



Physical Violence During Pregnancy in France: Frequency and Impact on the Health of Expectant Mothers and New-Borns

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Abstract

Objectives Even during pregnancy women may suffer from violence. We estimated the prevalence of physical abuse during pregnancy, we analyzed the main risk factors and described the relationship between physical violence, psychological wellbeing and pregnancy outcome. **Methods** We used a national representative sample of births, in all public and private maternity units, in 2016 in France. Women were interviewed after delivery, on their living conditions and occurrence of physical violence at least once during pregnancy. The study of risk factors and pregnancy outcome was done with multivariable logistic regressions. **Results** Of 12,330 women included in the analysis 1.8% (95% CI 1.6–2.0) had been exposed to physical violence during pregnancy. Risk of violence was associated with the couple situation [women without a partner or in couple not cohabiting (OR 2.89, 95% CI 1.96–4.26)], household income (less than 3000 euros monthly), and state medical assistance coverage. Physical violence was more prevalent in case of a history of induced abortion or cannabis use during pregnancy. Psychological distress was more frequent with than without physical violence (e.g., 62% vs. 24% had a sadness period during pregnancy, $p < 0.001$). The risk of spontaneous preterm birth and transfer of the newborn to a neonatal intensive care unit were significantly higher among women experiencing physical violence during pregnancy compared to other women. **Conclusions for Practice** Main factors associated with increased risk of violence during pregnancy were socio-economics. The identification by caregivers of women exposed to violence during pregnancy needs to be improved to develop preventive and care strategies.

Keywords Physical violence · Pregnancy · Social characteristics · Psychological distress

Significance

What is known? Women may be exposed to violence at different stages of their life, including during pregnancy, with adverse consequences for the health of the mother and baby. **What this article adds?** In France, in 2016, the frequency of physical violence during pregnancy was higher for women without a partner or in couple not cohabiting, and for those

living in poverty or precarious conditions. Psychological distress was much more frequent and the risk of spontaneous preterm birth and transfer of the newborn to a neonatal intensive care unit was higher among women victims of physical violence. Health professionals should introduce questions on violence during antenatal consultations, which is not yet done.

Background

Violence against women is a major public health problem, resulting in death, disability and various physical and mental health disorders. About one-third of women worldwide are victims of physical or sexual abuse by their partner, former partner or another person. Prevalence is difficult to estimate; the lifetime prevalence varies greatly among regions, from 27% in Europe to 45% in Africa among women aged 15 years or older (WHO 2013).

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Women may be exposed to violence at different stages of their life, including during pregnancy, with adverse consequences for the health of the mother and baby. A multicenter study by the WHO (Garcia-Moreno et al. 2005) estimated that the rate of pregnant women experiencing physical violence was greater than 5% in 11 of 15 sites included in 10 countries between 2000 and 2003. The lowest proportion was in Japan, 1%, and the highest in Peru, 28%. In the countries where the study was carried out, for more than 90% of the cases women were mistreated by the baby's father. In a representative sample of the Canadian population in 2009, 10.5% of women were victims of violence during pregnancy (Taillieu et al. 2016). In a review of studies from 23 countries, the frequency of physical abuse during pregnancy was 13.8% (James et al. 2013).

In France, until now, we had no national data regarding violence during pregnancy. In a 1995 study involving 16 European countries, the European Program on Occupational Risks and Pregnancy Outcome (EUROPOP), 2% (95% CI 1–4%) of women interviewed in one maternity unit in France reported family violence during pregnancy (Saurel-Cubizolles and Lelong 2005).

The estimated prevalence of violence differs among studies because of differences in sample design, violence measure and distribution of risk factors. Many risk factors are related to socioeconomic conditions, such as low income, low educational attainment, unemployment, young age or living alone (James et al. 2013; Saurel-Cubizolles and Lelong 2005; Coker et al. 2004; Taillieu and Brownridge 2010; Van Parys et al. 2014; Finnbogadóttir and Dykes 2016). Moreover, some behaviors such as use of alcohol, tobacco or illicit drugs are frequently reported as risk factors of violence (Taillieu et al. 2016; Taillieu and Brownridge 2010; Cook and Bewley 2008).

Exposure to violence in pregnancy negatively affects the psychological health of women. A meta-analysis estimated a two to threefold increased risk of major depressive disorder and 1.5-fold increased risk of postpartum depression with violence during pregnancy (Beydoun et al. 2012). In another meta-analysis, the risk of post-natal depression related to intimate partner violence during pregnancy was increased three-fold (odds ratio: 3.1 (95% CI 2.7–3.6) (Howard et al. 2013). Finally, the negative impact of physical violence on the course of pregnancy is documented, from the risk of spontaneous abortions to that of preterm delivery (Donovan et al. 2016; Hill et al. 2016), as well as an excess risk of perinatal or even infant mortality (Asling-Monemi et al. 2003).

Knowing the frequency of violence and risk factors is an essential step in the development and implementation of interventions to reduce the incidence of violence and to address their consequences. Using a representative sample of births in France in 2016, the aims of this paper were to (1) estimate the prevalence of women's exposure to physical

violence during pregnancy, (2) analyze the main risk factors and (3) describe the link between violence and some risky behaviors, psychological distress and main indicators of pregnancy outcome.

Methods

Study Design

The National Perinatal Survey (NPS) was conducted in 2016 by the INSERM Team of Perinatal Epidemiology (UMR1153-EPOPé), in collaboration with other institutions (Blondel et al. 2017). Data collection covered all births during 1 week in March 2016, that is, all live born or stillborn children, in public and private maternity units—as well as children born outside these institutions and subsequently transferred—at a gestational age of at least 22 weeks or weighing at least 500 g at birth. Data came from (1) an interview with women during their postpartum stay, to obtain information about their social and demographic characteristics and prenatal care; (2) a self-administered questionnaire with nine questions—on sensitive subjects such as violence, cannabis or psychological distress; and (3) medical files about complications of pregnancy and delivery and the child's health status at birth.

Women younger than 18 years and those with a stillbirth or late abortion for medical reasons were not interviewed and did not complete the self-administered questionnaire.

The NPS was approved by the ethics committee of the Health Research Institute in December 2014 (IRB00003888 no. 14-191), the French Commission on Information Technology and Liberties (CNIL—no. 915197) and the National Council on Statistical Information (visa no. 2016X703SA).

Variables

The occurrence of violence was identified by the following question in the self-administered questionnaire: “During your pregnancy, has anybody ever hit you, slapped you, beat you or intentionally shoved you or otherwise physically abused you?” with a yes/no response.

Data variables included age (younger than 20, 20–24, 25–29, 30–34, and 35 years or older), nationality (French, other European, North African, Sub-Saharan African, other nationalities). Maternal level of education was considered in five modalities (less than bachelor degree, at bachelor degree, bachelor degree + 1 or 2 years, bachelor degree + 3 or 4 years, and bachelor degree + 5 or more years). The bachelor is the diploma that ends high school, validated at 18 years. The social situation was also described by employment status during pregnancy (working, unemployed, student, not working), household monthly income (less than

500 euros, 500–1000, 1000–1500, 1500–2000, 2000–3000, 3000–4000, and 4000 euros or more), and medical insurance (social security, universal health coverage (*Couverture Maladie Universelle*—(CMU), state medical assistance (AME), or no insurance). The following living conditions were considered: accommodation type (own housing, with family or friends, in a foster home or hostel), and number of previous children (none, 1, 2, 3 or more).

Data was also available on couple situation assessed by the following question: “Currently, do you live in couple? yes, with a person who is living in the same accommodation than yours/yes, with a person who is not living in the same accommodation than yours/no you are not living in couple”; each answer was respectively called cohabiting/with a partner but not cohabiting/single. All these variables were selected because they have previously been related to violence in the literature.

Besides we analyzed the number of previous induced abortions (none, 1, 2 or more), tobacco smoking during pregnancy (non-smoker, 1 to 9 or 10 or more cigarettes a day) and cannabis use during pregnancy (none, less than once monthly, more often) as women’s behaviors potentially related to physical abuse.

In order to assess the psychological well-being of women during pregnancy, we have used four questions. Two of them were face-to-face questions as following: (1) “On a psychological point of view, how did you feel during your pregnancy? Good/quite good/quite poorly/poorly; (2) “Have you consulted a doctor, psychologist or psychotherapist for psychological difficulties during your pregnancy? Yes/no”. The other two were items from the self-questionnaire, answered yes/no: (3) “During your pregnancy, did you experience a period of at least two consecutive weeks during which you felt sad, depressed, or hopeless?” (4) “During your pregnancy, did you experience a period of at least 2 weeks during which you lost interest in most things that usually give you pleasure, such as leisure, work or activities?”

We used five indicators for pregnancy outcomes: (1) preterm birth (PB), defined as a birth occurring before 37 completed weeks of gestation; (2) spontaneous PB, when the PB had not been medically induced or followed a cesarean section before the beginning of labor; (3) low birthweight, defined as a weight lower than 2500 g; (4) small for gestational age (SGA), when the birthweight was lower than the 10th percentile taking into account sex and gestational age using French norms of intra-uterine growth (Audipog 2008); (5) transfer of the newborn to a neonatal intensive care unit after the delivery.

Statistical Analysis

Firstly, we estimated the prevalence of violence. Secondly, this frequency was analyzed by women’s characteristics using

the Chi square test. Variables significant on bivariate analysis at $p < 0.05$ were entered into a multivariable logistic regression model, estimating odds ratios and their 95% confidence intervals (CI). Then, we examined the association of physical violence with history of induced abortions and tobacco and cannabis use during pregnancy; these analyses were adjusted for the main risk factors of violence identified (with $p < 0.10$) by the previous multivariate analysis. Lastly, we analyzed the association of physical violence with the psychological well-being on the one hand and with the pregnancy outcome on the other hand using bivariate analyses, followed by multivariable models controlling for household income, couple relationship and social insurance. The analyses concerning pregnancy outcome were restricted to singletons, due to specific risks of multiple pregnancies; they have been adjusted for the same factors than above plus educational level, number of induced abortions, tobacco and cannabis use since these characteristics are major risk factors for the pregnancy outcome. We used the software SAS v 9.4 for analysis.

Results

The sample included 13,982 women with a live birth; data on violence was not available for 1652 women (11.8%). The present study included 12,330 women; of them, 11,922 had a singleton baby.

On the whole, 220 women reported physical violence during pregnancy, i.e. 1.8% (95% CI 1.6–2.0%) (Table 1). This percentage was higher for women younger than 24 than older women and for women with Sub-Saharan African or other nationality than European or North African nationality. It decreased with increasing educational level. Women who were students or, to a lesser extent, unemployed more often reported physical violence than did employed women. The prevalence of violence, which was strongly related to household income, was higher for women with lower income and those with state medical assistance (AME) or universal health coverage (CMU) than social security.

The prevalence of physical violence was greater for women who were not cohabiting with their partner or had no partner than for those cohabiting. It was increased for women not living in their own residence, especially those living in a foster home or hostel and for those who had three or more previous children.

The risk of physical violence was strongly related to the couple situation: the risk was increased for women who were not cohabiting with their partner or who had no partner versus those who were cohabiting, even after adjusting for other factors (adjusted OR 2.89, 95% CI 1.96–4.26). Household income also remained related to risk of violence after adjustment, particularly for incomes less than 3000 euros per

Table 1 Prevalence, crude and adjusted odds ratios of physical violence in pregnancy by social characteristics

	Physical violence in pregnancy							
	N	%	Crude OR	95% CI	p value	Adjusted OR ^a	95% CI	p value
Total	12,330	1.8						
Age (years)								
Less than 24	1642	3.1	2.36	1.61–3.46		1.23	0.77–1.94	
25–29	3882	1.8	1.31	0.92–1.87		1.18	0.81–1.73	
30–34	4176	1.3	1			1	–	
35 or more	2629	1.7	1.28	0.86–1.90	< 0.001	1.20	0.79–1.82	0.75
Nationality								
French	10,502	1.6	1			1	–	
European	392	2.0	1.30	0.63–2.66		1.00	0.46–2.19	
North African	549	2.7	1.75	1.02–2.99		1.24	0.68–2.26	
Sub-Saharan African	515	3.9	2.52	1.57–4.04		1.09	0.62–1.92	
Other	284	3.5	2.27	1.19–4.35	< 0.001	1.32	0.63–2.73	0.92
Educational level								
Less than bachelor	2848	2.8	3.58	2.11–6.06		1.23	0.67–2.28	
At bachelor degree	2672	2.2	2.75	1.60–4.73		1.18	0.64–2.16	
Bachelor+1 or 2	2351	1.5	1.87	1.04–3.35		1.10	0.58–2.05	
Bachelor+3 or 4	2178	1.1	1.38	0.74–2.57		1.05	0.55–2.00	
Bachelor+5 or more	2121	0.8	1		< 0.001	1		0.96
Women' employment ^b								
Working	8017	1.2	1					
Unemployed	2045	3.1	2.33	1.78–3.05	< 0.001	0.95	0.68–1.40	0.89
Students	261	5.0						
Not working	1934	2.2						
Household income per month ^c								
Less than 500 €	333	6.6						
< 1000 €	995	4.1	9.68	5.08–18.43		3.07	1.28–7.39	
< 1500 €	1036	3.1	6.20	3.11–12.33		3.11	1.34–7.23	
< 2000 €	1528	2.8	5.62	2.89–10.94		4.15	1.90–9.04	
< 3000 €	3262	1.3	2.60	1.33–5.04		2.25	1.06–4.75	
< 4000 €	2741	1.0	1.86	0.92–3.77		1.93	0.91–4.11	
4000 € or more	2148	0.5	1		< 0.001	1		< 0.008
Couple situation ^d								
Cohabiting	11,054	1.3	1			1		
Not cohabiting	446	6.3	4.97	3.73–6.63	< 0.001	2.89	1.96–4.26	
single	748	6.2						< 0.001
Medical insurance								
State medical assistance (AME)	131	8.4	7.02	3.70–13.32		2.43	1.04–5.65	
Universal health coverage (CMU)	1525	4.3	3.46	2.56–4.67		1.47	0.97–2.22	
Social security	10,313	1.3	1			1	–	
None	289	3.1	2.46	1.24–4.88	< 0.001	1.12	0.50–2.52	0.10
Housing								
Own accommodation	11,393	1.5	1			1	–	
Family or friends	761	4.2	2.80	1.90–4.11		1.10	0.69–1.74	
Foster home or hostel	104	9.6	6.78	3.47–13.23	< 0.001	2.11	0.97–4.58	0.17
No. of previous childbirths								
0	5171	1.8	1			1	–	
1	4364	1.4	0.75	0.54–1.04		0.84	0.59–1.19	
2	1789	2.2	1.20	0.82–1.76		1.07	0.70–1.65	
3 or more	999	2.7	1.50	0.97–2.31	< 0.02	0.96	0.56–1.65	0.65

^aAll variables included in the multivariate model for 11,861 women: 462 excluded due to missing data for at least one variable, 1.7% reported physical violence

^bThe odds ratios have been estimated grouping “unemployed”, “students” and “not working”

^cThe odds ratios have been estimated grouping “less than 500 €” and “less than 1000 €”

^dThe odds ratios have been estimated grouping “not cohabiting” and “single”

month. The risk of violence was increased for women with state medical assistance (AME) [adjusted OR 2.43 (95% CI 1.04–5.65)]. The relation between violence and educational level or nationality was no longer significant after adjustment. Because of missing values in at least one variable, 462 women were excluded from the multivariable analysis; 1.7% of them reported physical violence.

In the whole sample, 1652 women did not answer the question on physical abuse mainly because they were not interviewed by the NPS, it was the case of 1303 women, and only minimal data were available: age, parity and some medical data. The comparison of women for whom data on violence is available and the others shows differences: respectively, 13% versus 26% were younger than 25 years old (data not shown) and 8% versus 13% had 3 or more previous children, both characteristics related to risk of violence. Also, 349 women completed the interview but not the self-administered questionnaire or the question on violence. In comparing women with complete data with those who only had interview data, 23% versus 11% reported income less than 1000 euros per month, 12% versus 9% were not cohabiting with their partner or had no partner, and 26% versus 13% had state medical assistance (AME) or universal health coverage (CMU), all factors associated with physical violence. If all women with missing data for violence had the same prevalence of violence by age as

respondents, their rate of violence would be 2%—a rate obtained by applying the percentages of violence per age group observed on the available data—which would not really change the estimate on the overall sample, 1.81% versus 1.78%.

Having had one or more induced abortions was associated with physical violence during pregnancy, even after adjusting for main risk factors of violence (Table 2). As well, smoking tobacco or using cannabis during pregnancy was associated with violence. After adjusting for use of cannabis and the main risk factors of violence, tobacco smoking was no longer associated, but cannabis use remained strongly associated with physical violence.

The indicators of psychological symptomatology were associated with physical violence (Table 3). These associations were highly significant even when adjusting for the main risk factors of violence, with odds ratios higher than three. Consultations with a professional for psychological problems were more frequent in case of physical violence. These associations remained strong even after adjustment for the main risk factors of violence.

The rate of preterm births was higher among women exposed to physical abuse during pregnancy, as was the rate of spontaneous preterm birth (Table 4). There was no difference in the proportion of children with a birthweight lower than 2500 g or small for gestational age, whereas the

Table 2 History of induced abortion and other behaviors and physical violence during pregnancy

	Physical violence in pregnancy			Adjusted OR (95% CI)	
	No N = 12,110 %	Yes N = 220 %			
No. of previous induced abortions					
0	83.4	64.8	< 0.001	1 ^a	< 0.001
1	12.7	23.9		2.04 (1.47–2.85)	
2 or more	3.9	11.3		2.42 (1.53–3.85)	
Tobacco smoking during pregnancy					
No	84.5	73.3	< 0.001	1 ^b	0.17
1–9 cigarettes/day	11.8	19.8		1.40 (0.98–2.02)	
10 cigarettes/day or more	3.8	6.9		1.23 (0.71–2.16)	
Cannabis use in pregnancy					
Yes	2.0	7.8	< 0.001	3.05 (1.77–5.26) ^c	< 0.001
If yes,	(N = 281)	(N = 26)			
Less than 1/month	66.9	61.5	< 0.03	^d	
1–9 times/month	23.1	11.5			
10 times/month or more	10.0	26.9			

^aAdjusted for household income, couple relationship and medical insurance

^bAdjusted for household income, couple relationship, medical insurance and cannabis use

^cAdjusted for household income, couple relationship, medical insurance and tobacco smoking

^dNot available due to small numbers

Table 3 Psychological well-being during pregnancy and physical violence

	Physical violence in pregnancy			Adjusted OR (95% CI) ^a	
	No	Yes			
	N = 12,110	N = 220			
	%	%			
Self-rated psychological status					
Good	67.8	46.1	< 0.001	1	< 0.001
Quite good	22.2	28.3		1.73 (1.25–2.39)	
Quite poor	7.3	15.1		2.34 (1.55–3.52)	
Poor	2.8	10.5		3.47 (2.14–5.63)	
Episode of sadness ^b					
Yes	23.5	61.8	< 0.001	4.22 (3.17–5.62)	< 0.001
Loss of pleasure ^c					
Yes	18.1	50.7	< 0.001	3.63 (2.75–4.80)	< 0.001
Visit to a professional for psychological distress					
Yes	6.3	21.0	< 0.001	3.75 (2.66–5.29)	< 0.001

^aAdjusted for household income, couple relationship, and medical insurance

^bDuring your pregnancy, did you experience a period of at least two consecutive weeks during which you felt sad, depressed, or hopeless? Yes/no

^cDuring your pregnancy, did you experience a period of at least two weeks during which you lost interest in most things that usually give you pleasure, such as leisure, work or activities? Yes/no

Table 4 Outcomes of pregnancy and physical violence (singletons)

	Physical violence in pregnancy			Adjusted OR (95% CI)	
	No	Yes			
	N = 11,685	N = 216			
	%	%			
Preterm birth (<37 weeks)	5.6	8.8	< 0.04	1.55 (0.95–2.53) ^a	0.08
Spontaneous preterm birth	3.2	6.0	< 0.02	1.82 (1.02–3.27) ^a	< 0.05
Birthweight <2500 g	5.5	7.4	0.22	1.14 (0.67–1.95) ^b	0.61
SGA 10th percentile	9.2	9.8	0.76	0.88 (0.54–1.41) ^b	0.58
Transfer of newborn in NICU	8.1	15.7	< 0.001	1.62 (1.08–2.42) ^b	< 0.02

SGA small for gestational age taking into account sex and gestational age using French norms of intra-uterine growth (Audipog 2008), NICU neonatal intensive care unit

^aAdjusted for educational level, household income, couple situation, social insurance, number of induced abortions and cannabis use

^bAdjusted for educational level, household income, couple situation, social insurance, number of induced abortions, tobacco and cannabis use

percentage of children transferred to a neonatal intensive care unit (NICU) was higher among the group of women exposed to violence. After adjustment for education, income, couple situation, social insurance, number of induced abortions and cannabis use (plus tobacco use for transfer to a NICU), the excess of risk of spontaneous preterm birth and infant transfer remained statistically significant in relation to physical violence.

Discussion

The prevalence of reported physical violence during pregnancy was 1.8%. This proportion may seem rather low, but it corresponds to more than 14,000 women each year in France. Main risk factors of violence were not cohabiting with the partner or not having a partner and low household income. Women reporting violence frequently had a history of induced abortion and were more frequently cannabis

users. They frequently reported depressive symptoms and more often consulted professionals for psychological difficulties than women not exposed to violence. Women victims of physical violence had a higher risk of spontaneous preterm birth and of having a baby transferred to a neonatal intensive care unit.

Adequately measuring the prevalence of violence is difficult. In the present study, only one question was asked, without details on the context of occurrence or on the perpetrator. The question was included in a general survey on perinatal health, with multiple objectives; thus, our analysis benefited from the diversity of information collected. The question focused on physical violence, excluding emotional and sexual abuse. The wording of the question was very similar to an item on the *Abuse Assessment Screen*, but without secondary questions such as ‘by whom?’ or ‘How many times?’ (Rabin et al. 2009). Prevalence may have been underestimated: with only one question, some women could avoid responding positively. Moreover, as our findings illustrate, the selection of women by non-response to the survey, may have underestimated the frequency of violence.

The strength of this study is the quality of the sample, its large size and the representativeness of births at the national level over a recent period. This is the first time a question on violence has been asked in the French perinatal surveys. The question on violence was introduced in a self-administered questionnaire—with no one to hear the answer—and so could have implied better reporting, due to a more favorable climate of confidentiality.

Previous research has reported a wide range of prevalence of violence during pregnancy, 0.9% to 20% (Gazmararian et al. 1996; Saurel-Cubizolles and Lelong 2005). Studies were based on varied populations and some were mono-centric. More recently, in a cohort study including 1573 women during 2012–2013 in Sweden, the prevalence of domestic physical violence during pregnancy was 0.8%, and 2.5% when including emotional, physical or sexual abuse (Finnbogadóttir and Dykes 2016). From a sample of 1 894 women during 2010–2012 in Belgium, 2.4% of women reported being a victim of physical violence during pregnancy (Van Parys et al. 2014). In a Canadian sample of 4750 women in 2000, 1.2% reported physical violence by an intimate partner during pregnancy and 1.5% reported fear of their partner (Janssen et al. 2003). These percentages are close to the one we found. However, in a study of 848 women in two hospitals in Portugal in 2012, 22% were victims of domestic violence during pregnancy (Almeida et al. 2017). A meta-analysis of domestic violence showed a range of 3% to 23% for physical violence in developed countries (James et al. 2013). The characteristics of the sample and the measurement of violence have a great impact on estimating prevalence; almost all authors mentioned the risk of under-reporting. In general, it is difficult for women to declare that

they are exposed to violence and some choose to hide the situation because of threats, shame or distress. Few women denounce violence, seek help or complain (Salmona 2016).

We aimed to describe the main characteristics of abused women, and bring information to improve detection of such women by caregivers. The links between violence and social factors that we describe have been reported previously (Taillieu et al. 2016, Cook and Bewley 2008; Gartland et al. 2011). A meta-analysis showed twice the risk of being a victim of violence during pregnancy for women with low income (James et al. 2013). Our results underline the increased risk of violence for women in vulnerable and precarious social situations. Receiving state medical assistance or living in a hostel are both markers that women are in this situation. These women accumulate harmful conditions that go as far as physical violence, their risk was almost threefold that of women in social well-being. There are two possible reasons for the associations we observed: either the occurrence of violence is more frequent in the hostels, either some abused women may leave their abusive homes and go to live with friends or be admitted to a hostel.

Family situation is strongly linked to violence. The risk of physical abuse during pregnancy was increased for women who did not have a partner or did not live with their partner. We had no details on the biography of the couples: some could be in the process of separating, which is a critical step in the occurrence of violence. In a 2000 national survey on violence against women in France, an estimated 10% of women reported physical violence by the partner during the year of separation as compared with 2% of women who were not separated from their partner (Jaspard et al. 2003). In a European study in 1995–1997, the proportion of women reporting family violence was 14% when the couple separated during pregnancy versus 1% when the couple lived together (Saurel-Cubizolles and Lelong 2005). Several other studies observed increased risk of violence for women living alone (James et al. 2013; Taillieu and Brownridge 2010; Van Parys et al. 2014; Gartland et al. 2011).

Having had an induced abortion was related to physical violence; abused women have twice the risk of previous abortion and repeated abortions. Several papers have been published on abortion and violence (Fisher et al. 2005; Hall et al. 2014; Pinton et al. 2017). In a French study of medical abortions, we recently showed that women with repeated abortions reported more often that they were exposed to constraints or violence in their couple relationship (Opatowski et al. 2017). A 2000 Canadian study found that 33% of women who were physically abused or feared their partner during pregnancy had a prior induced abortion versus 21% of women not abused (Janssen et al. 2003). These studies suggest that women whose partner was not informed of the abortion may be victims of violence.

We found cannabis use strongly related to violence. In the same Canadian study, 17% of women who were physically abused or feared their partner during pregnancy used illicit drugs as compared with 2% of women not abused (Janssen et al. 2003). A study in 2009–2010 in Baltimore (USA) found that 63% of women reporting physical abuse used marijuana during pregnancy (16% used other illicit drugs) versus 33% of women not abused (10% for other drugs) (Alhusen et al. 2013). Drug use for pregnant women was suggested to be both a coping and survival strategy and a source of vulnerability to violence (Sales and Murphy 2000). Besides the use of illicit drugs may increase irritability and promote conflict and fighting.

Our results illustrate the association between violence and psychological distress. Abused women frequently reported poor psychological wellbeing and depressive symptoms. In the 2000 French survey on violence against women, risk of poor health, depressive symptoms, and stress symptomatology were increased for women who reported physical violence; the rate of suicide attempts in the previous 12 months was 5% with multiple episodes of physical violence, 3% with one reported episode and 0.2% with no exposure to violence (Saurel-Cubizolles 2005). A systematic review and meta-analysis of 67 studies concerning the perinatal period estimated a three-fold increased risk of high levels of depressive symptoms in the postnatal period after experiencing partner violence during pregnancy (OR 3.1, 95% CI 2.7–3.6) (Howard et al. 2013). This estimate is very close to ours.

Two systematic reviews, recently published, focused on the risk for adverse infant outcomes related to violence during pregnancy (Donovan et al. 2016; Hill et al. 2016). Consistent with our results they reported that violence was related to preterm birth, whereas the association with small for gestational age was less pronounced or not significant. In the study carried out in 16 European countries in 1995, the odds ratio of preterm birth related to family violence during pregnancy was 1.73 (95% CI 1.35–2.22) (Saurel-Cubizolles and Lelong 2005). This excess of preterm birth could result from an increase in stress induced by violence; sometimes, traumatic mechanisms, such as placental damage or ruptures of membranes may be caused by physical violence.

The frequency of physical violence during pregnancy we observed is possibly under-estimated, due to under-reporting by women and selection by non-response. Knowledge of risk factors is important for preventing physical violence during pregnancy because they can be helpful to identify victims early. Women who are victims of violence may be more likely to develop psychological disorders that will jeopardize their health and the mother–baby relationship. More representative studies are needed to better characterize the types of violence, frequency of assaults and the details of the perpetrator. In France, a special appointment with a midwife or doctor (called “interview of the 4th month”) aims to identify problems and provide prevention information;

this could be an opportunity to detect violence at home and take care of concerned women. Health professionals should systematically introduce questions on violence during antenatal consultations, which is not done currently.

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References

- Alhusen, J. L., Lucea, M. B., Bullock, L., & Sharps, P. (2013). Intimate partner violence, substance use, and adverse neonatal outcomes among urban women. *Journal of Pediatrics*, 163(2), 471–476.
- Almeida, F. S. J., Coutinho, E. C., Duarte, J. C., Chaves, C. M. B., Nelas, P. A. B., Amaral, O. P., et al. (2017). Domestic violence in pregnancy: Prevalence and characteristics of the pregnant woman. *Journal of Clinical Nursing*, 26(15–16), 2417–2425.
- Asling-Monemi, K., Pena, R., Ellsberg, M. C., & Persson, L. A. (2003). Violence against women increases the risk of infant and child mortality: A case-referent study in Nicaragua. *Bulletin of the World Health Organization*, 81(1), 10–16.
- AUDIPOG. (2008). Mise à jour des courbes morphométrie néonatale; 2008. http://www.audipog.net/courbes_morpho.php.
- Beydoun, H. A., Beydoun, M. A., Kaufman, J. S., Lo, B., & Zonderman, A. B. (2012). Intimate partner violence against adult women and its association with major depressive disorder, depressive symptoms and postpartum depression: A systematic review and meta-analysis. *Social Science of Medicine*, 75(6), 959–975.
- Blondel, B., Coulm, B., Bonnet, C., Goffinet, F., Le Ray, C., & National Coordination Group of the National Perinatal Surveys. (2017). Trends in perinatal health in metropolitan France from 1995 to 2016: Results from the French National Perinatal Surveys. *Journal of Gynecology Obstetrics and Human Reproduction*, 46(10), 701–713.
- Coker, A. L., Sanderson, M., & Dong, B. (2004). Partner violence during pregnancy and risk of adverse pregnancy outcomes. *Paediatric and Perinatal Epidemiology*, 18(4), 260–269.
- Cook, J., & Bewley, S. (2008). Acknowledging a persistent truth: Domestic violence in pregnancy. *Journal of the Royal Society of Medicine*, 101(7), 358–363.
- Donovan, B., Spracklen, C., Schweizer, M., Ryckman, K., & Saftlas, A. (2016). Intimate partner violence during pregnancy and the risk for adverse infant outcomes: A systematic review and meta-analysis. *BJOG: An International Journal of Obstetrics and Gynaecology*, 123(8), 1289–1299.
- Finnbogadóttir, H., & Dykes, A.-K. (2016). Increasing prevalence and incidence of domestic violence during the pregnancy and one and a half year postpartum, as well as risk factors—A longitudinal

- cohort study in Southern Sweden. *BMC Pregnancy and Childbirth*, 16(1), 327.
- Fisher, W. A., Singh, S. S., Shuper, P. A., Carey, M., Otchet, F., MacLean-Brine, D., et al. (2005). Characteristics of women undergoing repeat induced abortion. *Canadian Medical Association Journal*, 172(5), 637–641.
- Garcia-Moreno, C., Jansen, H., Ellsberg, M., Heise, L., & Watts, C. (2005). *WHO multi-country study on women's health and domestic violence against women*. Geneva: World Health Organization.
- Gartland, D., Hemphill, S. A., Hegarty, K., & Brown, S. J. (2011). Intimate partner violence during pregnancy and the first year postpartum in an Australian pregnancy cohort study. *Maternal and Child Health Journal*, 15(5), 570–578.
- Gazmararian, J. A., Lazorick, S., Spitz, A. M., Ballard, T. J., Saltzman, L. E., & Marks, J. S. (1996). Prevalence of violence against pregnant women. *Journal of American Medical Association*, 275(24), 1915–1920.
- Hall, M., Chappell, L. C., Parnell, B. L., Seed, P. T., & Bewley, S. (2014). Associations between intimate partner violence and termination of pregnancy: A systematic review and meta-analysis. *PLoS Medicine*, 11(1), e1001581.
- Hill, A., Pallitto, C., McCleary-Sills, J., & Garcia-Moreno, C. (2016). A systematic review and meta-analysis of intimate partner violence during pregnancy and selected birth outcomes. *International Journal of Gynecology and Obstetrics*, 133(3), 269–276.
- Howard, L. M., Oram, S., Galley, H., Trevillion, K., & Feder, G. (2013). Domestic violence and perinatal mental disorders: A systematic review and meta-analysis. *PLoS Medicine*, 10(5), e1001452.
- James, L., Brody, D., & Hamilton, Z. (2013). Risk factors for domestic violence during pregnancy: A meta-analytic review. *Violence and Victims*, 28(3), 359–380.
- Janssen, P. A., Holt, V. L., Sugg, N. K., Emanuel, I., Critchlow, C. M., & Henderson, A. D. (2003). Intimate partner violence and adverse pregnancy outcomes: A population-based study. *American Journal of Obstetrics and Gynecology*, 188(5), 1341–1347.
- Jaspard, M., Brown, E., Condon, S., Fougereyrollas-Schwebel, D., Houel, A., Lhomond, B., et al. (2003). *Les violences envers les femmes en France. Une enquête nationale* (p. 320). Paris: La Documentation Française.
- Opatowski, M., Bardy, F., David, P., Dunbavand, A., & Saurel-Cubizolles, M.-J. (2017). Repeat induced abortion: A multicenter study on medical abortions in France in 2014 [Caractéristiques des femmes ayant eu recours à plusieurs IVG. Enquête multicentrique sur les IVG médicamenteuses en France en 2014]. *Gynécologie Obstétrique Fertilité and Sénologie*, 45(1), 22–27.
- Pinton, A., Hanser, A. C., Metten, M. A., Nisand, I., & Bettahar, K. (2017). Is there any relation between couple violence and repeated medical abortion? [Existe-t-il un lien entre les violences conjugales et les interruptions volontaires de grossesses répétées?]. *Gynécologie Obstétrique Fertilité and Sénologie*, 45(7–8), 416–420.
- Rabin, R. F., Jennings, J. M., Campbell, J. C., & Bair-Merritt, M. H. (2009). Intimate partner violence screening tools. *American Journal of Preventive Medicine*, 36(5), 439–445.
- Sales, P., & Murphy, S. (2000). Surviving violence: Pregnancy and drug use. *Journal of Drug Issues*, 30(4), 695–724.
- Salmona, M. (2016). Pregnancy face to marital violence [La grossesse à l'épreuve des violences conjugales]. In R. Coutanceau & M. Salmona (Eds.), *Marital violence and Family [Violence conjugales et famille]* (pp. 64–76). Malakoff: Dunod.
- Saurel-Cubizolles, M.-J. (2005). Violence against women and mental health status: a national survey in France [Violences envers les femmes et santé psychique: une enquête nationale en France]. *Bulletin Epidémiologique Hebdomadaire*, 9–10, 36–37.
- Saurel-Cubizolles, M.-J., & Lelong, N. (2005). Family violence during pregnancy [Violences familiales pendant la grossesse]. *Journal de Gynécologie Obstétrique et Biologie de la Reproduction*, 34(1Suppl), S47–S53.
- Taillieu, T. L., & Brownridge, D. A. (2010). Violence against pregnant women: prevalence, patterns, risk factors, theories, and directions for future research. *Aggression and Violent Behavior*, 15(1), 14–35.
- Taillieu, T. L., Brownridge, D. A., Tyler, K. A., Chan, K. L., Tiwari, A., & Santos, S. C. (2016). Pregnancy and intimate partner violence in Canada: A comparison of victims who were and were not abused during pregnancy. *Journal of Family Violence*, 31(5), 567–579.
- Van Parys, A.-K., Deschepper, E., Michielsens, K., Temmerman, M., & Verstraelen, H. (2014). Prevalence and evolution of intimate partner violence before and during pregnancy: A cross-sectional study. *BMC Pregnancy and Childbirth*, 14(1), 294.
- World Health Organization. (2013). *Global and regional estimates of violence against women: Prevalence and health effects of intimate partner violence and non-partner sexual violence*. Geneva: World Health Organization.

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