RESEARCH ARTICLE

Comparative evaluation of the impact of the COVID-19 lockdown on perinatal experience: A prospective multicentre study

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Abstract

Objectives: To compare in the early postpartum the perinatal experience during a COVID-19 related lockdown ('lockdown' group) and a pandemic control group subject to looser restrictions.

Design and setting: This national multicentre prospective cohort study took place in four French maternity units.

Population: Women were recruited during the postpartum stay for the lockdown and pandemic control groups, according to their enrolment period. Both faced the same labour and delivery restrictions but only the pandemic control group could have a postpartum visitor.

Main outcome measures: The primary outcome was the perinatal experience during childbirth, assessed by the Labour Agentry Scale (LAS) self-administered questionnaire, completed before discharge.

Results: The study included 596 women and analysed 571 of them: 260 in the lockdown group and 311 in the pandemic control group. The mean LAS score was lower in the lockdown group (161.1 ± 26.8, 95% confidence interval [CI] 157.8–164.3 versus 163.3 ± 24.0, 95% CI 160.6–166.0; $P = 0.289$). In multivariable analysis, the LAS score was lower in the lockdown group (−6.2 points, $P = 0.009$), in women with caesarean (−21.6 points, $P < 0.001$) versus spontaneous deliveries, and among women financially impacted by the lockdown (−6.4 points, $P = 0.007$) or who experienced restrictions during childbirth (−8.1 points, $P < 0.001$). The LAS score rose with the prenatal care quality score ($P < 0.001$).

Conclusions: The perinatal experience was more negatively affected by lockdown restrictions than by the looser pandemic restrictions for controls, but mode of delivery remained the main factor influencing this experience.

KEYWORDS
birth experience, COVID-19, Labour Agentry Scale, lockdown, maternal sense of control

Tweetable Abstract: Perinatal experience, while most affected by caesarean, was worse in lockdown than later in the pandemic.

1 | INTRODUCTION

The first lockdown for the COVID-19 pandemic in France began in March 2020. Both the pandemic and the lockdown obviously affected the organisation of maternity wards. Visitors to these wards were often completely prohibited.[1] In several maternity hospitals, mothers could have only one person accompanying them during labour and delivery, and sometimes only in a very limited way.

It has now been widely demonstrated that the peripartum period involves particular mental health risks for women giving birth. Postnatal depression (PND) occurs in up to 10% of women postpartum, and post-traumatic stress disorder (PTSD) in up to 3%.[2,3] These disorders are major risk factors for maternal suicidal ideation, and maternal suicide is recognised today as the leading cause of maternal death in the postpartum period, accounting for 12–20% of those cases.[2–9] Beyond the risk of suicide, these disorders negatively affect mother–child interactions and marital and other intrafamily relationships.[10] One known risk factor for PND and PTSD is a negative childbirth experience,[11] which can be assessed indirectly by a self-assessment questionnaire, the Labour Agentry Scale (LAS).[12] Because data related to the association between mental health disorders and the LAS score are sparse, this specific association cannot be clearly quantified.[11]

The psychological impact of the current pandemic on the entire population has already been demonstrated.[13–15] In mothers, the pandemic appears to be an added risk factor for PND and PTSD.[15–19] Moreover, the absence of support—social, emotional, or simple companionship—in the perinatal period appears to be an independent risk factor for negative childbirth experience and PND.[20]

A better understanding of the various determinants of the negative psychological impact of the pandemic on mothers is essential to identify the corrective or protective measures to be implemented in the future. It is accordingly a priority to measure the impact of these restrictions imposed during childbirth in maternity units during the pandemic.

The primary objective was to compare, in the immediate postpartum period, the perinatal experience, assessed by the Labour Agentry Scale, between women who gave birth during the lockdown ('lockdown' group) and women who gave birth after the lockdown ended but while the pandemic continued and looser restrictions remained in force ('pandemic control' group). As a secondary objective, we sought to assess the impact of different perinatal context factors on the LAS, in particular, the mode of delivery and the prenatal care quality score.

2 | METHODS

This national, multicentre prospective cohort study included four French maternity hospitals.

All women who delivered a singleton baby after 37 weeks of gestation during either study period were eligible for inclusion. Women were informed about the study and recruited after childbirth, during D2 to D4 of their postpartum stay. Because investigators were not available every day, a few women for whom D2–D4 included a lack of investigators and who were discharged early, may have been missed. The exclusion criteria were pre-existing psychiatric disorders such as depressive syndrome, women considered positive for COVID-19, and those with stillbirths or newborns with congenital abnormalities.

The study was conducted during two preplanned periods, to define two separate groups. The first period corresponded to the second half of the first French lockdown, from 16 April to 11 May 2020. During this period, a single companion/support person (generally the partner) was allowed, only during the active phase of labour and delivery. No visits were possible after delivery or during the postpartum stay. These measures met the French guidelines issued by CNGOF (French National College of Obstetricians and Gynaecologists), to which all participating centres adhered. The second period corresponded to a time span during the pandemic without lockdown but with various continuing restrictions and covered the period from 22 June to 7 October 2020. Restrictions during labour and delivery were the same as during the lockdown but visits during the postpartum hospitalisation were permitted—but only for a single person. Women who gave birth during the first period were included in the lockdown group and women who gave birth during the second period were included in the pandemic control group. For both periods, wearing a mask during labour and delivery was strongly recommended but not mandatory.

The primary endpoint was the score of the validated version of the self-administered questionnaire, the Labour Agentry Scale, which included 29 items, to be rated from 1 to 7 on a Likert scale and completed in the immediate postpartum period, during the woman's postpartum hospitalisation, that is, within around 4 days after giving birth.[12]

We collected the following data: women's personal characteristics (age, parity, marital status, COVID-19 status, etc.) and perinatal variables (gestational age at birth, mode of delivery, mode of labour induction, companionship experience with the birth, delivery complications such as perineal tears or postpartum haemorrhage), as well as neonatal indicators (birthweight, Apgar score, pH, neonatal hospitalisation). The quality of prenatal care was evaluated with the *Quality of Prenatal Care Questionnaire*, also a self-administered questionnaire to be completed before postpartum discharge. It included 46 items scored from 1 to 5.[21,22] In addition, women were asked various questions about the effect of the financial impact of the pandemic and lockdown on their families as well as about their birth and perinatal experience, including various frustrations.

The study was initially designed with three groups of analysis: women giving birth during lockdown, during the post-lockdown pandemic, and control women, defined as giving birth during a 'normal' period without any restrictions, such as before the pandemic.[23] Given the current status of the pandemic, we do not know when this control

group can be recruited. Therefore, we decided to work on the first two groups, referring to the pandemic group as the pandemic control group for clarity's sake. Because we had taken this possibility into account in calculating the sample size, it is sufficient for a comparative analysis between only two groups. According to the literature, the Labour Agentry Scale (LAS) has a standard deviation of 20 and has no known clinically important difference (MCID). To show a standardised difference of 0.25 (small to medium effect) between the groups, with a power of 80% and a false discovery rate for multiple comparisons between the groups of 5%, and because the duration of the COVID-19 related lockdown was uncertain, the number of subjects to be included in the lockdown group was 200–300. A scalable approach was used to ensure that a minimum acceptable power was achieved and optimised by adjusting the number of subjects in the other group.

Once the final number of women included in the lockdown group was set, an analysis of variance (ANOVA) simulation found that 310 women were needed in the other group, which was further increased by more than 5% to 330 for a margin of error. As this was an observational study, groups were not perfectly homogeneous. Known maternal characteristics were, however, taken into account in the multivariable analysis, to neutralise their effects.

Depending on their nature, variables were described by their frequencies, proportions, means (standard deviation) or medians (interquartile range, IQR). Groups were compared with the appropriate statistical tests.

To avoid inflation of the Type I (alpha) risk and to keep the total false discovery rate below 5%, the significance threshold for the main analysis was set at 0.03, based on the result of simulations of hypotheses of expected differences in LAS between the groups.

The main analyses consisted of bivariable linear regressions of LAS scores on inclusion group, explanatory variables identified in the literature (maternal age, mode of delivery, mode of labour induction, relationship status, parity and neonatal admission to intensive or special care units) and presumed confounding factors. Multivariable linear regression of the LAS score was then performed with the inclusion group and explanatory variables in the model and stepwise selection, by minimising Akaike's Information Criterion for the confounding factors with a bivariate P-value <0.15.

3 | RESULTS

This study included 596 women: 267 in the lockdown group and 329 in the pandemic control group. The final analysis includes 571/596 (95.8%) women (Figure 1, study flow chart). The women's characteristics are presented in Table 1.

Groups were comparable except for parity (nulliparity and marital status were both more frequent in the pandemic control group: respectively, 49.2% versus 35.8%, $P = 0.001$ and 7.4% versus 3.1%, $P = 0.023$. The groups did not differ in obstetric or neonatal outcomes (Table 2). Both the lockdown and pandemic control groups reported that the pandemic affected them financially (39.9% and 31%, respectively, $P = 0.028$). No support or companion was available during labour and delivery for 12.3% of the lockdown group, compared with 6.4% of pandemic control group ($P = 0.015$). Support was maintained by digital devices in 6.25% and 5% of cases, respectively. Frustrations with the childbirth restrictions were reported for 53.8% in the lockdown group and 23.5% in the pandemic control group ($P \leq 0.0001$) and with the absence of postpartum visits in 91.5% versus 48.2% ($P \leq 0.0001$), respectively.
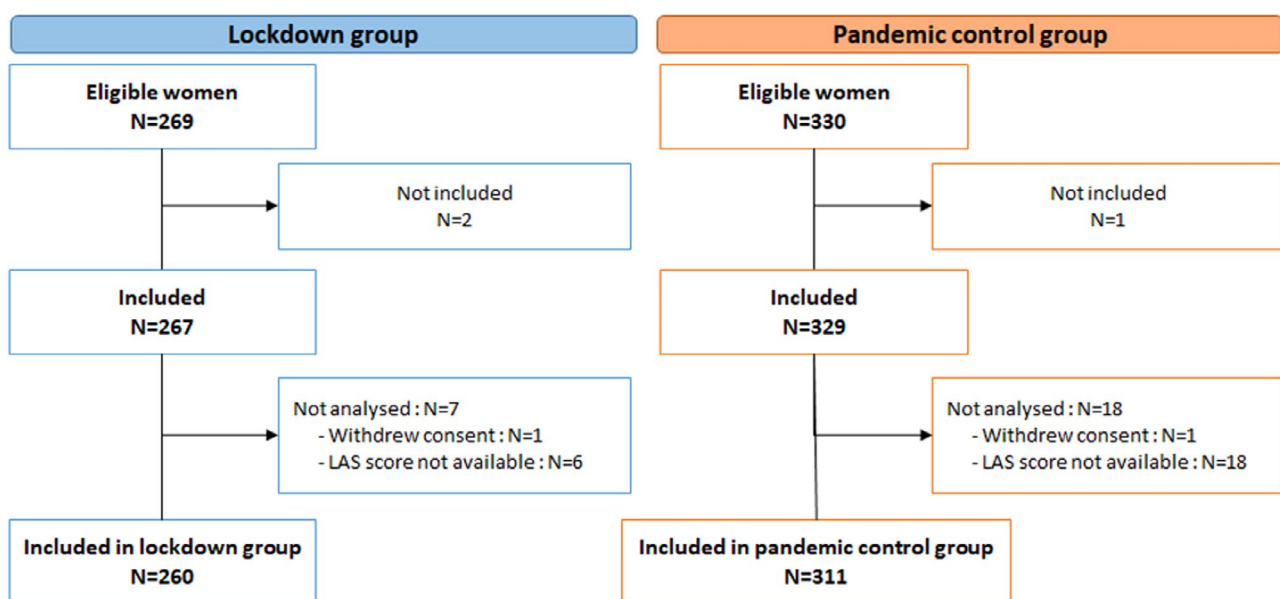

FIGURE 1 Flow chart

TABLE 1 Comparison of the characteristics of the women in the two groups

	Group				
	Lockdown		**Pandemic control**		
	n = 260		**n = 311**		**P**
Maternal age (years)					
Mean ± SD	30.9 ± 4.6		30.8 ± 5.1		0.702
Parity					
Nulliparous	93 (35.8%)		153	(49.2%)	0.001
Relationship status					
Lives alone	8 (3.1%)		23	(7.4%)	0.023
Women PCR-positive for SARS-CoV–2 during pregnancy or delivery					
Yes	3 (1.2%)		3	(1.0%)	1.000
Mode of conception					
Spontaneous pregnancy	252 (96.9%)		297	(96.1%)	0.370
Assisted reproduction	7 (2.7%)		13	(3.5%)	
High risk pregnancy					
Diabetes	32 (12.3%)		33	(11.4%)	0.515
Hypertensive disorders	13 (5.0%)		11	(4.2%)	0.371
Obesity	22 (8.5%)		39	(10.7%)	0.119
Presence of a companion during delivery					
Yes	228	(87.7%)	291	(93.6%)	0.015
Presence throughout labour and delivery	121	(46.5%)	216	(69.5%)	<0.001
Presence for a part of labour and/delivery	107	(41.2%)	75	(24.1%)	
Feeling of support/accompaniment					
Frustration with restrictions during childbirth					
Yes	140	(53.8%)	73	(23.5%)	<0.001
Frustration due to the absence of postpartum visit					
Yes	238	(91.5%)	150	(48.2%)	<0.001
Quality of Prenatal Care Questionnaire (QPCQ) (1–5)[a]					
Sharing of information					
n; Mean ± SD	258; 4.6 ± 0.4		309; 4.5 ± 0.5		0.050
Anticipatory guidance					
n; Mean ± SD	256; 3.9 ± 0.8		310; 3.8 ± 0.7		0.837
Sufficient time					
n; Mean ± SD	259; 4.3 ± 0.7		310; 4.3 ± 0.7		0.803
Approachability and availability					
n; Mean ± SD	258; 4.7 ± 0.7		310; 4.7 ± 0.7		0.960
Support and respect					
n; Mean ± SD±ET	256; 4.6 ± 0.5		308; 4.6 ± 0.5		0.190
Total score					
n; Mean ± SD	251; 4.3 ± 0.5		306; 4.3 ± 0.5		0.424

Data are expressed in n (%).

NICU, neonatal intensive care unit.

[a]5 = best assessment of the quality of prenatal care.

The mean LAS score was lower in the lockdown group: 161.1 ± 26.8, 95% confidence interval (CI) 157.8–164.3 versus 163.3 ± 24.0, 95% CI 160.6–166.0 ($P = 0.289$). In the multivariable analysis, the LAS score was significantly lower for women in the lockdown group (−6.2 points, $P = 0.009$), with a caesarean delivery (−21.6 points, $P < 0.001$ compared with spontaneous delivery), affected financially by the lockdown (−6.4 points, $P = 0.007$), and who reported negative

TABLE 2 Comparison of neonatal and obstetric outcomes in the two groups

	Group		
	Lockdown	Pandemic control	
	n = 260	n = 311	P
Birth weight (g)			
n	260	311	0.212
Mean ± SD	3344.3 ± 444.0	3296.9 ± 458.3	
APGAR at 1 minute			
n	260	311	0.027
Mean ± SD	8.7 ± 1.1	8.5 ± 1.6	
APGAR at 5 minute			
n	260	311	0.120
Mean ± SD	9.7 ± 0.9	9.6 ± 1.1	
Umbilical artery pH			
n	252	304	0.028
Mean ± SD	7.3 ± 0.1	7.3 ± 0.1	
Admission to NICU			
No	252 (96.9%)	299 (96.1%)	0.613
Yes	8 (3.1%)	12 (3.9%)	
Gestational age at delivery			
n	260	311	0.227
Mean ± SD	39.4 ± 1.2	39.3 ± 1.2	
Mode of labour induction			
Spontaneous	158 (64.5%)	193 (65.4%)	0.821
Induced	87 (35.5%)	102 (34.6%)	
Mode of delivery			
Spontaneous vaginal delivery	197 (75.8%)	216 (69.5%)	0.093
Operative vaginal delivery	63 (24.2%)	95 (30.5%)	0.537
Caesarean	33 (12.7%)	45 (14.5%)	
Instrumental delivery	30 (11.5%)	50 (16.1%)	
Postpartum haemorrhage			
No	244 (93.8%)	291 (93.6%)	0.892
Yes	16 (6.2%)	20 (6.4%)	
Perineal tears			
No	115 (44.2%)	156 (50.2%)	0.158
Yes	145 (55.8%)	155 (49.8%)	
Obstetric anal sphincter injury	5 (1.9%)	5 (1.6%)	

CI, confidence interval; NICU, neonatal intensive care unit; SD, standard deviation. Data are expressed in n (%).

experiences with restrictions during childbirth (−8.1 points, P < 0.001). The LAS score increased with the quality of prenatal care score (P < 0.001) and the mean score of the latter was similar between the groups (P = 0.424) (Tables 1 and 3).

4 | DISCUSSION

4.1 | Main findings

This study has shown that the restrictions during the first French COVID-19 related lockdown significantly affected the perinatal experience. In particular, the multivariable analysis showed that the LAS score was influenced negatively by lockdown (−6.2 points) and its financial impact (−6.4 points), as well as by the experience of restrictions during childbirth (−8.1 points). Nonetheless, the mode of delivery, especially caesarean section, remained the most important factor influencing the LAS score (−21.6 points).

4.2 | Strengths and limitations

To our knowledge, this is the first study assessing the perinatal experience during a COVID-19-related lockdown. The strengths of the study are the originality of this topical subject, the large sample size and the prospective nature. Indeed, close to 2 years after the pandemic began, many restrictions persist and several studies have noted their psychological impact.[13–15]

The limitations must also be noted. In the context of the pandemic, randomisation was not feasible. Thus, the best and only option for a comparative study was a before-and-after design, despite the risk of selection bias. Women with a poor childbirth experience may have been less likely to agree to participate in this study, which might have minimised the lockdown's negative impact. This bias could not be assessed in this study. Moreover, a potential inclusion bias exists because, although the vast majority of women who gave birth during these two periods were asked to participate in the study, the timing of inclusion was influenced by the availability of investigators between D2 and D4. It is accordingly possible that some women left the maternity hospital before they were invited to participate. Nonetheless, the caesarean rate did not differ significantly between the two groups, which suggests that this potential bias is minimal. Because a halo effect may exist—that is, women asked in the early postpartum period, especially by staff who cared for them, tend to rate their satisfaction higher than they do at a time more distant from the birth. We repeated these LAS assessments at 2 months and found no significant differences (data not shown).

Another limitation is the lack of collection of pain experienced during delivery and the postpartum, as pain may have a potentially negative impact on the LAS score. Finally, a true control group, unaffected by the pandemic, would have allowed us to evaluate the specific impact of the pandemic context on the perinatal experience.

4.3 | Interpretation

Several studies have focused on the risk of PND during lockdown, comparing lockdown and control

TABLE 3 Factors influencing the Labour Agentry Scale (LAS) score in the univariable and multivariable analysis

	LAS score								
	Bivariable regression					**Multivariable regression**			
			95% CI				**95% CI**		
	n	**Mean/r**[a]	**Lower**	**Upper**	***P***[a]	**Mean difference**[b]	**Lower**	**Upper**	***P***
Group									0.009
Pandemic control	311	163.3	160.6 to 166.0		0.289	–			
Lockdown	260	161.1	157.8 to 164.3			−6.2			
Maternal age (year)	571	−0.29	−0.7 to 0.1		0.182	−0.4	−0.9 to 0.1		0.141
Relationship status									0.993
In a relationship	540	162.0	159.8 to 164.1		0.190	–			
Not living with a partner	31	168.1	160.7 to 175.5			0.1			
Mode of delivery									<0.001
Spontaneous vaginal delivery	413	166.2	163.9 to 168.4		<0.001	–			
Caesarean delivery	78	145.6	138.7 to 152.4			−21.6			
Instrumental delivery	80	158.7	153.5 to 163.8			1.3			
Mode of labour induction									0.090
Spontaneous	351	165.0	162.6 to 167.5		0.008	–			
Labour induction	189	158.4	154.5 to 162.4			−4.1			
Admission to NICU									0.176
No	551	162.6	160.5 to 164.8		0.083	–			
Yes	20	152.7	140.4 to 164.9			−8.4			
Parity									0.195
Nulliparous	246	159.3	156.1 to 162.5		0.015	–			
Parous	325	164.5	161.8 to 167.3			3.4			
Financial impact related to confinement									0.007
No	365	164.2	161.7 to 166.8		0.017	–			
Yes	204	158.9	155.3 to 162.5			−6.4			
Time of companion's presence									
Absence	52	151.9	143.0 to 160.7		0.022	−2.4	−11.6 to 6.7		0.064
Total presence	337	164.7	162.2 to 167.1			–			
Partial presence	182	160.9	157.0 to 164.8			4.9	−0.2 to 9.9		
Frustrations with restrictions on childbirth									<0.001
No	211	167.9	164.8 to 170.9		<0.001	–			
Yes	213	156.3	152.6 to 160.0			−8.1			
Frustration due to the absence of postpartum visits									
No	103	165.6	160.9 to 70.2		0.091				
Yes	388	160.9	158.3 to 163.4						
QPCQ – Total score (1–5)	557	19.97	15.8 to 24.1		<0.001	22.4	14.6 to 30.2		<0.001
QPCQ – Anticipatory guidance (1–5)	566	8.68	6.0 to 11.4		<0.001	−4.1	−8.9 to 0.7		0.094

CI, confidence interval; NICU, neonatal intensive care unit; QPCQ, Quality of Prenatal Care Questionnaire.

[a]Mean for qualitative variables. Simple linear regression coefficient for quantitative variables.

[b]One-way analysis of variance test if there was equality of variances. Otherwise, Kruskal–Wallis test was used for qualitative variables. Test resulting from a simple linear regression for quantitative variables.

[c]Expected mean difference in score, after adjustment, between groups or for the increase of one unit of the variable considered.

groups.[17,19,24–26] They did not, however, consider PND's multifactorial background and, more specifically, the potential impact of the perinatal experience. Because the pandemic produced, indeed continues to produce, rapid and unanticipated changes, we were unable to provide a real prospective 'control' group, without pandemic-related restrictions or stress. Nonetheless, this study compares two distinct periods of the pandemic—with and without lockdown—and thus enables us to assess the specific impact of the French lockdown on perinatal experience during the pandemic.

Restrictions for labour and delivery were the same in both groups, but only the control group could receive any visits during their postpartum hospitalisation, and then only from one person. Although the active difference between groups was during the postnatal period, we hypothesised that it affected the birth experience (and control of it) in two different ways. First, the women giving birth during lockdown were not prepared to experience the birth alone, and more of them were alone than in the pandemic control group. This situation was unpredictable and had not been anticipated by women in the lockdown group during pregnancy (at least, not for very long), whereas women in the pandemic control group had known about these restrictions for several months. Secondly, the women in the lockdown group knew during labour and delivery that they would have no further visitors at all once the baby was born, which could certainly have affected their experience of birth and their perception of control. This difference is difficult to pinpoint and quantify but perhaps the rate of 'frustrations during childbirth and during postpartum' that women reported reflects a part of this aspect: it was significantly—around 50%—lower in the pandemic control group.

The LAS score enables us to evaluate the birth experience, at least indirectly. This validated self-administered questionnaire assesses feelings of control and psychosocial stress during labour.[2,3,27,28] A lower LAS score appears to be associated with quintupled PTSD and PND rates.[11] The LAS is known to be influenced by different factors, such as mode of delivery and parity.[27] Our results are consistent with the literature regarding the impact of mode of delivery, parity and labour induction on the LAS score in the univariate analysis.[27–29] The absence of continuous support during childbirth is also associated with a lower LAS score.[30] However, the concept of absence of companionship during childbirth, as studied in the literature, is not transposable to the current situation.[31] During the COVID-19 pandemic and specifically during lockdown, this absence of companionship was imposed by government restrictions. Its negative impact is therefore potentially greater than an absence due only to family situations.

The lack of a significant difference in raw LAS scores between the two groups might well be explained by the difference in mode of delivery and parity between them: the higher rate of caesarean delivery and nulliparous women in the control group would decrease their LAS score. Moreover, the mode of delivery and parity might not be the only factors influencing this outcome. A difference of 2.2 for the LAS may indeed be below the minimally important clinical difference. Nonetheless, because there was a difference between the groups in a multivariable analysis that was masked in the bivariate analysis, it seems plausible that the comparison of the raw LAS scores between them does not reflect the entire effect of the lockdown on parturients.

Although our results confirm that the lockdown affected the LAS score, the impact of mode of delivery remained predominant in the multivariable analysis, with the mean LAS score 21 points lower in women with caesarean compared with spontaneous vaginal deliveries.

Moreover, the link found between LAS score and quality of prenatal care (QPCQ) has not been reported in the literature.[21,22,32] The LAS score clearly rose together with the QPCQ score in our study, but we did not assess the factors influencing it, such as the mode of prenatal care, e.g. in-person or video visits.

The choice of the Labour Agentry Scale was based on its widespread use to evaluate women's sense of control during childbirth and its validation for this purpose.[12,27,28] The LAS permits comparison between studies, and it is much more than a simple evaluation of satisfaction during childbirth, which is both subjective and less reproducible. Due to the importance of the birth experience in the perinatal experience, the LAS must be interpreted as at least a partial assessment of the latter as well as the former.

5 | CONCLUSION

Restrictions during lockdown negatively affected the perinatal experience of women giving birth during lockdown. Nonetheless, caesarean delivery remains the principal factor influencing this perinatal experience. Maternity staff should take this impact into account in future decisions regarding visitation restrictions and childbirth management during lockdowns.

CONTRIBUTION TO AUTHORSHIP
C. Bertholdt, OM, JE and GA contributed to the conception and design of the study. OM and C. Bertholdt are the coordinating investigators; C. Banasiak is the study project manager; C. Alleyrat performed the statistical analysis; and C. Bertholdt and LC wrote the manuscript. All authors reviewed and contributed to the manuscript.

DATA AVAILABILITY
Data are available on request from the authors.

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REFERENCES
1. Viaux S, Maurice P, Cohen D, Jouannic JM. Giving birth under lockdown during the COVID-19 epidemic. J Gynecol Obstet Hum Reprod. 2020;49(6):101785. https://doi.org/10.1016/j.jogoh.2020.101785
2. Czarnocka J, Slade P. Prevalence and predictors of post-traumatic stress symptoms following childbirth. Br J Clin Psychol. 2000;39(1):35–51. https://doi.org/10.1348/014466500163095
3. Hahn-Holbrook J, Cornwell-Hinrichs T, Anaya I. Economic and health predictors of national postpartum depression prevalence: a systematic review, meta-analysis, and meta-regression of 291 studies from 56 countries. Front Psychiatry. 2018;8:248. https://doi.org/10.3389/fpsyt.2017.00248
4. Bodnar-Deren S, Klipstein K, Fersh M, Shemesh E, Howell EA. Suicidal ideation during the postpartum period. J Womens Health 2002. 2016;25(12):1219–24. https://doi.org/10.1089/jwh.2015.5346
5. Shi P, Ren H, Li H, Dai Q. Maternal depression and suicide at immediate prenatal and early postpartum periods and psychosocial risk factors. Psychiatry Res. 2018;261:298–306. https://doi.org/10.1016/j.psychres.2017.12.085
6. Vacheron M-N, Tessier V, Rossignol M, Deneux-Tharaux C. Comité National d'Experts sur la Mortalité Maternelle. [Maternal deaths due to suicide in France 2013–2015]. Gynecol Obstet Fertil Senol. 2021;49(1):38–46. https://doi.org/10.1016/j.gofs.2020.11.008
7. Esscher A, Essén B, Innala E, et al. Suicides during pregnancy and 1 year postpartum in Sweden, 1980–2007. Br J Psychiatry J Ment Sci. 2016;208(5):462–9. https://doi.org/10.1192/bjp.bp.114.161711
8. Lega I, Maraschini A, D'Aloja P, Andreozzi S, Spettoli D, Giangreco M, et al. Maternal suicide in Italy. Arch Womens Ment Health. 2020;23(2):199–206. https://doi.org/10.1007/s00737-019-00977-1
9. Orri M, Gunnell D, Richard-Devantoy S, Bolanis D, Boruff J, Turecki G, et al. In-utero and perinatal influences on suicide risk: a systematic review and meta-analysis. Lancet Psychiatry. 2019;6(6):477–92. https://doi.org/10.1016/S2215-0366(19)30077-X
10. Garthus-Niegel S, Horsch A, Handtke E, von Soest T, Ayers S, Weidner K, et al. The impact of postpartum posttraumatic stress and depression symptoms on couples' relationship satisfaction: a population-based prospective study. Front Psychol. 2018;9:1728. https://doi.org/10.3389/fpsyg.2018.01728
11. Adewuya AO, Ologun YA, Ibigbami OS. Post-traumatic stress disorder after childbirth in Nigerian women: prevalence and risk factors. BJOG Int J Obstet Gynaecol. 2006;113(3):284–8. https://doi.org/10.1111/j.1471-0528.2006.00861.x
12. Hodnett ED, Simmons-Tropea DA. The Labour Agentry Scale: psychometric properties of an instrument measuring control during childbirth. Res Nurs Health. 1987;10(5):301–10. https://doi.org/10.1002/nur.4770100503
13. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet Lond Engl. 2020;395(10227):912–20. https://doi.org/10.1016/S0140-6736(20)30460-8
14. Pan K-Y, Kok AAL, Eikelenboom M, Horsfall M, Jörg F, Luteijn RA, et al. The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: a longitudinal study of three Dutch case-control cohorts. Lancet Psychiatry. 2021;8(2):121–9. https://doi.org/10.1016/S2215-0366(20)30491-0
15. Racine N, Hetherington E, McArthur BA, McDonald S, Edwards S, Tough S, et al. Maternal depressive and anxiety symptoms before and during the COVID-19 pandemic in Canada: a longitudinal analysis. Lancet Psychiatry. 2021;8(5):405–15. https://doi.org/10.1016/S2215-0366(21)00074-2
16. Ostacoli L, Cosma S, Bevilacqua F, Berchialla P, Bovetti M, Carosso AR,, et al. Psychosocial factors associated with postpartum psychological distress during the Covid-19 pandemic: a cross-sectional study. BMC Pregnancy Childbirth. 2020;20(1):703. https://doi.org/10.1186/s12884-020-03399-5
17. Zanardo V, Manghina V, Giliberti L, Vettore M, Severino L, Straface G. Psychological impact of COVID-19 quarantine measures in northeastern Italy on mothers in the immediate postpartum period. Int J Gynecol Obstet. 2020;150(2):184–8. https://doi.org/10.1002/ijgo.13249
18. Oskovi-Kaplan ZA, Buyuk GN, Ozgu-Erdinc AS, Keskin HL, Ozbas A, Moraloglu TO. The effect of COVID-19 pandemic and social restrictions on depression rates and maternal attachment in immediate postpartum women: a preliminary study. Psychiatr Q. 2021;92(2):675–82. https://doi.org/10.1007/s11126-020-09843-1
19. Liu CH, Erdei C, Mittal L. Risk factors for depression, anxiety, and PTSD symptoms in perinatal women during the COVID-19 Pandemic. Psychiatry Res. 2021;295:113552 https://doi.org/10.1016/j.psychres.2020.113552
20. Bohren MA, Hofmeyr GJ, Sakala C, Fukuzawa RK, Cuthbert A. Continuous support for women during childbirth. Cochrane Database Syst Rev. 2017;7:CD003766. https://doi.org/10.1002/14651858.CD003766.pub6
21. Heaman MI, Sword WA, Akhtar-Danesh N, Bradford A, Tough S, Janssen PA, et al. Quality of prenatal care questionnaire: instrument development and testing. BMC Pregnancy Childbirth. 2014;14:188. https://doi.org/10.1186/1471-2393-14-188
22. Sword W, Heaman M, Peterson WE, Salvador A, Akhtar-Danesh N, Bradford-Janke A. psychometric testing of the french language quality of prenatal care questionnaire. J Nurs Meas. 2015;23(3):436–51. https://doi.org/10.1891/1061-3749.23.3.436
23. Bertholdt C, Epstein J, Banasiak C, Ligier F, Dahlhoff S, Olieric MF, et al. Birth experience during COVID-19 confinement (CONFINE): protocol for a multicentre prospective study. BMJ Open. 2020;10(12):e043057. https://doi.org/10.1136/bmjopen-2020-043057
24. Ayaz R, Hocaoğlu M, Günay T, Yardımcı OD, Turgut A, Karateke A. Anxiety and depression symptoms in the same pregnant women before and during the COVID-19 pandemic. J Perinat Med. 2020;48(9):965–70. https://doi.org/10.1515/jpm-2020-0380
25. Farrell T, Reagu S, Mohan S, Elmidany R, Qaddoura F, Ahmed EE, et al. The impact of the COVID-19 pandemic on the perinatal mental health of women. J Perinat Med. 2020;48(9):971–6. https://doi.org/10.1515/jpm-2020-0415
26. Lei L, Huang X, Zhang S, Yang J, Yang L, Xu M. Comparison of Prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 Epidemic in Southwestern China. Med Sci Monit Int Med J Exp Clin Res. 2020;26:e924609. https://doi.org/10.12659/MSM.924609
27. Dude A, Fette LM, Reddy UM, Tita ATN, Silver RM, El-Sayed YY, et al. Maternal sense of control during childbirth and infant feeding method. Obstet Gynecol. 2020;135(3):583–90. https://doi.org/10.1097/AOG.0000000000003697
28. Geerts CC, Klomp T, Lagro-Janssen ALM, Twisk JWR, van Dillen J, de Jonge A. Birth setting, transfer and maternal sense of control: results from the DELIVER study. BMC Pregnancy Childbirth. 2014;14:27. https://doi.org/10.1186/1471-2393-14-27

29. Grobman WA, Rice MM, Reddy UM, Tita ATN, Silver RM, Mallett G, et al. Labor induction versus expectant management in low-risk nulliparous women. N Engl J Med. 2018;379(6):513–23. https://doi.org/10.1056/NEJMoa1800566

30. Bohren MA, Berger BO, Munthe-Kaas H, Tunçalp Ö. Perceptions and experiences of labour companionship: a qualitative evidence synthesis. Cochrane Database Syst Rev. 2019;3:CD012449. https://doi.org/10.1002/14651858.CD012449.pub2

31. Kathuria P, Khetarpal A, Singh P, Khatana S, Yadav G, Ghuman NK. Role of birth companion in COVID-19: indispensable for her and an auxiliary hand for us. Pan Afr Med J. 2020;37:62. https://doi.org/10.11604/pamj.2020.37.62.23565

32. Sword W, Heaman M, Biro MA, Homer C, Yelland J, Akhtar-Danesh N, et al. Quality of prenatal care questionnaire: psychometric testing in an Australia population. BMC Pregnancy Childbirth. 2015;15:214. https://doi.org/10.1186/s12884-015-0644-7

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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