Psicothema

Article

The Impact of the COVID-19 Pandemic on Perinatal Depression and Anxiety: A Large Cross-sectional Study in Spain

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Abstract

Background: The current COVID-19 pandemic is a unique stressor with potentially negative consequences for pregnant and postpartum women. We investigated the impact of the COVID-19 pandemic on perinatal depression and anxiety in Spain. **Method:** This cross-sectional study was conducted from June to December 2020. A total of 3,356 adult pregnant and postpartum women (with infants up to 6 months of age) from all Spanish regions were surveyed. The assessment included measures of Coronavirus Perinatal Experiences (COPE-IS questionnaire) and Generalized Anxiety Disorder Screener (GAD-7=10) and Edinburgh Postnatal Depression Scale (EPDS=10). **Results:** The prevalence of perinatal anxiety and depression (above established cut-offs) was 33.3% and 47.2%, respectively; 29.2% of women screened positive for both conditions. Higher rates of perinatal depression and anxiety were associated with increased concern about threats of COVID-19, especially employment and the financial impact, along with increased overall levels of distress. Exposure to COVID-19 and its symptoms did not appear to be a relevant risk factor. More COVID-19-related predictors and a higher rate of depression were found in postpartum women. **Conclusions:** The current study highlights the substantial increase in symptoms of perinatal depression and anxiety, especially in postpartum women. Interventions for perinatal mental health should be a priority.

Keywords: COVID-19, perinatal, depression, anxiety, pregnancy.

Resumen

Impacto del COVID-19 en la Depresión y Ansiedad Perinatal: un Amplio Estudio Transversal en España. **Antecedentes:** la pandemia de COVID-19 es un estrés único con consecuencias potencialmente negativas para las mujeres en etapa perinatal. Este estudio pretende conocer el impacto de la pandemia de COVID-19 en la depresión y ansiedad perinatal en España. **Método:** estudio transversal realizado entre junio y diciembre de 2020. Un total de 3.356 mujeres adultas en etapa perinatal residentes en España fueron encuestadas. La evaluación incluyó medidas sobre Experiencias Perinatales de Coronavirus (COPE-IS), el Cuestionario de Ansiedad Generalizada (GAD-7=10) y la Escala de Depresión Posnatal de Edimburgo (EPDS=10). **Resultados:** la prevalencia de ansiedad y depresión perinatal fue 33,3% y 47,2%, respectivamente. El 29,2% sufrieron ansiedad y depresión. Las tasas más altas de depresión y ansiedad perinatal se asociaron con una mayor preocupación por las amenazas del COVID-19, especialmente con el impacto laboral y financiero, y un mayor nivel de angustia. La exposición al COVID-19 y sus síntomas no pareció ser un factor de riesgo relevante. Más predictores relacionados con el COVID-19 y una mayor tasa de depresión fue hallada en periodo posparto. **Conclusiones:** este estudio muestra el aumento sustancial de síntomas de depresión y ansiedad perinatal, especialmente en periodo posparto. La promoción de la salud mental perinatal debe ser una prioridad.

Palabras clave: COVID-19, perinatal, depresión, ansiedad, embarazo.

The novel coronavirus disease 2019 (COVID-19) has been declared a global pandemic by the World Health Organization and could have a negative impact on pregnant and postpartum women (The Royal College of Obstetricians and Gynaecologists, 2020). Spain is one of the European countries that has been most severely affected by the ongoing COVID-19 pandemic (European Centre for Disease Prevention and Control [ECDC], 2021), forcing the health system to change pregnancy and childbirth healthcare practices (e.g., visiting restrictions) (Goberna-Tricas et al., 2021).

Furthermore, the confinement and social distancing measures imposed by the Spanish government have been particularly challenging for pregnant and postpartum women (Brik et al., 2021; Goberna-Tricas et al., 2021). Fear of COVID-19 infection and its contagiousness to newborns, the lack of social support, isolation, and the perceived obstacles to preparing for childbirth during the pandemic may result in increased psychological distress during the perinatal period (Motrico et al., 2020).

The perinatal period represents a particular period of vulnerability to mental disorders, with depression and anxiety being the most common (Fawcett et al., 2019; Woody et al., 2017). According to recent reviews (Sun et al., 2020; Yan et al., 2020; Zhang et al., 2020), the COVID-19 pandemic has increased the prevalence of depression and anxiety by almost double compared to pre-pandemic cohorts. Studies have reported an increase in the overall prevalence of depression from 22% to 31% and of anxiety from 32% to 42% in pregnant and postpartum women.

Although no studies from Spain were included in the previous reviews, to the best of our knowledge, eight studies have been published to date (Brik et al., 2021; de Arriba-García et al., 2021; Esteban-Gonzalo et al., 2021; Lubián-López et al., 2021; Mariño-Narváez et al., 2021; Puertas-González et al., 2021a, b; Romero-González et al., 2021). However, they have some limitations. Most of the studies had small samples (less than 300 participants) (Brik et al., 2021; Mariño-Narváez et al., 2021; Puertas-González et al., 2021a, b; Romero-González et al., 2021), included women from only one or two Spanish regions (Brik et al., 2021; Lubián-López et al., 2021; Mariño-Narváez et al., 2021; Puertas-González et al., 2021a, b) and did not administer validated screening assessment tools for depression (de Arriba-García et al., 2021; Puertas-González et al., 2021a; Romero-González et al., 2021). Furthermore, no study has reported the prevalence of depression in pregnant and postpartum mothers with symptoms of or infection with COVID-19.

Given the scarce evidence, the impact of COVID-19 on perinatal depression and anxiety in Spain is still unknown. The question is relevant because of the known deleterious effects of mental health in women, their partners, and their offspring (Stein et al., 2014); further research is needed to study their status and to be able to implement prevention and treatment strategies.

Therefore, the aim of the present study was to examine the impact of the COVID-19 pandemic on perinatal depression and anxiety in a large sample of pregnant and postpartum women in Spain. Specifically, the study aimed to (1) report the prevalence of anxiety and depression during the COVID-19 pandemic; (2) assess differences in perinatal depression and anxiety due to COVID-19-related variables; and (3) determine the COVID-19 variables that can influence perinatal depression and anxiety.

Method

Participants

A total of 3,356 Spanish women during the perinatal period taking part of the Impact of the COVID-19 pandemic on perinatal mental health international study (Riseup-PPD-COVID-19) (Register: NCT04595123) were included in this cross-sectional study. The rationale for the inclusion criteria were to evaluate women throughout their pregnancy and during the first six months following childbirth.

The inclusion criteria were as follows: (1) were pregnant or a biological mother of a child aged six months or less; (2) women who were 18 years of age or older; (3) were living in Spain; and (4) provided informed consent to participate in the study. Women were excluded from the study if they were not Spanish pregnant or a biological mother of a child aged six months or less, if they were younger than 18 years of age and if they did not provide informed consent to participate in the study.

Instruments

The experiences of the women during the COVID-19 pandemic were assessed by the Spanish version of the Coronavirus Perinatal Experiences - Impact Survey (COPE-IS) (Thomason et al., 2020). In the present study, the variables included were as follows: 1) COVID-19 type of exposure and symptoms (three items): contact with someone who had been diagnosed with COVID-19 (yes/no), the diagnosis of and/or any symptoms compatible with COVID-19 (yes/no), and the death of any family or friends due to COVID-19 (yes/no); 2) COVID-19 concerns and distress (five items): of their own illness, of their child´s health, of employment and financial impact, and of the overall the level of distress about COVID-19. Each item was rated with a Likert scale ranging from 1 (no distress) to 7 (highly distressed).

The Spanish version of the Generalized Anxiety Disorder Screener (GAD-7; Spitzer et al., 2006) was used to measure anxiety (García-Campayo et al., 2010; Soto-Balbuena et al., 2021). The GAD-7 total score ranges from 0 to 21. A cut-off point of $\geq$ 10 was used for clinical significance in each participant (Spitzer et al., 2006). The GAD-7 showed good reliability by internal consistency and good concurrent validity in a previous study with Spanish pregnant women (Soto-Balbuena et al., 2021). Cronbach's α coefficient was .92 for the entire sample and, also, for pregnant and postpartum women.

The Spanish version of the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) was used to assess depression (García-Esteve et al., 2003; Vázquez & Míguez, 2019). Each item of the EPDS is scored on a 4-point scale (from 0 to 3), with the total scale score ranging from 0–30. The validated Spanish version of the EPDS has a cut-off point of $\geq$ 10 to identify the presence of probable perinatal depression in women, obtaining an area under the curve of .98, and also had good sensitivity and specificity values (García-Esteve et al., 2003). Cronbach's α was .88 for our entire sample and .89 and .88 for pregnant and postpartum women, respectively.

Procedure

The method was previously described in detail elsewhere (Motrico et al., 2021). Summarizing, data collection was from 15 June to 31 December 2020. Participants were recruited through social media advertising (e.g., Instagram), networks of organizations, policymakers, local organizations, and other stakeholders (using the network provided by Riseup-PPD). Participants who provided online informed consent and fulfilled all the inclusion criteria were invited to participate in the study by using the project website link (https://momsduringcovid.org/about/). Participants who did not meet the inclusion criteria were informed by a message thanking them for their interest and explaining them the inclusion criteria of the study through the project website. All the data were collected by an online questionnaire specifically created to meet the objectives of the study. Data collection took approximately 20 minutes to complete.

The present study received approval from the Ethics Committee (Ethics Protocol: 1257-N-20). All data were completely anonymized, according to the Helsinki Declaration of Research with Human Beings.

Data analysis

Survey data were manually checked for accuracy and consistency before analysis. From an original 4,316 respondents, we identified and removed 960 invalid records because participants either indicated an erroneous pregnancy duration (more than 42 weeks; n = 324) or their children were more than 6 months old (n = 636). All analyses were conducted using records without missing values.

Descriptive data analyses were performed to report frequencies and percentages for categorical data and means and standard

Emma Motrico, Sara Domínguez-Salas, Carmen Rodríguez-Domínguez, Irene Gómez-Gómez, María F. Rodríguez-Muñoz, and Diego Gómez-Baya

deviations for continuous variables. Differences between participants with perinatal depression and anxiety by demographics (age and primigravida/primipara) and COVID-19-related variables were examined using the χ^2 statistic or Student's *t*-test. Size effects were presented following the interpretation proposed by Cramer's *V* and Cohen's *d* for the effect size as follows: 0-0.19, negligible; 0.20-0.49, small; 0.50-0.79, medium; 0.80 and over, high (Cohen, 1988).

Multivariate logistic regression analyses were conducted to identify how demographics and COVID-19-related variables predicted perinatal depression and anxiety. All *p* values were two-sided and considered significant below .05. All confidence intervals (CI) were reported at 95%. SPSS v26.0 statistical software was used for these analyses.

Results

Descriptive statistics

A total of 3,356 pregnant and postpartum women from the 17 Spanish Autonomous Communities and the autonomous cities of Ceuta and Melilla participated in the study. Most of them lived in Andalusia (18%), Madrid (17.2%), Catalonia (13.6%), and Valencia (7.6%) (see Figure 1).

The main characteristics of the 1,402 (44.5%) pregnant and 1,954 (55.5%) postpartum women are described in Table 1. The mean age was 33.7 (SD = 4.3), and at least 62.1% of the participants were primigravida/primiparous. Regarding COVID-19 exposures and symptoms, 16.6% of the pregnant and 14.5% of the postpartum women reported symptoms and/or diagnosis of a COVID-19 infection.

Some differences were found in COVID-19 concerns and distress between pregnant and postpartum women. In both groups, the most important concern was the change in daily life due to COVID-19. The results indicated that pregnant women were more concerned over their own COVID-19-related symptoms and/or

Table 1
Main characteristics of the participants

	All participants (*N* = 3,356)	Pregnant women (*n* = 1,402)	Postpartum women (*n* = 1,954)
	N (%)	n (%)	n (%)
Demographic			
Age [*M* (*SD*)]	33.7 (4.3)	33.4 (4.2)*	33.8 (4.3)*
Primigravida/primiparous			
No	1,273 (37.9)	570 (40.7)*	703 (36)*
Yes	2,083 (62.1)	832 (59.3)*	1,251 (64.0)*
COVID-19 exposures and symptoms			
Contact with someone who has been diagnosed with COVID-19			
No	2,489 (74.2)	1,022 (72.9)	1,467 (75.1)
Yes	867 (25.8)	380 (27.1)	487 (24.9)
Symptoms and/or confirmed COVID-19 diagnosis			
No	2,839 (84.6)	1,169 (83.4)	1,670 (85.5)
Yes	517 (15.4)	233 (16.6)	284 (14.5)
Death of a close person due to COVID-19			
No	2,988 (89.0)	1,238 (88.3)	1,750 (89.6)
Yes	368 (11.0)	164 (11.7)	204 (10.4)
COVID-19 concerns and distress [*M* (*SD*)]			
Own COVID-19 related symptoms and/or potential illness	4.2 (2.0)	4.4 (2.0)*	4.2 (2.0)*
Child's health	4.5 (2.4)	5.1 (2.2)**	4.1 (2.5)**
Employment and financial impact	4.8 (2.1)	4.7 (2.1)*	5.0 (2.0)*
Daily live impact	5.2 (1.2)	5.2 (1.2)	5.3 (1.2)
Overall level of distress	4.7 (1.6)	4.2 (1.6)**	4.5 (1.6)**
Perinatal mental health			
GAD-7 scores [*M* (*SD*)]	7.5 (5.4)	7.4 (5.3)	7.6 (5.4)
GAD-7 ≥ 10	1,107 (33.3)	458 (32.7)	659 (33.7)
EPDS scores [*M* (*SD*)]	9.3 (5.8)	9.0 (6.9)*	9.5 (5.7)*
EPDS ≥ 10	1,585 (47.2)	628 (44.8)*	957 (49.0)*

Note: * p < .05; ** p < .001

Spanish Autonomous Communities or Cities	Cumulative Confirmed COVID-19 Cases (28/12/2020)
Andalusia	260,433
Aragon	78,849
Asturias	26,838
Balearic Islands	34,023
Canary Islands	26,317
Cantabria	17,667
Castilla La Macha	98,196
Castile and Leon	131,180
Catalonia	346,643
Ceuta	3,020
Region of Valencia	139,660
Extremadura	35,051
Galicia	59,776
Madrid	388,498
Melilla	4,445
Murcia	59,130
Navarre	42,099
Basque Country	109,493
La Rioja	18,095
TOTAL	**1,879,413**

Colour legend according to cumulative Confirmed COVID-19 Cases by Autonomous Community or Cities (Spain)

< 20,000 / 20,001 – 40,000 / 40,001 – 60,000 / 60,001 – 80,000 / 80,001 – 100,000 / 100,001 – 120,000 / 120,001 – 140,000 / 140,001 – 160,000 / 160,001 – 180,000 / 180,001 – 200,000 / 200,001 – 220,000 / 220,001 – 240,000 / 240,001 – 260,000 / 260,001 – 280,000 / 280,001 – 300,000 / 300,001 – 320,000 / 320,001 – 340,000 / 340,001 – 360,000 / 360,001 – 380,000 / 380,001 – 400,000

Note: Framed, data showed the frequency (percentage) of participants according to Spanish Autonomous Community or Cities.
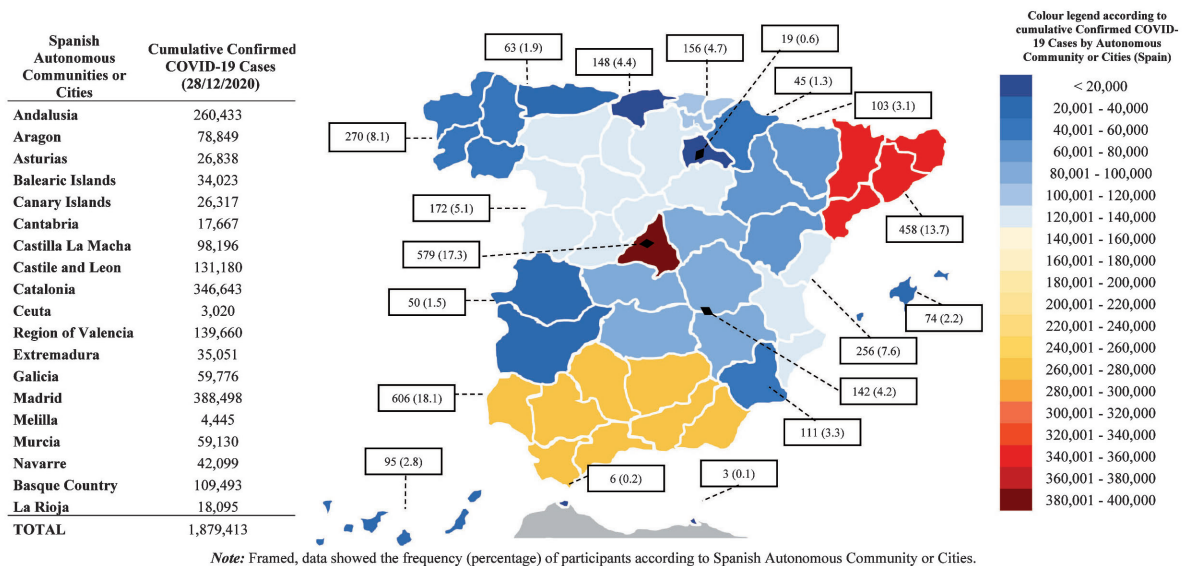
Figure 1. Confirmed COVID-19 cases accumulated in Spain (December 28, 2020) according to Autonomous Community and geographical distribution of the study participants. Authors' own elaboration based on data from Centro de Coordinación de Alertas y Emergencias Sanitarias. Ministerio de Sanidad (Gobierno de España, 2021)

potential illness (M = 4.4, SD = 2.0), t = 2.87, p = .004, d = 0.10, and over their child's health (M = 5.1, SD = 2.2), t = 12.09, p < .001, d = 0.42. Furthermore, postpartum women reported more concern about employment and financial impact (M = 5.0, SD = 2.0), t = -2.49, p = .013, d = 0.09, and reported more distress (M = 4.5, SD = 1.6), t = -3.95, p <.001, d = 0.14.

The rates in the overall sample of perinatal anxiety and depression, according to established cut-off points, were 33.3% and 47.2%, respectively; 29.2% of the women screened positive for both conditions. Postpartum women presented higher rates of depression than pregnant women, V = 0.04, p = .017 (see Table 1).

Association between COVID-19-related variables and perinatal mental health

Differences in perinatal mental health by demographics and COVID-19-related variables are described in Tables 2 and 3. Pregnant women with anxiety and depression were younger, were not primigravida, reported COVID-19 symptoms and/or confirmed a COVID-19 diagnosis, and indicated higher levels of concern and distress related to COVID-19 (p < .001). Postpartum women with anxiety or depression also showed greater concern and distress related to COVID-19 (p < .001) and reported higher percentages of COVID-19-related deaths of people close to them. Moreover, postpartum women with anxiety were younger than those without anxiety, t = 4.17, p < .001, d = 0.21.

Predicting perinatal mental health during the COVID-19 pandemic

The logistic regression models to predict perinatal mental health during the COVID-19 pandemic, based on demographics (age and primigravida/primipara) and COVID-19-related variables, are described in Tables 4 and 5. The four models correctly classified approximately 71.9-79.7% of the participants. The Hosmer-Lemeshow test indicated a good fit of the models, and the omnibus test allowed us to assert that the new models (with explanatory variables included) were an improvement over the baseline models. Higher explained variance was observed for anxiety in pregnant women (42%), while the other three models reached R^2 values over 33%.

Regarding the subsample of pregnant women, being younger (OR = 0.95), not being primigravida (OR= 0.67), having concerns about employment and financial impact (OR = 1.11), and having a higher level of general distress due to COVID-19 (OR = 2.59) increased the likelihood of suffering anxiety. Furthermore, the predictive variables for depression in pregnant women were a higher level of overall distress (OR = 2.26), not being primigravida (OR = 0.73) and having greater concern about one's own COVID-19-related symptoms or potential illness (OR = 0.93) (see Table 4).

In the subsample of postpartum women, being younger (OR = 0.96), the death of a close person due to COVID-19 (OR = 1.46), increased concern about their child´s health (OR = 1.06) and about employment and financial impact (OR = 1.10), and a higher level

Table 2
Association between variables and perinatal mental health in pregnant women during the COVID-19 pandemic

	Anxiety (GAD-7 ≥ 10)					Depression (EPDS ≥ 10)				
	No (*n* = 944)	Yes (*n* = 458)	χ^2/t	*p*	Effect size	No (*n* = 774)	Yes (*n* = 628)	χ^2/t	*p*	Effect size
Demographic										
Age [*M* (*SD*)]	33.7 (4.0)	32.9 (4.6)	3.09	.002	0.19	33.6 (4.0)	33.2 (4.4)	1.53	.127	0.08
Primigravida										
No	365 (38.7)	205 (44.8)	4.75	.029	0.06	297 (38.4)	273 (43.5)	3.74	.053	0.05
Yes	579 (61.3)	253 (55.2)				477 (61.6)	355 (56.5)			
COVID-19 exposures and symptoms										
Contact with someone who has been diagnosed with COVID-19										
No	687 (72.8)	335 (73.1)	0.02	.884	0.00	568 (73.4)	454 (72.3)	0.21	.672	0.01
Yes	257 (27.2)	123 (26.9)				206 (26.6)	174 (27.7)			
Symptoms or/and confirmed COVID-19 diagnosis										
No	804 (85.2)	365 (79.7)	6.67	.010	0.07	654 (84.5)	515 (82.0)	1.38	.213	0.03
Yes	140 (14.8)	93 (20.3)				120 (15.5)	113 (18.0)			
Death of a close person due to COVID-19										
No	842 (89.2)	396 (86.5)	2.23	.135	0.04	693 (89.5)	545 (86.8)	2.54	.111	0.04
Yes	102 (10.8)	62 (13.5)				81 (10.5)	83 (13.2)			
COVID-19 concerns and distress [*M* (*SD*)]										
Own COVID-19 related symptoms or potential illness	4.1 (1.9)	4.9 (2.0)	-6.81	<.001	0.39	4.1 (1.9)	4.7 (2.0)	-5.17	<.001	0.28
Child's health	4.7 (2.3)	5.7 (2.0)	-8.39	<.001	0.46	4.8 (2.3)	5.5 (2.1)	-5.96	<.001	0.32
Employment and financial impact	4.4 (2.1)	5.3 (2.0)	-7.80	<.001	0.43	4.4 (2.1)	5.1 (2.0)	-6.48	<.001	0.35
Daily live impact	4.9 (1.2)	5.7 (1.0)	-13.77	<.001	0.74	4.8 (1.3)	5.6 (1.1)	-11.79	<.001	0.62
Overall level of distress	3.6 (1.4)	5.5 (1.3)	-24.71	<.001	1.34	3.5 (1.5)	5.1 (1.4)	-21.62	<.001	1.16

Table 3
Association between variables and perinatal mental health in postpartum women during the COVID-19 pandemic

	Anxiety (GAD-7 ≥ 10)					Depression (EPDS ≥ 10)				
	No (n = 1295)	Yes (n = 659)	χ²/t	p	Effect size	No (n = 997)	Yes (n = 957)	χ²/t	p	Effect size
Demographic										
Age [M (SD)]	34.1 (4.1)	33.2 (4.6)	4.17	<.001	0.21	34.0 (4.1)	33.7 (4.5)	1.60	.111	0.07
Primiparous										
No	468 (36.1)	235 (35.7)	0.04	.835	0.01	351 (35.2)	352 (36.8)	0.53	0.53	0.05
Yes	827 (63.9)	424 (64.3)				646 (64.8)	605 (63.2)			
COVID-19 exposures and symptoms										
Contact with someone who has been diagnosed with COVID-19										
No	965 (74.5)	502 (76.2)	0.64	.423	0.02	747 (74.9)	720 (75.2)	0.03	.874	0.01
Yes	330 (25.5)	157 (23.8)				250 (25.1)	237 (24.8)			
Symptoms or/and confirmed COVID-19 diagnosis										
No	1112 (85.9)	558 (84.7)	0.50	.479	0.02	864 (86.7)	806 (84.2)	2.34	.126	0.03
Yes	183 (14.1)	101 (15.3)				133 (13.3)	151 (15.8)			
Death of a close person due to COVID-19										
No	1181 (91.2)	569 (86.3)	11.01	.001	0.08	912 (91.5)	838 (87.6)	7.98	.005	0.04
Yes	114 (8.8)	90 (13.7)				85 (8.5)	118 (12.4)			
COVID-19 concerns and distress [M (SD)]										
Own COVID-19 related symptoms or potential illness	3.9 (1.9)	4.7 (2.1)	-8.62	<.001	0.43	3.8 (1.9)	4.6 (2.0)	-8.68	<.001	0.39
Child's health	3.7 (2.4)	4.9 (2.4)	-10.37	<.001	0.50	3.5 (2.4)	4.7 (2.4)	-10.64	<.001	0.48
Employment and financial impact	4.6 (2.1)	5.5 (1.8)	-10.17	<.001	0.47	4.5 (2.1)	5.3 (1.9)	-9.90	<.001	0.45
Daily live impact	5.0 (1.3)	5.8 (1.0)	-16.29	<.001	0.72	4.9 (1.3)	5.6 (1.1)	-14.31	<.001	0.65
Overall level of distress	3.9 (1.5)	5.5 (1.2)	-25.76	<.001	1.15	3.7 (1.5)	5.3 (1.3)	-25.08	<.001	1.13

of overall distress due to COVID-19 ($OR = 2.10$) increased anxiety. Moreover, postpartum depression was predicted by COVID-19 concern and overall distress. Specifically, greater concern about their child's health ($OR = 1.06$), about their employment and financial impact ($OR = 1.10$), and a higher level of overall distress due to COVID-19 ($OR = 2.12$), were the significant predictors in the model (See Table 5).

Discussion

The present study shows the negative impact of the COVID-19 pandemic on perinatal mental health in Spain. The prevalence of anxiety and depression (above validated cut-off scores) were 33.3% and 47.2%, respectively; 29.2% of women presented both conditions. These rates are more than doubled compared to the pre-pandemic data from studies with similar characteristics. Being primigravida is a protective factor for antenatal anxiety and depression, and younger age was a risk factor exclusively for antenatal anxiety. A higher level of concern, especially for employment and financial impact, and overall distress related to the COVID-19 pandemic predicted depression and anxiety in pregnant and postpartum women. Exposure to COVID-19 and its symptoms did not appear to be a relevant risk factor, except for the death of a family member and postpartum depression. More COVID-19-related predictors and a higher rate of depression were reported in postpartum women. The models presented good overall data fit and explained approximately 42% to 33% of the variance.

Comparing with the existing literature, depression and anxiety (above validated cut-off scores) during the COVID-19 pandemic were higher than expected based on previous pre-pandemic studies (Fawcett et al., 2019; Woody et al., 2017). The prevalence of perinatal depression and anxiety in non-pandemic conditions in Spain is approximately 11.9% - 14.8% for depression (Rodríguez-Muñoz et al., 2017; Gutiérrez-Zotes et al., 2018) and 19.5-16.8% for anxiety (Soto-Balbuena et al., 2018). However, our results are compatible with recent meta-analyses (Sun et al., 2020; Yan et al., 2020; Zhang et al., 2020) and previous studies with Spanish samples (Brik et al., 2021; Lubián et al., 2021) that reported an increase in perinatal depression and anxiety during the pandemic.

In our sample, being primigravida was a protective factor against antenatal anxiety and depression during the pandemic. Our results can be explained because women with prior pregnancies suffered more stress due to confinement and a lack of support during COVID-19 for childcare (Romero et al., 2020). Nevertheless, previous studies during the pandemic showed mixed results (Effati-Daryani et al., 2020; Lebel et al., 2020) and more evidence is needed. Being younger was a risk factor exclusively related to perinatal anxiety. This result confirms that previous studies have found a significant correlation between younger age and anxiety (Biaggi et al., 2016) but not as a risk factor for depression (Yin et al., 2020).

Table 4
Logistic regression for predicting anxiety and depression in pregnant women during the COVID-19 pandemic

Predictors	β	S.E.	Wald	df	p	OR	95% C.I. for EXP (B) Lower	95% C.I. for EXP (B) Upper	Nagelkerke R^2	Sensitivity/Specificity (Correctly classified)
Anxiety (GAD-7 ≥ 10)*										
Demographics									.42	61.8/88.4%
Age	-0.05	0.02	7.70	1	.006	0.95	0.92	0.99		(79.7%)
Primigravida (Ref. No)	-0.42	0.15	7.92	1	.005	0.66	0.49	0.88		
COVID-19 exposures and symptoms										
Contact with any person with confirmed infection with COVID-19 (Ref. No)	-0.26	0.17	2.48	1	.116	0.77	0.56	1.07		
Symptoms/confirmed COVID-19 diagnosis (Ref. No)	0.36	0.18	3.62	1	.057	1.43	0.99	2.06		
Death of a close person due to COVID-19 (Ref. No)	0.05	0.22	0.06	1	.807	1.05	0.69	1.61		
COVID-19 concern and distress										
Own COVID-19 related symptoms or potential illness	0.03	0.04	0.76	1	.384	1.03	0.96	1.11		
Child's health	-0.05	0.04	1.83	1	.176	0.95	0.88	1.02		
Employment and financial impact	0.11	0.04	8.59	1	.003	1.11	1.04	1.19		
Daily live impact	0.02	0.08	0.05	1	.824	1.02	0.87	1.19		
Overall level of distress	0.95	0.07	180.04	1	<.001	2.59	2.26	2.98		
Constant	-3.79	0.74	26.52	1	<.001	0.02				
Depression (EPDS ≥ 10)**										
Demographics									.34	68.9/75.1%
Age	-0.02	0.02	1.37	1	.242	0.98	0.95	1.01		(72.3%)
Primigravida (Ref. No)	-0.32	0.13	5.54	1	.019	0.73	0.56	0.95		
COVID-19 exposures and symptoms										
Contact with any person with confirmed infection with COVID-19 (Ref. No)	-0.03	0.15	0.04	1	.849	0.97	0.73	1.30		
Symptoms/confirmed COVID-19 diagnosis (Ref. No)	0.01	0.17	0.00	1	.961	1.01	0.72	1.42		
Death of a close person due to COVID-19 (Ref. No)	0.11	0.20	0.33	1	.565	1.12	0.76	1.66		
COVID-19 concern and distress										
Own COVID-19 related symptoms or potential illness	-0.07	0.04	3.92	1	.048	0.93	0.87	1.00		
Child's health	-0.02	0.03	0.21	1	.649	0.99	0.92	1.05		
Employment and financial impact	0.06	0.03	3.34	1	.068	1.06	1.00	1.13		
Daily live impact	-0.04	0.07	0.26	1	.609	0.97	0.84	1.11		
Overall level of distress	0.82	0.06	179.88	1	<.001	2.26	2.01	2.55		
Constant	-2.65	0.65	16.36	1	<.001	0.07				

* Omnibus Test: X^2 (10) = 481.91; $p < .001$. Hosmer and Lemeshow Test: X^2 (8) = 8.11, $p = .422$
** Omnibus Test: X^2 (10) = 391.52; $p < .001$. Hosmer and Lemeshow Test: X^2 (8) = 5.89, $p = .660$

Exposure to COVID-19 and its symptoms does not appear to be a relevant risk factor for predicting anxiety and depression, except for the death of a family member and postpartum depression. However, COVID-19-related concerns, especially employment and financial impact, are a predictor of anxiety and depression throughout the perinatal period. Our results are in line with previous studies that found that uncertainty about the effects of a COVID-19 infection and employment layoffs were associated with higher anxiety and depression levels (Esteban-Gonzalo et al., 2021; Lebel et al., 2020). Furthermore, distress is an explanatory factor for anxiety and depression throughout the perinatal period during COVID-19. Thus, the COVID-19 pandemic, as a threatening stressful event, has been especially challenging for pregnant and postpartum women, increasing the risk of psychopathology (Motrico et al., 2020).

In addition, more predictors of anxiety and depression were found during the postpartum period than during pregnancy, as well as higher rates of depression. The explanation for these results could be the unique challenges that postpartum women have faced during the pandemic (such as childbirth) (Mariño-Narváez et al., 2021) and the higher risk of depression during the postpartum period (Woody et al., 2017).

This study presents several strengths and some limitations. This is the first study in the scientific literature reporting the psychological impact of the COVID-19 pandemic in a large sample of Spanish pregnant and postpartum women. The results from this study were derived from 3356 pregnant and postpartum women living in Spain. Although the data were collected from an online convenience sample with inherent bias potential, the representativeness of the sample is consistent with the population

Table 5
Logistic regression for predicting anxiety and depression in postpartum women during the COVID-19 pandemic

Predictors	β	S.E.	Wald	df	p	OR	95% C.I. for EXP (B) Lower	Upper	Nagelkerke R²	Sensitivity/Specificity (Correctly classified)
Anxiety (GAD-7 ≥ 10)*										
Demographics									.34	53.5/85.8%
Age	-0.05	0.01	10.43	1	.001	0.96	0.93	0.98		(74.9%)
Primiparous (Ref. No)	-0.13	0.12	1.13	1	.288	0.88	0.69	1.12		
COVID-19 exposures and symptoms										
Contact with any person with confirmed infection with COVID-19 (Ref. No)	-0.13	0.13	0.90	1	.343	0.88	0.68	1.15		
Symptoms/ confirmed COVID-19 diagnosis (Ref. No)	0.12	0.16	0.59	1	.441	1.13	0.83	1.56		
Death of a close person due to COVID-19 (Ref. No)	0.38	0.18	4.48	1	.034	1.46	1.03	2.08		
COVID-19 concern and distress										
Own COVID-19 related symptoms or potential illness	-0.03	0.03	1.17	1	.280	0.97	0.91	1.03		
Child's health	0.06	0.03	5.23	1	.022	1.06	1.01	1.11		
Employment and financial impact	0.10	0.03	10.35	1	.001	1.10	1.04	1.17		
Daily live impact	0.07	0.07	1.26	1	.261	1.08	0.95	1.23		
Overall level of distress	0.74	0.06	170.27	1	<.001	2.10	1.88	2.34		
Constant	-3.62	0.59	37.55	1	<.001	0.03				
Depression (EPDS ≥ 10)**										
Demographics									.33	73.4/70.6%
Age	-0.00	0.01	0.06	1	.804	1.00	0.97	1.02		(71.9%)
Primiparous (Ref. No)	-0.16	0.12	1.87	1	.172	0.85	0.68	1.07		
COVID-19 exposures and symptoms										
Contact with any person with confirmed infection with COVID-19 (Ref. No)	-0.04	0.13	0.12	1	.733	0.96	0.75	1.23		
Symptoms/ confirmed COVID-19 diagnosis (Ref. No)	0.20	0.16	1.58	1	.209	1.22	0.90	1.65		
Death of a close person due to COVID-19 (Ref. No)	0.25	0.18	1.99	1	.159	1.29	0.91	1.83		
COVID-19 concern and distress										
Own COVID-19 related symptoms or potential illness	-0.04	0.03	1.52	1	.217	0.96	0.91	1.02		
Child's health	0.06	0.02	6.86	1	.009	1.06	1.02	1.12		
Employment and financial impact	0.10	0.03	11.97	1	.001	1.10	1.04	1.16		
Daily live impact	-0.06	0.06	1.06	1	.303	0.94	0.84	1.06		
Overall level of distress	0.75	0.05	207.15	1	<.001	2.12	1.91	2.34		
Constant	-3.50	0.55	41.03	1	<.001	0.03				

* Omnibus Test: X² (10) = 526.58; *p* < .001. Hosmer and Lemeshow Test: X² (8) = 6.98, *p* =.538
** Omnibus Test: X² (10) = 538.34; *p* < .001. Hosmer and Lemeshow Test: X² (8) = 8.98, *p* = .344

demographics (INE, 2021) and the official data of cumulative confirmed COVID-19 cases in Spain at the end of the survey (Government of Spain, 2021).

The questionnaires used to evaluate our outcomes, EPDS and GAD-7, have good properties to estimate the prevalence of depression and anxiety (García-Campayo et al., 2010; García-Esteve et al., 2003; Vázquez & Míguez, 2019), but we cannot rule out classification bias. Moreover, the gold standard for the diagnosis of mental disorders remains structured clinical interviews. However, due to restrictive measures during the pandemic, the administration of a clinical interview to a large sample would not have been possible.

About implications for research and practice, there is needed research studies that assess perinatal depression and anxiety in routine maternal care and confirm the diagnosis through a face-to-face diagnostic interview. Furthermore, given the potentially serious consequences of untreated anxiety and depression during the perinatal period on mothers and their offspring (Stein et al., 2014), the implementation of evidence-based interventions should be addressed. Psychological interventions for preventing and treating depression and anxiety during the perinatal period are effective (Branquinho et al., 2021; Curry et al., 2019). Research is warranted to develop tailored and evidence-based eHealth interventions during the perinatal period to ensure scalability and broad access (Muñoz et al., 2021).

To conclude, the COVID-19 pandemic has a devastating impact on perinatal mental health. The current study highlights the substantial increase in symptoms of perinatal depression and anxiety in Spain, especially in postpartum women. Interventions for perinatal mental health should be a priority.

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