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Births in Times of Pandemic: Mothers' Views on the Use of COVID-19 Hospital Precautionary Measures

Nacimientos en Pandemia: Percepción de las Madres del Uso de Medidas de Precaución Intrahospitalarias COVID-19

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Due to the COVID-19 pandemic, health institutions adjusted protocols to include additional precautionary measures which may impact mothers' and babies' experiences of birth and post-partum. This mixed-methods cross-sectional study aims to describe mothers' experience of hospital precautionary measures and their view on how these impacted on their levels of discomfort as well as positive and negative feelings experienced by them and their newborns, and maternal depressive symptomatology. A convenience sample from a private clinic in Santiago was used to compare two groups: 62 mothers with a negative Sars-CoV-2 PCR test (controls) and 58 mothers with a positive or pending Sars-CoV-2 PCR test prior to labor (cases), with different precautionary measures applied according to risk. An online questionnaire designed for this study and the EPDS was used. T-tests were used for comparing means as well as non-parametric tests and qualitative thematic analysis. Cases experienced more discomfort than controls, but at the same time they reported feeling significantly more competent. Of the total sample, 51.67% were at risk of postpartum depression, with no significant differences between groups. No significant differences were found in newborns' level of discomfort, stress or positive or negative feelings according to mothers. Mothers reported an overall positive impact on their mother-infant bond. These results emphasize that mothers in their perinatal period have been exposed to a highly stressful context during the pandemic, which has impacted on their mental health. The impact of hospital precautionary measures, their implications for maternity protocols and these patients' need for support are discussed.

Keywords: COVID-19 pandemic, precautionary measures, pregnancy, birth, postpartum period

Debido a la pandemia del COVID-19 los protocolos de salud incluyeron medidas de precaución intrahospitalarias adicionales, pudiendo impactar la experiencia de parto y postparto de madres y bebés. Este estudio transversal de metodología mixta describió la experiencia de las madres sobre el uso de las medidas de precaución y su percepción sobre su impacto en el nivel de malestar, emociones positivas y negativas tanto de madres como bebés y en sintomatología depresiva materna. Se obtuvo una muestra por conveniencia en una clínica privada de Santiago, comparando dos grupos: 62 madres con prueba Sars-CoV-2 PCR negativa (controles) y 58 madres con prueba Sars-CoV-2 PCR positiva o pendiente previo al parto (casos), con distintas medidas de precaución según riesgo. Se aplicó una encuesta online diseñada para el estudio y la EDPS. Se usaron pruebas t para comparación de medias, pruebas no paramétricas, y análisis temático cualitativo. Los casos experimentaron mayor malestar que los controles, pero expresaron sentirse más competentes. Un 51,67% de la muestra total presentaba riesgo de depresión postparto sin diferencias significativas entre los grupos. No se encontraron diferencias significativas en el nivel de malestar, estrés o en las emociones positivas o negativas de los recién nacidos según lo reportado por las madres, pero reportaron un impacto positivo en el vínculo madre-bebé. Durante la pandemia las puérperas han sido expuestas a un contexto altamente estresante que ha impactado su salud mental. Se discuten las implicancias para los protocolos de maternidad y las necesidades de acompañamiento de estas pacientes.

Palabras clave: pandemia COVID-19, medidas de precaución, embarazo, parto, postparto

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In March 2020, the World Health Organization declared the coronavirus (COVID-19) outbreak a pandemic. The public health measures implemented to contain its spread have been accompanied by innumerable psychological and social consequences which affect people and their communities (Mesa Técnica de Salud Mental en la Gestión del Riesgo de Desastres, 2020).

In the context of a pandemic, it is common for people to feel stressed and worried about their and their families' health. They can experience fear of getting ill, dying, losing their jobs, not being able to provide enough income for their families, being separated from their loved ones due to lockdown and social isolation, and much more (Mesa Técnica de Salud Mental en la Gestión del Riesgo de Desastres, 2020).

Being pregnant and/or having a child is, ideally, an experience filled with positive feelings. Nonetheless, many women experience anxiety and depression during the perinatal period (Topalidou et al., 2020). Moreover, in conditions of extreme stress, emergency, or natural disaster, the risk of developing mental health disorders increases (World Health Organization, n.d.). Recent studies during the pandemic have shown an increase of violence toward women (Sediri et al., 2020; UN-Women, 2020) as well as increased concerns regarding labor and neonatal care, early mother-baby separations, anxiety about death (Fakari & Simbar, 2020), and generalized fear (Romero et al., 2020), all of which are additional stress factors for expectant mothers. Women have been found to experience more mental distress during the pandemic (Simha et al., 2020); specifically, studies have shown that women in their perinatal period are more vulnerable to developing mental health difficulties during the pandemic (Almeida et al., 2020).

Health institutions have had to adjust their clinical protocols for pregnant women and newborns (NB) to ensure the health and wellbeing of all their patients. However, these new measures can impact on mothers and their babies as they can entail physical separation between them, restriction of contact and visits, and use of personal protective equipment (PPE), which are not the usual protocols with these patients. Evidence shows that NB are highly dependent on their primary caregivers and that their emotional, social, and cognitive development is built within the mother-baby attachment relationship (Winston & Chicot, 2016). Furthermore, it is known that skin-to-skin contact fosters NB' physiological stability and behavioral organization and promotes mother-baby attachment (Browne, 2004). Restricting these mother and baby experiences may hinder the establishment of their bond and impact their mental health.

In the health center where this study was conducted, in Santiago, Chile, every pregnant patient who is admitted is asked to have a Sars-CoV-2 PCR test done no more than 72 hours prior to birth. If it is an emergency birth, a risk survey is conducted, and the Sars-CoV-2 PCR is taken if the mother has not already done one. Patients who report risk factors are treated as "suspicious" or COVID-19 positive as per the corresponding protocols for maternity and neonatology. If no risk of having COVID-19 is stated in the survey, patients are treated with precautionary measures until the results of their test are obtained. To date, there is no evidence in Chile describing how mothers experience the use of these measures. This study seeks to contribute to knowledge in this area.

The main objective of the current study was to describe mothers' views on the use of hospital precautionary measures and how they perceive these measures could have impacted their own and their NB' mental health, considering maternal depressive symptomatology, level of discomfort, and positive and negative feelings of both mother and baby during birth and postpartum. Mothers who had to follow additional precautionary measures are expected to report a more negative view of their experience of birth and postpartum and to report higher levels of symptomatology.

Method

Design

A mixed-methods, quasi-experimental, cross-sectional study was conducted. It considered both qualitative exploratory analyses and quantitative descriptive analyses. Two groups of patients were compared according to their status at admission:

1. *Cases:* These included mothers who fell under one of three categories:
    - confirmed to be COVID (+) during labor.
    - pending Sars-CoV-2 PCR test result during labor and having identified risk factors in their survey ("suspicious" and treated as COVID-19(+) until proven otherwise).

- pending Sars-CoV-2 PCR test result, but having no identified risk factors ("preventive" and asked to follow specific precautionary measures until PCR test result is known).

2. *Controls:* Mothers who were confirmed to be COVID-19(-) during labor and were only required to follow the new protocols used during the pandemic for all patients; that is, they received treatment as usual during the pandemic.

Table 1 shows the specific protocols regarding the use of precautionary measures in maternity and neonatal services applied in each group.

Table 1
Precautionary Measures According to Each Group Condition

	Cases		Controls
	COVID-19(+)/suspiciouswith moderate to severe symptoms	Preventive/asymptomatic COVID-19(+)/suspicious or COVID-19(+) with minor symptoms	COVID-19(-) or treatment as usual
Skin-to-skin contact	Not allowed.	Protected and supervised skin-to-skin contact can be conducted after birth for 30 minutes: mothers must use a mask and sanitize their hands.	Allowed.
Location of NB and contact with mother	Must remain in mother's room or is admitted in NICU if mother is symptomatic or cannot take care of baby. Mother cannot visit in NICU until her recovery (14 days). A healthy non-contact relative may visit during baby's hospitalization.	Must remain in mother's room where the infant's crib must be at least 1.8 mt away from the mother's face. Mother may have physical contact with baby only during feeding. A special nursery is provided for brief interventions only for these babies.	May remain in mother's room and/or spend periods of time in the regular nursery.
Feeding*	Formula if NB is in NICU (the sanitization procedures and infrastructure required are not available in the nursery). Protective breastfeeding if NB is in mother's room: mothers must use a mask and wash their hands or sanitize them with alcohol gel.	Protective breastfeeding: mothers must use a mask and wash their hands or sanitize them with alcohol gel.	Can breastfeed or feed formula at will.
Visitors	The mother cannot receive any visitors.	Only one person is allowed to visit the mother during her entire stay.	Only one person is allowed to visit the mother during her entire stay.
Use of PPE	Permanent use of masks.	Permanent use of masks.	Use of masks only when medical staff is in room.

Note. NB: Newborn, NICU: Neonatal Intensive Care Unit, PPE: Personal Protective Equipment.
* Breastfeeding protocols were maintained during the pandemic, where rooming-in was prioritized to promote breastfeeding. Breastfeeding was supported by maternity ward midwives.

Participants

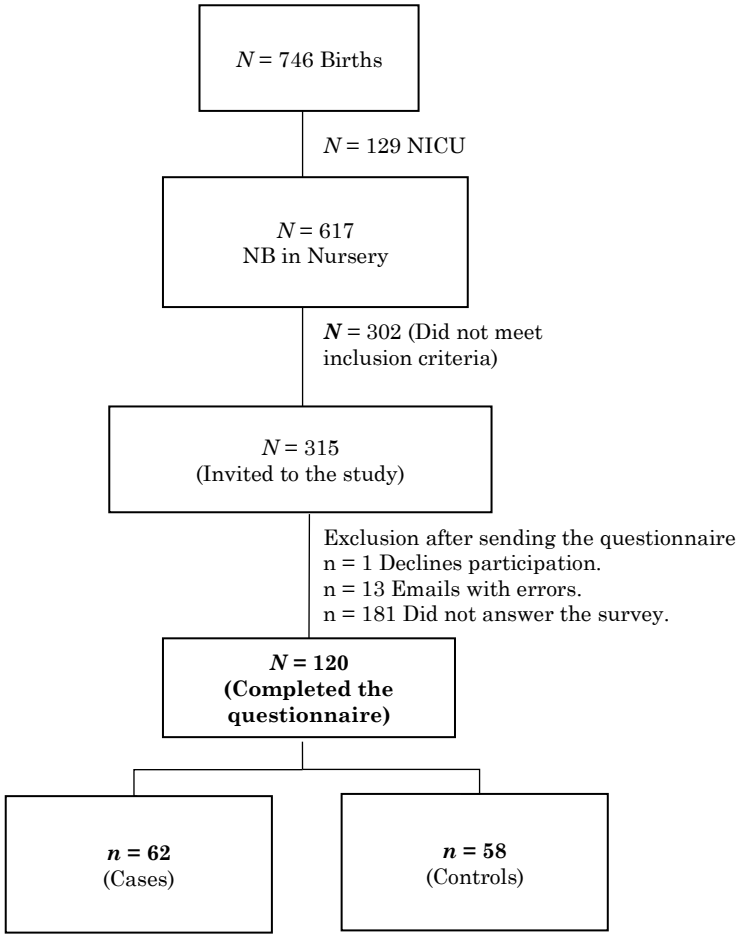
A convenience sample was obtained from patients who gave birth at a private clinic in Santiago, Chile, during the COVID-19 pandemic, from August 2020 to October 2020. During this period, most boroughs were still in complete lockdown. Mothers who gave birth during this time experienced the last months of their pregnancy during the highest peak of the pandemic so far. Twelve weeks before recruitment there was an average of 203.6 new cases per million people (Mathieu et al., 2020). However, during the months the study was conducted the infection rates were decreasing with an average of 87.9 new cases per million people (Mathieu et al., 2020).

Inclusion criteria considered all mothers who spoke fluent Spanish and had access to Internet. Mothers of NB admitted to the Neonatal Intensive Care Unit (NICU) for non-COVID-19 related reasons were excluded, as research shows that having a NB hospitalized can constitute a traumatic event and depression

rates of these parents are higher (Bonacquisti et al., 2020). Likewise, mothers who were underage (< 18-years-old) were excluded from the study.

All mothers who met the inclusion criteria were invited to participate by NICU staff before their discharge. These staff members did not have prior contact with the mothers and were not involved in NB's or mothers' care. The questionnaire was sent to a total of 315 mothers. Of these, 13 emails presented errors and were not delivered to their recipients. Mothers who did not answer the questionnaire within the first week were sent the link one more time. A total of 121 mothers responded and only one explicitly declined to participate in the study, resulting in a total of 120 participants: 62 controls and 58 cases (see Figure 1). Regarding the mothers who did not complete the questionnaire, 115 were controls and 66 were cases. There is no additional information as to why these mothers chose not to participate.

Figure 1
Data Collection Flow Chart



Measures

Self-Report Questionnaire

An online self-report questionnaire was designed on a free platform for the specific purposes of this study. Since the questionnaire did not aim to assess a particular construct, it did not require a validation study. It contained 34 closed Likert-scale questions and 13 open-ended questions (see Table 2 for examples of the items included in the questionnaire). The questionnaire explored mothers' experience of precautionary measures (amount and quality of information received, level of agreement and adherence to measures) and mothers' perception of the impact of these measures on their level of stress and discomfort, as well as positive and negative feelings experienced by mothers and their NB during birth and postpartum. Likewise, they were invited to express their view on how these measures might have impacted on their mother-infant bond. Furthermore, participants were asked to report on their current maternal depressive symptomatology.

Table 2
Examples of Different Types of Items of the Online Questionnaire

Item	Type
The amount of information regarding the precautionary measures I had to follow with my baby was…	Likert-scale: Very insufficient / Insufficient / Enough / Very good / Excellent
In general, what was your level of agreement with these precautionary measures?	Likert-scale: Strongly disagree / Disagree / Neither agree nor disagree / Agree / Strongly agree
How much discomfort did the precautionary measures cause you?	Likert-scale: Very little / Little / A bit / A lot / Very much
In general, how stressful the birth and the first days postpartum was for your newborn?	Likert-scale: Extremely stressful / Very stressful / Stressful / Very little stressful / Not at all stressful
How much was your experience of pregnancy negatively impacted by the COVID-19 pandemic?	Likert-scale: Not at all / Very little / Some / Considerable / Extreme
In what ways was your experience of pregnancy negatively impacted by the COVID-19 pandemic?	Open-ended
What helped you cope with the difficulties you mention above?	Open-ended
What has been the most difficult aspect of having a baby in the COVID-19 pandemic?	Open-ended
What do you think has been the most difficult aspect for your newborn?	Open-ended
Considering your stay at the hospital during birth and postpartum, you felt….	Multiple choice for each feeling: Not at all / Very little / Somewhat / Considerably / Extremely
Safe/Anxious/Guilty/Comfortable	
In general, which feelings do you think your newborn experienced during birth and the first days postpartum (please mark all that apply)	Multiple choice: Calm / Well taken care of / Loved / Accompanied / Peaceful / Alone / Scared / Stressed / Confused / Worried / Irritable

Variables related to the mothers' or NB' feelings were grouped according to positive and negative feelings. Mothers were asked about the intensity of feelings they experienced during birth and postpartum. Specifically, they were asked about six positive feelings (calm, safe, peaceful, comfortable, competent, and enthusiastic) and 10 negative feelings (tense, upset, regretful, anxious, worried, guilty, irritable, sad, mad, and distraught). Positive and negative feelings were considered, as studies have shown that a higher tendency to present negative affect during stressful events may be linked to depression (Wichers et al., 2007), whereas positive affect in the face of stress can be a sign of resilience and a protective factor for depression (Fredrickson, 2001). Specifically, regarding postpartum depression, research has found that positive affect during pregnancy can have a protective role, whereas negative affect during pregnancy have a higher association with postpartum depression (Bos et al., 2013).

Similarly, mothers were also asked to report on the perceived presence or absence of feelings in their babies, specifically, five positive feelings (calm, well taken care of, loved, accompanied, and peaceful) and six negative feelings (alone, scared, stressed, confused, worried, and irritable). Although in a rather narrow range of expression, studies have shown that NB experience different emotions (Lewis, 2008) and several tools have been developed in which infant affect is assessed (Cárcamo et al., 2014; Mesman et al., 2009).

Sociodemographic variables, the psychological impact of the pandemic during their pregnancy, and stress factors associated to the pandemic were also considered to ensure both groups had similar conditions prior to the use of precautionary measures. Eighteen stress factors associated to the COVID-19 pandemic were considered assessing five different categories: sanitary measures (voluntary or mandatory lockdown and difficulties accessing essential products), economic or work-related stress (loss of employment, temporary employment suspension, and decrease of family income), family (loss of childcare, isolation from family and friends, couple breakup, and COVID-related or non-COVID related mourning), change of residence (home, borough, or city), and health (COVID-related or non-COVID related illness, COVID-related or non-COVID related hospitalization and COVID-related or non-COVID related illness of a close relative or family member).

Edinburgh Postnatal Depression Scale (EPDS)

To assess maternal depressive symptomatology, the questionnaire also included the EPDS. This is a 10-item self-report scale used internationally to screen for postpartum depression. EPDS scores range from 0 to 30, where higher scores indicate more symptomatology. The version validated in Chile by Jadresic et al. (1995) was used, which shows a good internal consistency with a Cronbach alpha of 0.77 for the Chilean population, 76.7% sensitivity and 92.5% specificity. It considers a cut-off point of 10 to indicate risk of postnatal depression.

Procedure

This study received the approval of the Andrés Bello University Ethics Committee. Mothers did not receive any monetary retribution for their participation in the study, and their responses did not affect the medical attention provided nor incur additional costs for the family. Written information about the study and its aims was provided. Mothers were asked for their personal email addresses where they received the online questionnaire and a copy of the consent form no more than three days after discharge. Participants were required to declare their consent online to gain access to the questionnaire. All results were anonymized to ensure confidentiality. Mothers completed the questionnaire within the first month, with a mean of 6.61 (SD = 4.68) days after discharge.

Data Analysis

Preliminary tests were run on SPSS 21.0 for each variable to assess their distribution and to determine the use of parametric or nonparametric tests. Student's t-tests were used to compare both groups for variables with normal distributions. Mann-Whitney U test was used as a non-parametric alternative. Spearman rank tests were conducted to assess associations between variables. Categorical data was compared using χ^2. In order to conduct χ^2 tests for variables with five or more categories in Likert scales, some categories were merged according to the researchers' criteria and following the assumed intention of each possible answer. This allowed more fluent reading and interpretation of χ^2 results when there were not enough theoretical cases per cell to do so. Despite this, when there were not enough theoretical cases per cell to conduct a χ^2 test, a Fisher's exact test was used. A significance level of 0.01 was used for all tests.

Qualitative data were analyzed using thematic analysis (Braun & Clarke, 2006). Each group of open-ended questions was coded by different pairs of researchers to ensure triangulation of data.

Results

Sample Description

Socio-Demographic Data

Both groups showed similar socio-demographic conditions (see Table 3). Significant differences were found for type of birth, where 93.5% of controls had a cesarean compared to 50% of cases. Of the total sample, 85.8% of mothers had a physiological pregnancy without morbidity, $\chi^2(1, n = 120) = 0.168$, $p = 0.682$, and 96.7% of mothers had term deliveries, $\chi^2(1, n = 120) = 4.423$, $p = 0.035$, with no significant differences between groups.

Table 3
Sociodemographic Measures

Variable	Cases (n = 58)	Controls (n = 62)	Total (n = 120)	Statistical test
Age	M = 33.93, SD = 4.50	M = 34.66, SD = 4.54	M = 34.31, SD = 4.52	$t(118) = 0.884$, p = 0.378
First child	37 (63.80%)	34 (54.80%)	71 (59.20%)	$\chi^2(1, n = 120) = 0.995$, p = 0.319
Private health insurance	58 (100%)	59 (95.20%)	117 (97.50%)	$\chi^2(1, n = 120) =$, p = 0.245
In a couple relationship	56 (96.55%)	61 (98.38%)	117 (97.50%)	$\chi^2(1, n = 120) =$, p = 0.609
With paid maternity leave	53 (91.40%)	53 (85.50%)	106 (88.30%)	$\chi^2(1, n = 120) = 1.011$, p = 0.315
Twin pregnancy	0	1 (1.60%)	1 (0.80%)	$\chi^2(1, n = 120) = 0.943$, p = 0.331
Gestational age	M = 38.26, SD = 1.22	M = 38.66, SD = 0.92	M = 38.45, SD = 1.10	$U = 1436$, $p = 0.046$
NB weight	M = 3224.31, SD = 435.64	M = 3453.69, SD = 515,29	M = 3336.36, SD = 493.28	$t(118) = 2.624$, p = 0.010*, $d = 0.481$, 99% CI [0.543 , 458.223]
Type of birth	29 (50.00%)	4 (6.50%)	33 (27.50%)	$\chi^2(1, n =120) = 28.504$, $p < 0.001$
Accompanied during labor	56 (96.60%)	62 (100%)	118 (98.30%)	$\chi^2(1, n = 120) =$, p = 0.232

*Although statistically significant, this difference has no clinical relevance.

The Experience of the Pandemic During Pregnancy

In relation to stress factors mothers were exposed to during the pandemic: no differences were found between the groups in the amount of stress factors reported, $U = 1638.5$. $p = 0.394$, nor for each individual factor (see table 4). The stress factors most mentioned were associated with sanitary measures, such as mandatory (81.7%) or voluntary lockdowns (79.2%), and family factors related to these, such as having to isolate from family and friends (80%). It is worth mentioning that 34.2% of the total sample reported a decrease in their family income.

With regard to how mothers perceived the pandemic had impacted their pregnancies, data showed that both groups experienced a similar impact ($\chi^2(2, n = 120) = 5.66$, $p = 0.059$). Of the total sample, 49.17% reported that COVID-19 had impacted negatively on their pregnancy in a considerable or extreme way.

Table 4
Stress factors during pandemic

Variable	Cases (n = 58)	Controls (n = 62)	Total (n = 120)	Statistical test
Mandatory lockdown	48 (82.80%)	50 (80.60%)	98 (81.70%)	$\chi^2(1, n = 120) = 0.089, p = 0.765$
Voluntary lockdown	45 (77.60%)	50 (80.60%)	95 (79.20%)	$\chi^2(1, n = 120) = 0.170, p = 0.680$
Loss of employment	2 (3.40%)	1 (1.60%)	3 (2.50%)	*
Temporary employment suspension	3 (5.20%)	7 (11.30%)	10 (8.30%)	$\chi^2(1, n = 120) = 1.468, p = 0.226$
Change of home	7 (12.10%)	9 (14.50%)	16 (13.30%)	$\chi^2(1, n = 120) = 0.155, p = 0.694$
Change of borough or city	5 (8.60%)	8 (12.90%)	13 (10.80%)	$\chi^2(1, n = 120) = 0.569, p = 0.451$
Non-COVID related hospitalization	42 (72.40%)	48 (77.40%)	90 (75.00%)	$\chi^2(1, n = 120) = 0.400, p = 0.527$
COVID related hospitalization	3 (5.20%)	8 (12.90%)	11 (9.20%)	$\chi^2(1, n = 120) = 2.151, p = 0.142$
Loss of childcare	13 (22.40%)	15 (24.20%)	28 (23.30%)	$\chi^2(1, n = 120) = 0.053, p = 0.818$
Isolation form family and friends	45 (77.60%)	51 (82.30%)	96 (80.00%)	$\chi^2(1, n = 120) = 0.409, p = 0.523$
Couple breakup	1 (1.70%)	1 (1.60%)	2 (1.70%)	*
Difficulties accessing essential products	9 (15.50%)	6 (9.70%)	15 (12.50%)	$\chi^2(1, n = 120) = 0.934, p = 0.334$
Non-COVID related illness of a close relative or family member	4 (6.90%)	4 (6.50%)	8 (6.70%)	$\chi^2(1, n = 120) = 0.010, p = 0.922$
Had COVID	2 (3.40%)	1 (1.60%)	3 (2.50%)	*
COVID related illness of a close relative or family member	8 (13.80%)	9 (14.50%)	17 (14.20%)	$\chi^2(1, n = 120) = 0.013, p = 0.910$
COVID related mourning	3 (5.20%)	2 (3.20%)	3 (2.50%)	$\chi^2(1, n = 120) = 0.284, p = 0.594$
Non-COVID related mourning	6 (10.30%)	5 (8.10%)	11 (9.20%)	$\chi^2(1, n = 120) = 0.187, p = 0.665$
Decrease of family income	18 (31.10%)	23 (37.10%)	41 (34.20%)	$\chi^2(1, n = 120) = 0.490, p = 0.484$

*Statistical tests were not run as there were not enough cases per cell.

Supplementing these data with the qualitative analysis of the open-ended questions, 87 mothers reported that the most difficult thing during pregnancy was not being able to share the experience with their extended family and not having their support network available due to lockdown. Similarly, 10 mothers mentioned that they felt more vulnerable during pregnancy and had to take additional precautions. Mothers also reported feeling scared, anxious, worried, and lonely or reported other similar psychological impacts of the pandemic during their pregnancies:

> To me gestating and raising children are done "in a tribe", and I didn't have my tribe (family, friends, etc.) during this entire period. Nobody saw me with my belly. If it weren't for social media, no one would have known I was pregnant. I have my husband and my other child, but the truth is that I felt very lonely in this pregnancy. (case)

Sanitary norms were mentioned by 19 participants as generating stress during pregnancy due to the difficulties accessing essentials for their babies, having to attend medical check-ups unaccompanied or having to ask for special authorization in order to leave their house:

> It stressed me to have to coordinate medical check-ups and tests on the same day with very limited time because only two authorizations were allowed and for just three hours. (control)

Likewise, 14 mothers reported that the pandemic impacted on planning for the baby's arrival and that they had to change or abandon what they had planned or dreamed:

> Not being able to share with family and friends this beautiful process, having to stop doing activities for my baby, like a photo session or the baby shower, working from home, preventive lockdown, social isolation, and not being able to buy the baby's things, etc. (control)

Despite feeling the absence of their extended family, 76 participants mentioned that what helped them most to deal with these difficulties was the presence of their nuclear family, especially their partner's support. Seventeen mothers also highlighted technology as a tool for communicating with their loved ones:

> Having a good partner at home, in this case my husband, who is very understanding and who supports you and helps you … at the end I wasn't even able to tie my shoelaces … and who has initiative with house chores. The use of technology also allowed me to receive lots of signs of affection. (control)

Implementation of Hospital Precautionary Measures

Regarding mothers' COVID-19 condition, all participants used precautionary measures in a preventive way (see Table 1 above), with just one patient testing positive for COVID-19 while asymptomatic. These measures were lifted after obtaining a negative PCR test result, which, on average, occurred 24 hours after the test was taken. No infants were hospitalized due to COVID-19. Controls followed the pandemic measures detailed above.

No significant differences were found between groups in respect of mothers' perception of the amount of information received about the measures, $\chi^2(1, n = 120) = 0.001$, $p = 0.970$, the quality and clarity of the information, $\chi^2(1, n = 120) = 0.269$, $p = 0.604$, or their level of agreement with the measures, $\chi^2(2, n = 120) = 2.378$, $p = 0.304$. Of the entire sample, 79.17% reported that the amount of information was satisfactory, 80.83% considered the quality and clarity of the information to be satisfactory, and 82.50% mentioned agreeing with the measures implemented by the hospital. Only one mother (1.72%), who belonged to the cases group, thought the measures were not necessary at all.

With reference to the level of adherence to the measures, 49.17% of the entire sample reported having followed the measures with maximum preciseness with no significant differences between groups, $\chi^2(1, n = 120) = 4.063$, $p = 0.044$. Both groups showed similar levels of concern about getting COVID-19 while in hospital, $\chi^2(1, n = 120) = 0.688$, $p = 0.407$, with 50.42% of the total sample being worried, very worried or extremely worried. Likewise, 66.67% of the total sample reported being worried, very worried or extremely worried that their NB could get COVID-19 while in hospital, with no significant differences between groups, $\chi^2(1, n = 120) = 0.818$, $p = 0.366$. Additionally, 55.83% of the total sample reported that COVID-19 might have severe or very severe physical effects on their NB; there were no significant differences between groups, $\chi^2(2, n = 120) = 0.494$, $p = 0.781$.

The Experience of the Hospital Precautionary Measures During Birth and Postpartum

With respect to how mothers perceived the hospital precautionary measures had impacted them during their stay at the hospital (see Table 4), cases reported experiencing more discomfort than controls. Within cases, 31.03% reported the lowest level of discomfort (*very little*) and 6.90% reported the highest (*very much*),

compared to controls, of whom no participant reported *a lot* or *very much* discomfort and 12.90% marked the lowest level. The level of discomfort was associated with adherence to the measures, r_s = -0.261, p = 0.004, where the higher the adherence the less the discomfort. The level of discomfort reported by mothers was not associated with the level of agreement with the hospital precautionary measures, r_s = -0.134, p = 0.144, the mothers' perception of the need for these measures, r_s = -0.116, p = 0.206, their concern of getting COVID-19 themselves, r_s = 0.011, p = 0.907, or their NB getting COVID, r_s = -0.061, p = 0.511.

No significant differences were found between groups regarding how different their birth and postpartum experience was to their expectations, $\chi^2(1, n = 120) = 0.716$, p = 0.397, with 24.17% of the total sample indicating that it was very or radically different to what they have expected. The difference between their experience of birth and postpartum and their prior expectations was not associated with the moment they were informed of the hospital precautionary measures, r_s = 0.081, p = 0.381, that is, before, during, or after giving birth.

As to the feelings mothers experienced during birth and postpartum, as mentioned above, these were grouped into positive and negative feelings. No significant differences were observed between groups in total positive feelings or total negative feelings. When selecting each feeling separately, cases reported feeling significantly more "competent" than controls, $\chi^2(2, n = 120) = 12.236$, p = 0.002. No significant differences were found between groups for any other feeling (see table 5).

Table 5
Mothers' emotions during birth and postpartum

Mothers' feelings	Cases (n = 58)			Controls (n = 62)			χ^2	p
	Not at all	Very little/ little/ some	Consid-erable/ extreme	Not at all	Very little/ little/ some	Consid-erable/ extreme		
Calm	3 (5.20%)	13 (22.40%)	42 (72.40%)	4 (6.50%)	23 (37.10%)	35 (56.50%)	3.427 (2, n = 120)	0.180
Safe	3 (5.20%)	10 (17.20%)	45 (77.60%)	1 (1.60%)	17 (27.40%)	44 (71.00%)	2.696 (2, n = 120)	0.260
Tense	18 (31.00%)	27 (46.60%)	13 (22.40%)	15 (24.20%)	34 (54.80%)	13 (21.00%)	0.944 (2, n = 120)	0.624
Upset	42 (72.40%)	13 (22.40%)	3 (5.20%)	44 (71.00)	15 (24.20%)	3 (4.80%)	0.056 (2, n = 120)	0.972
Regretful	49 (84.50%)	7 (12.10%)	2 (3.40%)	50 (80.60%)	7 (11.30%)	5 (8.10%)	1.164 (2, n = 120)	0.559
Anxious	17 (29.30%)	19 (32.80%)	22 (37.90%)	9 (14.50%)	19 (30.60%)	34 (54.80%)	4.905 (2, n = 120)	0.086

(continúa)

Table 5 (Conclusión)

Mothers' emotions during birth and postpartum

Mothers' feelings	Cases (n = 58)			Controls (n = 62)			χ^2	p
	Not at all	Very little/ little/ some	Consid-erable/ extreme	Not at all	Very little/ little/ some	Consid-erable/ extreme		
Comfortable	4 (6.90%)	15 (25.90%)	39 (67.20%)	0 (0.00%)	23 (37.10%)	39 (62.90%)	5.557 (2, n = 120)	0.062
Competent	2 (3.45%)	36 (62.07%)	20 (34.48%)	11 (17.70%)	39 (62.90%)	12 (19.40%)	5.557 (2, n = 120)	0.002
Worried	10 (17.20%)	29 (50.00%)	19 (32.80%)	9 (14.50%)	32 (51.60%)	21 (33.90%)	12.23 6 (2, n = 120)	0.920
Guilty	49 (84.50%)	5 (8.60%)	4 (6.90%)	49 (79.00%)	7 (11.30%)	6 (9.70%)	0.601 (2, n = 120)	0.741
Irritable	41 (70.70%)	13 (22.40%)	4 (6.90%)	44 (71.00%)	13 (21.00%)	5 (8.10%)	0.084 (2, n = 120)	0.959
Sad	29 (50.00%)	19 (32.80%)	10 (17.20%)	37 (59.70%)	18 (29.00%)	7 (11.30%)	1.394 (2, n = 120)	0.498
Angsty	29 (50.00%)	22 (37.90%)	7 (12.10%)	34 (54.80%)	17 (27.40%)	11 (17.70%)	1.795 (2, n = 120)	0.408
Mad	48 (82.8%)	8 (13.80%)	2 (3.40%)	51 (82.30%)	9 (14.50%)	2 (3.20%)	0.016 (2, n = 120)	0.992
Enthusiastic	6 (10.30%)	9 (15.50%)	43 (74.10%)	3 (4.80%)	13 (21.00%)	46 (74.20%)	1.697 (2, n = 120)	0.428
Peaceful	3 (5.20%)	17 (29.30%)	38 (65.50%)	8 (12.90%)	23 (37.10%)	31 (50.00%)	3.754 (2, n = 120)	0.153

An association was found between mothers' positive feelings and their concern that their NB might get COVID-19 while in hospital, r_s = -0.236, p = 0.009): where mothers reported more positive feelings, they reported less concerns that their NB would get COVID-19. Mothers' positive feelings were not associated with concern about getting COVID-19 themselves, r_s = -0.177, p = 0.055, their agreement with the hospital precautionary measures, r_s = -0.059, p = 0.523, their perception of the need for these measures, r_s = -0.154, p = 0.093, or their prior expectations of their birth and postpartum experiences, r_s = -0.189, p = 0.038.

No significant differences were observed between groups in depressive symptomatology or in the amount of mothers above the cut-off score, that is, being in risk of postpartum depression, with a mean of 9.78 and a standard deviation of 5.43: 62 mothers of the total sample (51.67%) were at risk of developing postpartum depression.

Table 6
Mothers' Perception of the Psychological Impact of Hospital Precautionary Measures During Birth and Postpartum

Variable	Cases (n = 58)	Controls (n = 62)	Statistical test
Discomfort	30 (51.72%)	16 (25.81%)	$\chi^2(1, n = 120) = 8.515$, $p = 0.004$
Positive feelings (max. 30 points)	M = 19.24, SD = 5.47	M = 17.29, SD = 5.47	$t(118) = -2.016$, $p = 0.046$
Negative feelings (max. 50 points)	M = 16.36, SD = 5.16	M = 16.98, SD = 5.40	U = 1668.5, $p = 0.495$
Postpartum depressive symptoms	M = 10.20, SD = 5.30	M = 9.40, SD = 5.60	$t(118) = -0.893$, $p = 0.374$
Risk of postpartum depression	33 (56.89%)	29 (46.77%)	$\chi^2(1, n = 120) = 1.230$, $p = 0.267$

With regard to the general impact of the pandemic on patients' experience of birth and postpartum, no significant differences were observed between groups, $\chi^2(1, n = 120) = 1.230$, p = 0.267. Of the total sample, 28.33% reported considerable or extremely negative impact during birth and postpartum.

Complementing these results with the information obtained from the open-ended questions, 58 mothers reported less contact with extended family as something that negatively impacted on their experience. In contrast, 21 mothers reported there were no negative impacts or that not being able to receive visitors during their hospital stay was something positive, because it allowed them to have some intimate time with their family and partner:

> It wasn't affected, because I was accompanied at all times by my husband, and postpartum was much more intimate for the three of us with no visitors. (case)

The hospital precautionary measures were reported as causing discomfort during birth and postpartum by both groups, although this was reported more frequently by cases (31.03%) than controls (14.52%). Cases reported that they received less help from health professionals or sometimes were attended "from the door", due to physical distance restrictions and the use of PPE.

> Having to give birth with a mask was very uncomfortable. In these processes, where one is in more need of containment from the medical team, for reasons that are understandable, the medical team had to keep their distance in general and demanded that the sanitary protocol was followed. Although one understands it, it is inevitable to feel isolated or discriminated, because they treat you as if you are 100% contagious. (case)

Regarding the mother-infant bond, there were no statistically significant differences between groups for negative or positive impact. Most mothers (70%) stated that COVID-19 had not had a negative impact (see Table 5). Moreover, 45% reported a considerable or extreme positive impact. Nonetheless, 46.67% of the total sample reported being considerably or extremely worried that COVID-19 and the pandemic context might have a negative impact on their NB.

Table 7
Mothers' Perception of COVID-19 Impact on Birth and Postpartum and Mother-Infant Bond

Perception of impact	Cases (n = 58)			Controls (n = 62)			χ^2	p
	Not at all	Very little/ little/ some	Considerable/ extreme	Not at all	Very little/ little/ some	Considerable/ extreme		
Negative impact of COVID-19 on mother-infant bond	36 (62.07%)	18 (31.03%)	4 (6.90%)	48 (77.42%)	11 (17.74%)	3 (4.84%)	3.417 (2, n = 120)	0.181
Positive impact of COVID-19 on mother-infant bond	14 (24.14%)	16 (27.59%)	28 (48.28%)	18 (29.03%)	18 (29.03%)	26 (41.94%)	0.559 (2, n = 120)	0.756
Worries about COVID-19 and the context of the pandemic having a negative impact on NB	4 (6.90%)	26 (44.83%)	28 (48.28%)	5 (8.06%)	29 (46.77%)	28 (45.16%)	0.142 (2, n = 120)	0.932

As to the qualitative items which explored the impact on the mother-infant bond, 94 mothers clarified that COVID-19 had no negative impact and 52 participants stated the pandemic was not a difficult context for their NB, elaborating further that their baby would not be aware of what was happening. Moreover, 86 mothers mentioned that the pandemic allowed them to have a quiet and intimate time with their baby and nuclear family, promoting their bond:

> Being alone, just the three of us in the room, without any visitors, and now in our home, strengthens our bond as parents and couple as we can be relaxed, with our own times and without any pressures or having to receive guests. (control)

The fear of the baby getting COVID-19 was mentioned as a difficulty by 49 mothers. Further, 30 mothers spoke about a fear of not being able to socialize with the extended family. Nine participants reported that the stress they were experiencing could be passed on to their infants and impact them negatively:

> To have a stressed mom who is worried about herself and about him. Children feel these things. They can identify when one is not well. It happens with my oldest son. He looks at me as though trying to figure out what's going on with me, and I try to speak to him cheerfully, but sometimes postpartum gets the best of you and, well, then I try to explain to him what's happening to me. (case)

Mothers also referenced hospital precautionary measures, especially the use of masks, as interfering with their contact with their infants:

> It was very hard for me to give birth with a mask. And when my baby was born, I couldn't see him well because of the position … and the mask wouldn't let me. And I couldn't even kiss him when he was born because of the mask … and then because they told me I couldn't take my mask off when I was with him until I had my PCR test come out negative. I think I gave my son his first kiss 24 hours after birth. (case)

About mothers' perception of the psychological impact of hospital precautionary measures on their NBs, no significant differences were found between groups in mothers' perceived level of discomfort in their NBs caused by the measures or in perceived level of stress during birth and postpartum (see Table 6). Of the total sample, 88.33% reported perceiving that the hospital precautionary measures did not cause any discomfort to their NB and 31.67%, perceiving that their NB did not suffer any stress. Mothers who did report that their NB was stressed most frequently marked the lowest level of stress, with 46.67% of the total sample stating a *very little* stressful experience for their NB.

Table 8
Mothers' Perception of the Psychological Impact of Hospital Precautionary Measures on Newborns

Perception of impact	Cases (n = 58)	Controls (n = 62)	Statistical test
Discomfort	8 (13.79%)	6 (9.68%)	$\chi^2(1, n = 120) = 0.493$, $p = 0.483$
Stress	43 (74.14%)	39 (62.90%)	$\chi^2(1, n = 120) = 1.748$, $p = 0.186$
Positive feelings	$M = 2.97$, $SD = 1.5$	$M = 2.94$, $SD = 1.53$	$U = 1808$, $p = 0.957$
Negative feelings	$M = 0.5$, $SD = 0.92$	$M = 0.58$, $SD = 0.82$	$U = 1635.5$, $p = 0.307$

Finally, no significant differences were found between groups in NB positive or negative feelings, as reported by their mothers. The most frequently reported feelings were "well taken care of" (74.17%), "loved" (67.50%) and "accompanied" (65%).

Discussion

The present study aimed at describing mothers' experience of the use of additional hospital precautionary measures during birth and postpartum and how they perceived they impacted on themselves, their NB and the mother-infant bond. The main results show that mothers with additional hospital precautionary measures (cases) reported feeling more discomfort during birth and postpartum than the control group; however, they also felt more competent as mothers. No significant differences were found in any other of the variables assessing psychological impact.

Almost half of the mothers who completed the survey mentioned a considerable to extreme negative impact of the pandemic during pregnancy. Lockdowns and sanitary restrictions made mothers feel lonely. They were not able to share their pregnancy with their family and friends and lived with a fear of contagion, taking maximum precautions as they considered themselves as being more vulnerable due to higher exposure when attending frequent medical appointments. On many occasions this led to extended voluntary lockdowns. Research has shown that lockdowns can generate stress and loneliness, and they have been associated to an increase in anxiety and fear of death (Droit-Volet et al., 2020). Mothers in the present study also reported experiencing less support from family and friends due to social isolation, though they highlighted how technology was a helpful tool to keep in contact. Some researchers have stated that mothers perceive their social media friends as a real source of social support, from which they also obtain information about pregnancy and maternity (Baker & Yang, 2018). Quality of social support during pregnancy is relevant as low levels of social support have been associated to postpartum depression (Senturk Cankorur et al., 2015) and low birth weight of NB (Feldman et al., 2000). Furthermore, as a consequence of the sanitary measures implemented by governments, there have been more impediments in accessing timely diagnosis and treatments (Davenport et al., 2020). As pregnancy is a period of high psychological vulnerability (Symes, 2017), it is important to consider the psychological impact of the pandemic in this population.

Moreover, the above-mentioned factors also interfered with the mothers' ability to prepare for the birth of their children. They could not share this experience with their loved ones, engage in specific pregnancy rituals, like baby showers, or attend workshops that would prepare them for labor and put them in contact with other mothers. They also reported having more difficulties buying essential items for their babies, doing exercise, or engaging in other activities they dreamed of doing during this period. Rituals are an important part of transition processes and, during maternity, they promote a sense of community with other mothers and an opportunity to share a new identity (Nelson, 2009). Likewise, previous studies have stated that being able to buy items for their babies or receive gifts at baby showers is an important step in pregnancy, as it helps mothers feel more prepared to welcome their baby, gives them a sense of control during this transition, and helps them manage their anxiety (Afflerback et al., 2014).

Mothers in this study reported not being able to engage in these activities, which possibly made them feel unprepared and more anxious in a context that has already been filled with uncertainties regarding the pandemic.

Additionally, it is noteworthy that, in general, mothers had to attend check-ups and ultrasounds unaccompanied, and fathers were not part of this process. Studies have shown that fathers' active participation in their partners' pregnancy can positively impact on the physical and mental health of fathers, mothers, and NBs (Plantin et al., 2011). More research is required in this area to assess the impact of pandemic sanitary measures on fathers' participation and its impact on the mental health of expectant mothers.

Regarding birth and postpartum, although most mothers reported agreeing with the hospital precautionary measures, these were described as a source of discomfort during birth, which interfered with mothers' contact with their NB. However, mothers reported that measures had not impacted negatively on their mother-infant bond or on the infant, because they believed the infant would not be aware enough. It is possible that the high levels of stress that both groups reported experiencing during the pandemic interfered with their maternal reflective functioning. Previous studies have reported interference with maternal reflective functioning in high-stress contexts (Schechter et al., 2005). Reflective functioning is the ability to interpret behavior as an expression of internal mental states, that is, feelings, thoughts, desires, and beliefs, among others (Fonagy et al., 2002), and it has been shown to have an important role in the transmission of secure attachment (Katznelson, 2014). The stress mothers experienced might have hindered their ability to think of their NB as having a mind of their own that can perceive the world around them, making it difficult for them to believe that their NBs felt the impact of the pandemic.

It is noteworthy that mothers in this study not only reported high levels of stress associated to the pandemic, but also stated feeling fear of them or their NB getting the virus. This is in line with recent studies that have underscored fear as a predominant feeling in expectant women during the COVID-19 pandemic (Romero et al., 2020). Fear can sometimes result in the use of defense mechanisms, such as dissociation, to protect against anxiety. This might have led to some incongruent behaviors observed in the present study, such as mothers not following hospital precautionary measures, despite being worried about their NB's health.

As for the perceived psychological impact of hospital precautionary measures during COVID-19, some cases mentioned receiving less help from medical staff or "from the door" check-ups during their stay at the hospital. It is possible that these patients had less interruptions from medical professionals during their stay to avoid using PPE which can cause work fatigue and a heavier workload (Houghton et al., 2020) or because of fear of contracting the virus themselves, a fear which has been reported to have intensified in medical staff during the COVID-19 pandemic (Cawcutt et al., 2020). Unknowingly, this situation might have facilitated a space of greater intimacy for mothers and their NB and partners. It is possible that due to these fewer interruptions and NB not spending periods of time in nursery, mothers experienced a higher sense of competency as they had to care for their NB all day. This may have promoted more mother-baby interactions from the start and possibly enhanced mothers' sense of satisfaction and personal pride (Botha et al., 2020). This issue raises awareness of the importance of providing an intimate space for new families to get to know each other during the first days postpartum. Hospitals should review their procedures to allow families enough privacy and reduce unnecessary interruptions.

Additionally, when assessing maternal depressive symptomatology, no significant differences were found between groups. However, it is worth mentioning that the overall sample showed high levels of symptomatology, with more than half at risk of postpartum depression. On average, one in three women show depressive symptomatology during postpartum in Chile, with 10% of puerperae meeting diagnostic criteria for clinical postpartum depression (Jadresic et al., 2007). These rates demonstrate the impact the pandemic has had on this specific population, which is in line with studies that have shown that women during the perinatal period are at a higher risk of developing a mental health illness during the pandemic (Almeida et al., 2020). Other studies have reported contradictory results, showing lower rates of postpartum depression during the pandemic (Pariente et al., 2020). However, the authors suggest considering these results with caution as they may respond to the specific context of where the study was carried out, regarding the country's sanitary measures, restrictions, spread of the disease in the area, among other reasons (Pariente et al., 2020). Other studies have shown an increase of postnatal distress, which the authors associate to symptoms already present during pregnancy and related to the generalized anxiety and tension caused by the COVID-19 pandemic (Ostacoli et al., 2020).

Nonetheless, depressive symptomatology during the pandemic might also be related to mothers' pre-existing psychopathology (Ravaldi et al., 2020), something which was not assessed in this study.

Concerning how mothers perceived the hospital precautionary measures had impacted their NB, mothers generally reported a positive impact. They stated that not having visitors facilitated a quiet space where they got to know their baby more intimately, enhancing their bond. It is worth noting that recent studies have associated the lack of visitors during the COVID19 pandemic to a quiet environment in the maternity ward which, in turn, has been described as a protective factor for reducing postnatal stress symptoms (Ostacoli et al., 2020). Furthermore, considering that the additional precautionary measures were lifted approximately 24 hours after birth, the implementation period was quite short and during a time during which NB are mostly sleeping (De Beritto, 2020). Therefore, the possible interference these measures could have caused might have been very mild. More studies are required to assess the impact on NB and mother-infant bonding when these measures are followed for longer periods of time and observational measures independent of mothers' report are used.

This study highlights relevant aspects of mothers' experience of their perinatal period during the COVID-19 pandemic and the perceived effects of the precautionary measures taken by maternity and neonatology services to protect mothers, NB and medical staff. However, there were no COVID-19(+) symptomatic patients at the time of assessment who would have been required to follow stricter measures for longer periods of time, which would have been more representative of the experience of mothers who gave birth during the highest levels of the virus. Additionally, most participants had private health insurance, so the results may not be representative of the general population. Further, information was only gathered through an online survey and previous studies have shown a lower quality of response when using these platforms (Schneider et al., 2018). Additionally, there is no information regarding the experience of patients who did not complete the survey. Therefore, these results must be considered with caution.

It is also important to take into account that all aspects related to NB were collected through their mothers' report and were not assessed directly. Specifically, regarding NB's feelings, the present study did not consider a trained observer for the assessment of infant affect as the mothers were asked to report on these aspects. Therefore, mothers' own emotional state or desires might have tainted their perception of their NB's emotions.

Risk factors prior to the pandemic, such as mental health background, trauma, and marital satisfaction were not collected and may have further explained the results obtained. Moreover, analyzing feelings in a dichotomy of positive and negative can be limiting. Although some studies state that experiencing positive emotions after a crisis may protect from developing depressive symptomatology in the future (Fredrickson et al., 2003), in some occasions, higher levels of positive feelings may also be due to dissociation as a coping mechanism, something that was not assessed in this study. Similarly, normative responses during a crisis like the COVID-19 pandemic, such as feeling afraid (Romero et al., 2020), are not taken into account. However, it is worth noting that even though these can be expected reactions, its presence during the perinatal period for an extended amount of time can negatively impact child development and the mother-infant bond (Monk et al., 2012; Olza, 2017).

In conclusion, although the additional precautionary measures were experienced by mothers as more discomforting, the high rates of depressive symptomatology in both groups are a cause for concern and may be associated to the stressful context of the COVID-19 pandemic. An unexpected positive outcome was the positive impact on their mother-infant bond due, in general, to the visit restrictions. Hospitals should learn from the experiences of mothers during the pandemic and critically evaluate their regular procedures to ensure quiet and intimate spaces during mothers' hospital stay to promote their mother-infant bond and their sense of competency.

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