass index before pregnancy, anxiety/depression sum score (compound, continuous variable with 0–2 points based on diagnosis of anxiety/depression with/without medication use before pregnancy and diagnosis of anxiety/depression with/without medication use or anxiety/depression symptoms during pregnancy [mean score > 1.75 on the Hopkins Symptom Checklist during gestational Weeks 17–19]).

Abbreviations: aOR, adjusted odds ratio, ASM, antiseizure medication; CI, confidence interval.

[a]Based on eight statements from questionnaire during gestation Week 30; see text. Missing data among nulliparous women who responded to the questionnaire: *n* = 1 in women with ASM-treated epilepsy and *n* = 266 in women without epilepsy did not answer any of the statements. Missing data among multiparous women who responded to the questionnaire: *n* = 1 in women with ASM-treated epilepsy and *n* = 300 in women without epilepsy did not answer any of the statements. *N* may further vary slightly in the table due to some women having missing data on one or more of the statements.

*Effect estimates in which the 95% CIs did not include one were considered significant.
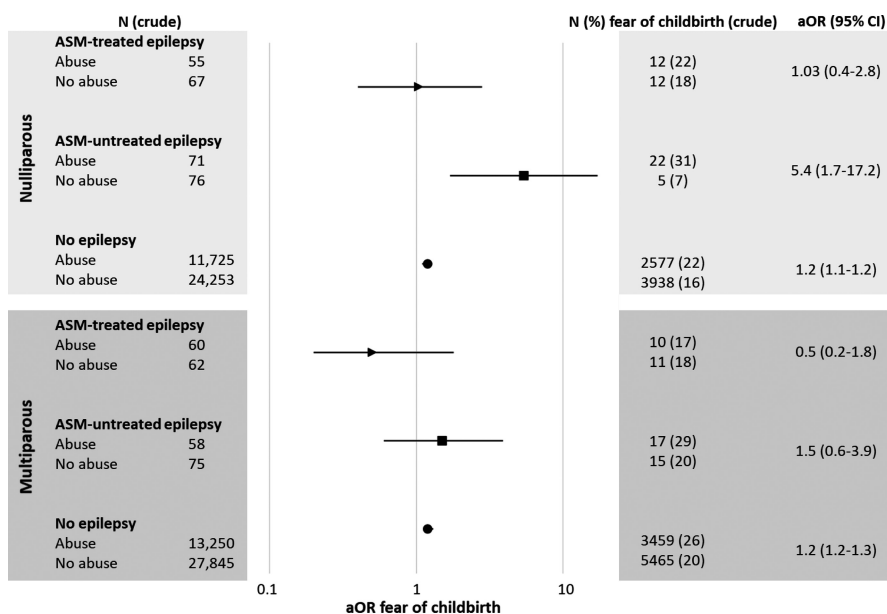
FIGURE 2 Association between having experienced abuse and fear of childbirth in women with and without epilepsy. Forest plot shows adjusted odds ratios (aORs) of the fear of childbirth in women with self-reported experiences of abuse compared to women with no abuse experience. Nulliparous and multiparous women within each of the three study groups were examined separately. See the text for information on the covariates in the adjusted models. ASM, antiseizure medication; CI, confidence interval

TABLE 4 Experiences of abuse and childbirth expectations in women with epilepsy with and without epileptic seizures during pregnancy

	Women with ASM-treated epilepsy		Women with ASM-untreated epilepsy	
	Seizure, $n = 35$	No seizure, $n = 96$	Seizure, $n = 11$	No seizure, $n = 127$
Abuse experiences, n (%)[a]				
Any abuse subcategory[b]	17 (49)	45 (47)	<5	60 (47)
Childhood abuse[c]	12 (34)	24 (25)	<5	43 (34)
Emotional abuse[d]	12 (34)	39 (41)	<5	54 (43)
Physical abuse[d]	9 (26)	15 (16)	<5	22 (17)
Sexual abuse[d]	5 (14)	16 (17)	<5	28 (22)
Experience of rape[e]	<5 [$n = 37$]	6 (6) [$n = 101$]	<5 [$n = 11$]	14 (11) [$n = 131$]
Childbirth expectations, n (%)[f]				
Prefer pain relief	14 (41)	38 (40)	9 (82)*	42 (33)*
Fear of childbirth	6 (18)	14 (15)	<5	24 (19)
Prefer cesarean section	6 (17)	25 (26)	<5	20 (16)
Worry for the baby	7 (21)	14 (15)	<5	19 (15)

Note: Women with epileptic seizures (all types of seizures) were compared with women without epileptic seizure within each epilepsy group using chi-square test for independence or Fischer exact test. Cells with fewer than five individuals are marked with "<5" for personal data privacy purposes.

Abbreviation: ASM, antiseizure medication.

[a]Based on four questions from questionnaire during gestation Week 30; see text. Missing data among women who responded to the questionnaire: $n = 1$ women with ASM-treated epilepsy and $n = 1$ women with ASM-untreated epilepsy did not answer any of the questions.

[b]Emotional, physical, or sexual abuse.

[c]Emotional, physical, or sexual abuse as a child.

[d]Abused as a child or as an adult or abused last year.

[e]Based on one question from questionnaire during gestational Weeks 17–19; see text. Missing data among women who responded to the questionnaire: $n = 1$ women with ASM-treated epilepsy and $n = 4$ women with ASM-untreated epilepsy did not answer the question.

[f]Based on eight statements from questionnaire during gestation Week 30; see text. Missing data among women who responded to the questionnaire: $n = 1$ women with ASM-treated epilepsy and $n = 1$ women with ASM-untreated epilepsy did not answer any of the statements. *N* may further vary slightly in the table due to some women having missing data on one or more of the statements.

*Two-sided *p*-values < .05 were considered significant.

childhood abuse, posttraumatic stress disorder (PTSD), rape, and lifetime abuse traumas between people with epileptic and nonepileptic seizures and found that such experiences were also common in patients with epileptic seizures.[15,16] However, participants were few ($N = 51$ and $N = 35$, respectively), the study populations were patients with intractable seizures, and they did not compare abuse rates with a healthy control group. In a population-based study from England, 34% of men and women with epilepsy reported sexual abuse and 9% reported physical abuse compared to 21% (aOR = 2.0 [95% CI = 1.3–3.3]) and 5% (aOR = 1.9 [95% CI = .9–4.2]) in the general population, respectively.[6] Differences in study design and our study population consisting of pregnant women can explain the different prevalences compared to our study.

The increased prevalence of abuse in women with epilepsy included both childhood abuse and abuse as an adult. In the general population, abuse is associated with an increased risk of pregnancy complications, such as low birth weight and preterm delivery, and psychiatric

disorders, such as anxiety and depression.[7,8] Childhood abuse in particular is associated with several adverse pregnancy outcomes, including childbirth complications, increased fear of childbirth, and a higher likelihood of PTSD, anxiety, and health complaints in general.[8] The association between having experienced abuse or fear of childbirth and the consequences for pregnancy outcomes have not been examined previously in women with epilepsy. Several studies have found that women with epilepsy who experience abuse more often have depression and anxiety disorders, including postpartum depression.[5,6,18] Based on our findings, clinicians treating women with epilepsy should be aware of the increased risk of abuse associated with this disorder.

Fear of childbirth was increased after self-reported experiences of abuse in nulliparous women with ASM-untreated epilepsy, as well as in women without epilepsy. Considering the increased risk of pregnancy complications, peripartum psychiatric disorders, and increased morbidity and mortality in women with epilepsy,[1,2] it was

unexpected that fear of childbirth was not more frequently reported in women with epilepsy compared to those without epilepsy. On the contrary, multiparous women with ASM-treated epilepsy reported less fear of childbirth compared to women without epilepsy after adjustment for a range of potential confounding factors. One explanation could be that women with epilepsy, particularly if ASM-treated, have better and more frequent follow-up[31] during pregnancy than women without epilepsy. A previous study reported increased fear of childbirth in nulliparous, but not in multiparous, women with ASM-treated epilepsy compared to women without epilepsy, but did not investigate associations with experiences of abuse.[17] Our findings among nulliparous women with ASM-untreated epilepsy are in line with studies from the general population, in which previous experiences of abuse have been associated with fear of childbirth in nulliparous, but not in multiparous, women.[10] This association, however, was not present among women with ASM-treated epilepsy. Women with ASM-treated epilepsy are likely to differ from women with ASM-untreated epilepsy regarding type of and severity of epilepsy, and are more likely to have specialized and frequent follow-up during pregnancy and a detailed birth plan. This may have decreased any fear of childbirth among nulliparous women with ASM-treated epilepsy and experiences of abuse, and thereby explain the lack of any association. Fear of childbirth among multiparous women is associated with previous negative birth experiences.[10,12,13] An association between the number of epileptic seizures during pregnancy and fear of childbirth has previously been reported in women with epilepsy,[17] but our data could not confirm this. However, we found an association between having epileptic seizures during pregnancy and preference for pain relief during childbirth.

Strengths of our study include a validated epilepsy diagnosis, a large amount of material from women with and without epilepsy, separation of epilepsy with and without ASM treatment during pregnancy, and detailed information regarding different abuse subcategories. We have adjusted for relevant confounders. Limitations of this study include the cross-sectional design and suboptimal validation of some variables. Instruments assessing abuse and fear of childbirth are difficult to validate, and a clear definition of fear of childbirth has not been established.[12,13] We dichotomized childbirth expectation variables conservatively, with only "agree completely" and "agree" regarded as positive answers, whereas the option "agree somewhat" was considered a negative answer. Caucasian women with high socioeconomic status are overrepresented in MoBa, and the overall participation rate among the invited pregnancies was 41%.[19,32] Our prevalence estimates may thus not be generalizable to pregnant women with epilepsy who chose not to participate in MoBa or were not invited.

However, the epilepsy prevalence in MoBa and among all pregnant women in Norway was similar.[32] We adjusted for self-reported anxiety and depression disorders or symptoms before and during pregnancy, but data on other psychiatric disorders in MoBa were not available.

In conclusion, we found an increased prevalence of self-reported emotional, physical, and sexual abuse in pregnant women with epilepsy compared to women without epilepsy. Nulliparous women with ASM-untreated epilepsy who previously experienced abuse had an increased fear of childbirth. Clinicians should be aware of these associations when treating women with epilepsy.

CONFLICT OF INTEREST
K.E. has received unrestricted research grants from Novartis. N.E.G. has received speaking and/or consultant honoraria from UCB, Ra Pharmaceuticals, Roche, Alexion, Argenx, and Immunovant. M.H.B. has received speaking and/or consultant honoraria from Novartis, Teva, Eisai, and Lilly, and project funding from Novartis unrelated to the present work. Neither of the other authors has any conflict of interest to disclose. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

AUTHOR CONTRIBUTIONS
Johannes Vederhus contributed to the study design, analysis, interpretation of data, and writing the manuscript. Elisabeth Synnøve Nilsen Husebye contributed to the study design, analysis, interpretation of data, writing the manuscript, and funding. Karine Eid contributed to the data acquisition, interpretation of data, and critical revision of the manuscript. Nils Erik Gilhus contributed to the

data acquisition, interpretation of data, critical revision of the manuscript, and funding. Marte Helene Bjørk contributed to the study design, data acquisition, interpretation of data, critical revision of the manuscript, study supervision, and funding.

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