Perinatal emotional states: a comparative study between two cohorts recruited in a Mediterranean environment

Núria Voltas[13], Victoria Arija[23], Carmen Hernández-Martínez[13], Luigi Nappi[4], Giuseppe Cibelli[5], Josep Basora[6], Josefa Canals[13]

[1]*Research Center for Behavioral Assessment (CRAMC), Department of Psychology, Universitat Rovira i Virgili, Tarragona, Spain*
[2]*Nutrition and Public Health Unit, Universitat Rovira i Virgili, Reus, Spain*
[3]*Nutrition and Mental Health Research Group (NUTRISAM), Universitat Rovira i Virgili, Spain*
[4]*Department of Medical and Surgical Sciences, Institute of Obstetrics and Gynecology, University of Foggia, Foggia, Italy*
[5] *Department of Clinical and Experimental Medicine, University of Foggia, Foggia, Italy*
[6] *Unitat de Suport a la Recerca Tarragona-Reus, Institut d'Investigació en Atenció Primària Jordi Gol, Tarragona, Spain*

Corresponding author: J. Canals

Email address: josefa.canals@urv.cat
Postal address: Research Center for Behavioral Assessment (CRAMC), Department of Psychology, Universitat Rovira i Virgili, Crta/ de Valls s/n 43007 Tarragona, Spain
Telephone number: (+34) 977 - 25 78 97
Fax number: (+34) 977 - 55 80 88
ORCID: orcid.org/0000-0002-6209-9558

N. Voltas

Email address: nuria.voltas@urv.cat
Telephone number: (+34) 977 - 25 80 88
Postal address: Research Center for Behavioral Assessment (CRAMC), Department of Psychology, Universitat Rovira i Virgili, Crta/ de Valls s/n 43007 Tarragona, Spain
Fax number: (+34) 977 - 55 80 88
ORCID: orcid.org/0000-0001-8855-0282

V. Arija

Email address: victoria.arija@urv.cat
Telephone number: (+34) 977 - 25 9334
Postal address: Nutrition and Public Health Unit, Universitat Rovira i Virgili, C/ Sant Llorenç, 21, 43201 Reus, Spain
Fax number: (+34) 977 – 75 93 34
ORCID: orcid.org/0000-0002-1758-0975

C. Hernández-Martínez

Email address: carmen.hernandez@urv.cat
Telephone number: (+34) 977 - 25 8175
Postal address: Research Center for Behavioral Assessment (CRAMC), Department of Psychology, Universitat Rovira i Virgili, Crta/ de Valls s/n 43007 Tarragona, Spain
Fax number: (+34) 977 - 55 80 88
ORCID: orcid.org/0000-0001-6328-8679

L. Nappi

Email address: luigi.nappi@unifg.it
Postal address: Viale L. Pinto, 71100 Foggia, Italy
Telephone number: (+39) 00881732350

G. Cibelli

Email address: giuseppe.cibelli@unifg.it
Postal address: Via Napoli, 20, 71100 Foggia, Italy
Telephone number: (+39) 0881588094

J. Basora

Email address: jbasora.tarte.ics@gencat.cat
Postal address: Centre d'Atenció Primària (CAP) Sant Pere, Camí de Riudoms, 53-55, 43202, Reus, Spain
Telephone number: (+34) 977 77 85 11

Abstract

Experiencing negative emotional states during pregnancy has been linked to adverse outcomes for mother and offspring. Our study aims were to compare the perinatal emotional states and obstetrical variables between pregnant women recruited in Spain (n=202) and Italy (n=103), and to investigate prenatal anxiety related factors. The study had two phases. In the 1st phase (3rd trimester of pregnancy), prenatal anxiety was assessed using the State-Trait Anxiety Inventory (STAI); other prenatal and sociodemographic variables were also collected. In the 2nd phase (40 days postpartum), the STAI and the Edinburgh Postnatal Depression Scale were administered. Compared to the Spanish sample, the Italian sample presented higher STAI state and STAI factor 1 mean scores (22.5 vs. 18.6 and 10.0 vs. 7.2), shorter gestations (mean gestation weeks: 39.1 vs. 39.8), more unplanned pregnancies (31.1% vs. 16.4%), and more cesareans deliveries (42.5% vs. 16.0%). Low socioeconomic levels, younger ages, previous miscarriages and unplanned pregnancies were related to prenatal anxiety. Postpartum depression rates were 31.3% and there were no differences between countries. Our results suggested that it may be interesting in both countries to create a prenatal monitoring protocol that attaches more importance to emotional wellbeing both during pregnancy and in the long term.

Keywords Italy, Spain, perinatal emotional states, prenatal anxiety, postnatal depression, risk factors

Introduction

Pregnancy is a period characterized by progressive physiological and psychological changes. It is therefore regarded as a stressful life event for women because adapting to these changes can cause considerable emotional distress (Bhat et al. 2015; Çalıkoğlu et al. 2018; Hodgkinson et al. 2014). Many of the physiological changes that take place are universal and widely known, and may generate emotional effects that affect not only the pregnant women but also the people around them. Childbearing women are also known to be at considerable risk of developing mood disorders (Rodríguez-Muñoz et al. 2017).

Previous research has studied the biopsychosocial and sociocultural factors that can influence physical and mental maternal health during pregnancy and which may therefore affect the course of pregnancy, the development of the fetus, and even the neurodevelopment and health of the infant. Because of the influence they can exert on several postnatal outcomes, the emotional states of pregnant women (maternal positive and/or negative states) have been the object of considerable study (Martini et al. 2015; Voellmin et al. 2013). First of all, it should be pointed out that positive and negative emotional states are independent constructs and that the vast majority of the literature focuses more on the effects of the negative states (De Cates et al. 2015). The positive effect during pregnancy, on the other hand, has received little attention, though several studies have concluded that it is related to the length of the pregnancy (a lower risk of preterm birth), a normal delivery, appropriate weight at birth, the child's cognitive, language, and parentally rated competences (Hernández-Martínez et al. 2011; Lobel et al. 2000; Phua et al. 2017; Voellmin et al. 2013). On the other hand, emotional distress, including anxiety and depression, which mainly involve a negative affective reaction to the experience of pregnancy and the moment of birth, has been widely studied (Alderdice and Lynn 2011; Koletzko et al. 2015; Rees, Channon, and Waters, 2019). It is important to be aware that the presence of anxiety and depression, and even subclinical symptoms, can

significantly reduce a women's wellbeing during pregnancy. Symptoms of anxiety and depression during pregnancy have several implications for a woman's health, such as an increase in the sensation of nausea and vomiting, a high risk of preeclampsia, lower prenatal care, and a trend towards greater substance use (Andersson et al. 2003; Hu et al. 2015). In this regard, untreated affective problems during pregnancy may lead to adverse outcomes for the health of pregnant women and their children and can become a risk factor for a preterm birth, low birth weight for gestational age, or an unplanned cesarean delivery (Ding et al. 2014; Liou, Wang, and Cheng 2016; Lobel and Dunkel-Schetter, 2016; Smorti, Ponti, and Tani 2019).

Few studies have been made of the factors that contribute to the presence of emotional problems during pregnancy and postpartum, and their findings are inconsistent (Furtado et al. 2018). Previous studies have observed that maternal age, previous parity, unplanned pregnancies, lower educational levels or income statuses, and psychological aspects such as a history of affective disorders or low self-esteem are associated with the presence of anxiety and depression during pregnancy (Bayrampour et al. 2012; Bayrampour, McDonald, and Tough 2015; Biaggi et al. 2016; Lederman and Weis 2009; Martini et al. 2015; Sharapova, and Goguikian-Ratcliff 2018; Tearne et al. 2016). In this regard, symptoms of depression and anxiety have been found to be significantly prevalent during pregnancy. Previous studies have reported prevalence of prenatal depression symptoms to be between 7 and 25%, and up to 54% of these women still presenting these symptoms after delivery (Underwood et al. 2016). Specifically, a Spanish sample of 569 pregnant women showed that the prevalence of antenatal depression symptoms, assessed using the Edinburgh Postnatal Depression Scale (EPDS), was 23.4% during pregnancy in general, and 31.8%, 17.2%, and 21.4%, respectively, for each trimester (Vázquez and Míguez, 2019). Corbani et al. (2017) showed that among Italian women the prevalence of antenatal depressive symptoms was 12.4%, while Molgora et

al. (2018), also in a sample of Italian women, showed that the prevalence was 8.5% in the 3rd trimester (between the 34th and the 36th week of pregnancy). Both Italian studies also used the EPDS. Interestingly, there are methodological differences between the studies, mainly in the use of different EPDS cut-off points and the measurement of antenatal depression, which was carried out at different times of pregnancy. With regard to postnatal depression symptoms, Giardinelli et al. (2012) found that 13.2% of the participants in an Italian sample of women showed these symptoms three months after delivery, while a study conducted with 99 Spanish women indicated that the rate of postpartum depression (measured 6-8 weeks postpartum) was 22.2% (Míguez et al. 2017). With regard to anxiety symptoms, in a systematic review, Dennis, Falah-Hassani, and Shir (2017) found that the self-reported prevalence of anxiety symptoms increased during pregnancy from 18.2% in the 1st trimester to 24.6% in the 3rd. In Italy, Giardinelli et al. (2012) found that during pregnancy 20.5% of assessed women scored positive for anxiety symptoms. More than a decade ago, in a study conducted with Spanish women who wanted to become pregnant, the authors assessed anxiety symptoms prospectively and found that the scores decreased during pregnancy from the moment of preconception and increased in the immediate postpartum (Canals, Esparó, and Fernández-Ballart 2002). In a recent study, Soto-Balbuena et al. (2018) found that the prevalence of anxiety in a sample of pregnant Spanish women was 19.5% in the 1st trimester, 16.8% in the 2nd trimester, and 17.2% in the third, which shows a decrease in levels of anxiety from the 1st to the 3rd trimester.

Although there is a growing body of research on negative emotional states during pregnancy, very few studies have followed up samples of women from pregnancy to the postnatal period with the aim of exploring the changes in their emotional states. Neither are there many studies comparing results between countries (Underwood et al. 2016). In fact, there is a lack of multicenter studies conducted in several countries at the same time using the same

methodology to enable data from several geographic areas to be compared. The main aim of this study, therefore, is to compare data from a sample of women recruited in Spain with data from another sample recruited in Italy. Obstetrical data, positive and negative emotional states, the prevalence of anxiety symptoms in two periods (3rd trimester of pregnancy and 40 days postpartum), and postnatal depressive symptoms were assessed and compared. We also aim to identify factors associated with the presence of prenatal anxiety and how prenatal emotional states can be related to birth outcomes. Since both samples are from Mediterranean environments and public health systems, we hypothesized that prenatal and postnatal anxiety levels, the prevalence of postnatal depression symptoms and the obstetrical data would be similar. We also hypothesized that both samples would show similar predictors of prenatal anxiety. On the basis of the findings of other studies, we expected to find that previous miscarriages and unplanned pregnancies may be strongly related to the presence of prenatal anxiety in both samples.

Materials and Methods

Study design and participants

For the present study, the sample in Spain was collected from the project ECLIPSES, the aim of which was to determine the level of iron supplementation, adapted to the hemoglobin levels of women in early pregnancy, that is best for mother-child health (Arija et al. 2014). Approval was obtained from the Clinical Research Ethics Committee of the Jordi Gol Research Institute in Primary Care [Instituto de Investigación en Atención Primaria; IDIAP], and the project was designed in accordance with the requirements of the Declarations of Helsinki and the Tokyo update. The main inclusion criteria were as follows: adult females older than 18 years of age who were capable of understanding the official State languages (Castilian or Catalan in Spain and Italian in Italy) as well as the study characteristics and

informed consent form. The main exclusion criteria were as follows: multiple pregnancy, chronic illness, or risky pregnancies (suspected fetal malformation, morbid obesity, preeclampsia, etc.). The Spanish sample consisted of n = 202 pregnant women recruited in 10 Primary Care Centers (PCC) of the Tarragona Sexual and Reproductive Healthcare Service [Centres d'Atenció a la Salut Sexual i Reproductiva (ASSIR)] of the Catalan Institute of Health [Institut Català de la Salut (ICS)]. The Italian sample consisted of n = 103 pregnant women recruited from hospital care prenatal visits carried out in the Gynecology and Obstetrics Department of the Ospedali Riuniti in the city of Foggia (primary care center). The researchers informed the pregnant women about the nature and purpose of the study and gave them the informed consent form. They also explained that the information they provided would remain confidential and be used only for research purposes. If they agreed to participate and sign the informed consent form, the researchers (psychologist, midwives and gynecologists) explained how to fill out the questionnaires and responded to the participants' queries about the two phases of the study. In the 1st phase, which was conducted during the 3rd trimester of pregnancy, prenatal anxiety was assessed and other prenatal and sociodemographic data were collected. In the 2nd phase, conducted 40 days postpartum, postnatal anxiety and depression symptoms were assessed. Other variables, such as type of delivery, birth weight and gestational age, were also collected in this phase. In both samples, data collection was carried out in the 1st phase mainly by midwives or gynecologists while in the 2nd phase it was carried out mainly by psychologists. All professionals participating in the study received prior training and were knowledgeable about the study protocol. The participants' informed consent allowed the researchers to take data from the women's medical records as well as from their visits. For the Spanish sample, visits in the 1st and 2nd phases were conducted at the ASSIR centers. For the Italian sample, visits in the 1st phase were conducted at the Gynecology and Obstetrics Department of the Ospedali Riuniti, while those

in the 2nd phase were conducted at the *Department of Clinical and Experimental Medicine of the University of Foggia. The hospital and the university are very close to each other on the same campus.*

The same tests were carried out and the same information was collected at both health centers. The researcher N.V. participated in the field work in both countries. This ensured that the same methodology was used to record the variables.

Instruments

State-Trait Anxiety Inventory (STAI) (Buela-Casal, Guillén-Riquelme, and Seisdedos 2011; Pedrabissi and Santinello, 1989; Spielberger, Gorsuch, and Lushene 1988) is a self-report questionnaire consisting of 40 items. These items are rated on a four-point Likert scale designed to measure maternal levels of Trait Anxiety (20 items; dispositional and stable anxiety) and State Anxiety (20 items; situational and transient anxiety). For this study the four factors described by the authors of the questionnaire were also used: STAI factor 1 (state of nervousness, tension, anxiety, and restlessness) and STAI factor 2 (positive state of mind, animation, welfare, satisfaction and self-confidence), both of which are calculated with the State Anxiety scale items; STAI factor 3 (stable trait of melancholy, despair and feelings of inability); and STAI factor 4 (emotional stability and absence of mood changes), calculated with the Trait Anxiety scale items. Thus, in the prenatal stage the negative emotional states can include the State Anxiety total score and the STAI factor 1 and factor 3 scores, and the positive emotional states can include the STAI factor 2 and factor 4 scores. The STAI was administered to the mother during the 3rd trimester, and then 40 days postpartum.

The *Edinburgh Postnatal Depression Scale* (EPDS) (Benvenuti et al. 1999; Cox, Holden, and Sagovsky 1987; García-Esteve et al. 2003) is a widely used 10-item self-report scale for identifying depressive disorders in the perinatal period. Each item is scored on a frequency

scale ranging from 0 to 3, and the total score is obtained by summing all the item responses. A cut-off score of 10 was used to identify symptoms of depression. This cut-off point has demonstrated good psychometric properties in both Italy (Carpiniello et al. 1997) and Spain (Garcia-Esteve et al. 2003). These symptoms were placed in the category of postpartum negative emotional states because the questionnaire was administered to the mother 40 days postpartum.

Sociodemographic, obstetric, and neonatal variables were obtained from a general data questionnaire and the women's medical records. The following information was collected: parity (nulliparous or multiparous), whether there had been a previous miscarriage (yes or no), whether the pregnancy was planned (planned or not planned), the parents' occupations and educational levels, the mothers' age at delivery, the gestational age at delivery, the infants' birth weight and gender, and the type of delivery (eutocic, instrumental, and cesarean). Socioeconomic status (SES) was established by the Hollingshead Index (2011) considering the occupations and educational levels of the mother and the father. To categorize occupation we used the document *Classificació Catalana d'Ocupacions* (CCO-2011) for the sample recruited in Spain and the document *Le Classificazione Delle Professioni* (2013) for the sample recruited in Italy.

Data analyses

Statistical analyses were performed using the statistical software package IBM SPSS Statistics Version 25.0. Descriptive statistics of the sociodemographic, prenatal, birth, and postnatal variables were analyzed. We used the χ^2 test and Student's t-test depending on the types of variables compared between the samples recruited in Spain and Italy.

Student's t-tests were also applied to study any differences between the prenatal and postnatal symptoms of anxiety and the postnatal depression symptoms in the two samples.

Multiple linear regression models were applied to determine which variables were related to negative emotional states (prenatal anxiety) and which were related to positive emotional states. Adjusted and unadjusted models were conducted separately for the Spanish sample, the Italian sample, and the whole sample. The adjusted models were conducted using the following covariates: the mothers' age, the SES, previous miscarriage, parity, and whether the pregnancy was planned. The unadjusted models were conducted by a regression for each of the possible associated variables.

Multiple and logistic regression models were also conducted to determine whether prenatal emotional states predict the obstetric and birth outcomes (specifically, gestational age, the type of delivery, and the child's birth weight).

Results

Descriptive data related to prenatal and birth variables by sample

The descriptive analyses showed that the participants in both countries have similar characteristics except that the Italian sample presented more unplanned pregnancies (31.1% vs. 16.4%, p = .004), shorter duration pregnancies [39.1 (SD: 1.5) vs. 39.8 (SD: 1.3), p = .001], and a higher percentage of cesarean deliveries (42.5% vs. 16.0%, p = .001) than the Spanish sample (see Table 1).

Negative and positive emotional states by sample

Table 2 shows that in the prenatal period the Italian mothers showed significantly higher rates of State Anxiety and STAI factor 1 than the Spanish mothers [22.5 (SD: 9.9) vs. 18.6 (SD: 9.5), p = .001, and 10.0 (SD: 6.1) vs. 7.2 (SD: 5.2), p = .001, respectively]. On the other hand,

the Spanish mothers showed a higher mean score for STAI factor 2 than the Italian mothers [18.7 (SD: 5.3) vs. 17.4 (SD: 4.7), $p = .045$].

As expected, the results showed significant Pearson correlations between the State and the Trait anxiety for the whole sample (0.740), and for the Spanish (0.802) and the Italian (0.626) samples individually. In terms of the postnatal STAI scores, there were no significant differences between the two samples and the Pearson correlations were again significant between the State and the Trait anxiety both for the whole sample (0.779) and for the Spanish (0.797) and Italian (0.713) samples individually. The EPDS mean scores also showed no significant differences between the two samples in the postnatal assessment. Also, considering an EPDS cut-off point ≥ 10, the prevalence of depressive symptoms was 31.3% for the whole sample without significant differences between the Spanish sample (31.4%) and the Italian sample (31.0%). Postnatal assessment was carried out when the children had a mean age of 49.0 days in the Spanish sample (SD: 11.5), a mean age of 48.5 days in the Italian sample (SD: 15.6), and a mean age of 48.7 days (SD: 11.5) overall. On the other hand, as is shown in Table 3, in the whole sample and in the Spanish sample, we observed a significant decrease in the STAI state, and factors 1 and 3 between the prenatal and the postnatal period. In the Italian sample this decrease was only significant for the STAI state and factor 1. On the other hand, the results for the whole sample and the Spanish and Italian samples individually showed a significant increase in factor 2 between the two periods.

Factors associated with the presence of prenatal anxiety

As we can see in Table 4, the adjusted regression analyses show that in the Spanish sample women who belong to a lower SES environment had higher State Anxiety and STAI factor 1 scores. Conversely, they had lower levels of positive emotional states (STAI factor 2 and STAI factor 4). In the Italian sample, younger mothers or mothers who had undergone a prior

miscarriage presented higher scores for STAI factor 3. Also, the results using the whole sample showed a relationship between having a higher SES and presenting high positive emotional states during the 3rd trimester of pregnancy. On the other hand, the unadjusted models showed that, in general, a lower SES, not planning the pregnancy, being young, and having had a previous miscarriage were related to prenatal anxiety. Specifically, in the Spanish sample the results showed that younger mothers presented high scores on STAI factor 1. The results also showed that lower SES was related to a higher State Anxiety, STAI factor 1, and STAI factor 3, and that belonging to a higher SES environment was also related to positive emotional states (STAI factor 2 and STAI factor 4) as in the adjusted models. Unplanned pregnancies were associated with higher rates of anxiety (State Anxiety) while planned pregnancies were associated with higher levels of positive emotional states (STAI factor 2). In the Italian sample, the adjusted models showed that being young and having had a previous miscarriage were related to higher scores on STAI factor 3 and that not having a previous history of miscarriage was related to high scores on STAI factor 4. The analyses conducted with the whole sample showed that the results for the SES variable were similar to those obtained in the Spanish sample (low SES was related to negative emotional states and high SES to positive emotional states). Planned pregnancies were highly related to positive emotional states during pregnancy in the whole sample.

The multiple and logistic regression models conducted to determine whether antenatal emotional states predict the obstetric and birth outcomes showed no statistically significant results in either of the two samples or in the sample as a whole.

Discussion

Although the two samples are similar – they were both recruited from the public health system in a Mediterranean environment – the Italian sample presented significantly higher rates of negative emotional states in the 3rd trimester of pregnancy than the Spanish sample. In

agreement with our results, previous studies conducted in both countries also showed prenatal anxiety rates of around 20% (Giardinelli et al. 2012; Soto-Balbuena et al. 2018). The Spanish sample also showed significantly higher positive emotional states than the Italian sample in the same period. Overall, negative emotional states decreased significantly from the prenatal period to the postnatal period in both samples, while positive emotional states increased significantly. However, postpartum depression rates were considerable (31.3% for the whole sample, 31.4% for the Spanish sample, and 31.0% for the Italian sample). In addition, there were significant differences in obstetric conditions such as the duration and type of delivery. In the Italian sample there was a higher percentage of cesarean deliveries than in the Spanish sample (42.5% vs. 16.0%), while the gestational age at delivery was significantly higher in Spain. The results also showed that the factors that increase the risk of negative emotional states at the end of pregnancy were a lower SES, not planning the pregnancy, being young, and having had a previous miscarriage.

Although the pregnant women in the two samples had a similar mean age, most women in the Italian sample were multiparous (61.2%), so the Italian participants had more experience of pregnancy and motherhood. Nevertheless, they showed significantly higher levels of anxiety (higher scores on State Anxiety and STAI factor 1) in the 3rd trimester of pregnancy than the pregnant women recruited in Spain. In agreement with these results, previous evidence suggests that multiparous women have higher levels of overall anxiety than primiparous women (Lederman and Weis 2009). Mothers who are responsible for other children may have an added stress factor during pregnancy and then during parenting. Moreover, 31.1% of the mothers in the Italian sample also reported that their pregnancies had not been planned, while in the Spanish sample this figure was 16.4%. Unplanned pregnancies may also be a factor in the presence of anxiety, as has been suggested by Barton et al. (2017). These authors found that unplanned motherhood was associated with an increased risk of psychological distress in

the postpartum period, particularly among women who felt unhappy or ambivalent at the beginning of their pregnancy. Women therefore need to receive effective education regarding pregnancy planning, behaviors, and lifestyle since the preconceptional period if they are to have a healthy pregnancy and postpartum (Ignaszak-Kaus et al. 2018; Poels et al. 2018). However, cross-cultural differences may also exist between the two samples in relation to motherhood expectations. Recently, Berrington (2020) examined family formation expectations among UK adolescents and young adults aged between 16 and 21 and found significant differences between ethnic groups in relation to expectations for timing and the type of family formation. These findings remain after controlling for religiosity, parental background and individual characteristics. Although our two samples were from Mediterranean environments, which are culturally closer, the differences observed between the two may be associated with these sociocultural factors. In this regard, more studies are needed to determine whether societal, religious, ethnic or cultural expectations or norms may be influencing our findings.

As far as the anxiety symptoms in both samples are concerned, it should be pointed out that women from the Spanish sample presented significantly higher rates of positive maternal emotional states during the 3rd trimester of pregnancy than the women from the Italian sample. Although we found no association between the antenatal emotional states and the obstetric and birth outcomes, in a previous study conducted by our research group the results suggested that a positive state of mind and emotional stability during pregnancy were associated with a normal delivery (Hernández-Martínez et al. 2011). Moreover, positive maternal mental health during pregnancy is even associated with several positive aspects of offspring development (Phua et al. 2017). Comparing the scores on emotional tests in this study suggests that in part, the psychological support provided during the pregnancy may be different in the two samples. Although birth preparation sessions are offered to the pregnant

women in both health centers (approximately since the 20th week of pregnancy), psychological aspects are scarce in both countries. Moreover, as participation in these sessions is not mandatory, not all the pregnant women receive this formation. One response to this situation may be to review the protocols and try to give greater emphasis to emotional wellbeing during pregnancy (for example, by conducting more evaluations and considering the consequences that negative emotional states may have over the course of the pregnancy, in childbirth and during the postpartum by including a psychologist in some sessions to discuss these issues). As Biaggi et al. (2016) suggested, administering screening tools to identify women at risk of anxiety and depression during pregnancy should be a universal practice aimed at promoting wellbeing during pregnancy and in the long term for women and their offspring.

At the postnatal level, the STAI scores showed a significant decrease in negative states and a significant increase in positive states, and there were no differences in the scores of the two countries. It seems that the baby's arrival reduces anxiety levels, so prenatal anxiety may be related to fears about childbirth or motherhood. As has been shown elsewhere, for both primiparous and multiparous women, pregnancy is acknowledged as a period of increased emotional vulnerability in which it is fairly common to experience negative emotions, although for most women these emotions are transient (Austin et al. 2010; Don et al. 2014; Huizink et al. 2014; Huizink et al. 2017; Lederman and Weis 2009). In this regard, it should also be pointed out that anxious women may experience pregnancy differently from those without basal anxiety. In both samples the postnatal depression rates were considerable, i.e. around 31.0%. This is slightly higher than the results shown by Míguez et al. (2017) in a Spanish sample (22.2%) and significantly higher than those found in a study conducted in Italy by Giardinelli et al. (2012) (13.2%). In contrast to a multiethnic study conducted by Shakeel et al. (2018), which found a lower prevalence of postpartum depression symptoms

(9.3%) measured 14 weeks postpartum, we found higher rates for the whole sample (31.3%). This could be due to differences in when the assessment was made because we measured the depression symptoms only 40 days after delivery. In this regard, it is known that prevalence rates for postnatal depression symptoms vary considerably across studies because of methodological differences (O'Hara and McCabe, 2013). Shorey et al. (2018) conducted a systematic review and meta-analysis and found that the prevalence of depression was 17% among healthy mothers. There were, however, statistical differences between geographical regions, with the highest prevalence in the Middle East (26%) and the lowest prevalence in Europe (8%). Our results and the results in the literature are mixed and therefore by no means conclusive, so future studies are needed. We also believe that it is important to enquire about depressive symptoms at various points during the perinatal period because the literature does not clarify which period involves the highest risk for depression (Takehara et al. 2018).

In relation to the significantly higher rates of cesarean deliveries in the Italian sample, according to the data presented by the Italian Ministry of Health in the Certificate of Childbirth Assistance report (CeDAP), in 2014 35% of deliveries were by cesarean section. In Italy, then, there is a greater use of surgical delivery than in Spain where, according to data from the Annual Report of the National Health System published in 2016, in the public and private health systems the rate of cesarean sections was 25%. Both rates are far above the rates recommended by the World Health Organization (WHO), which for more than three decades has set the ideal rate for cesarean sections at between 10 and 15% (WHO Statement on Caesarean Section Rates, 2015). The pregnancies in Italy were also significantly shorter, but this may be related to the high rates of cesarean section. After all, as reported by the Italian Ministry of Health, 93.2% of the deliveries in Italy are at term (between the 37th and the 42nd gestational week).

The adjusted regression models showed some differences between the two samples in terms of the factors related to the presence of prenatal anxiety. In the Spanish sample, our results indicated that a low SES was associated with prenatal anxiety, an association that has been found by other authors in various countries (Bhat et al. 2015; Kang et al. 2016; Rubertsson et al. 2014). In contrast, the findings of a recent study conducted with Tanzanian women suggest that the SES does not show significant predictive properties (Wall et al. 2018). On the other hand, and as has been found in other studies, in the Italian sample our results indicated that anxiety was significantly related to younger age and previous miscarriage (Bhat et al. 2015; McCarthy et al. 2015; Rubertsson et al. 2014; Shapiro et al. 2017; Torres et al. 2017). Overall, as we had hypothesized, the unadjusted analyses showed that, in addition to a low SES, younger age, previous miscarriage, and unplanned pregnancy also significantly predicted prenatal anxiety. Other authors have suggested that unplanned pregnancy is associated with adverse mothers' well being or quality of life and children's health (Cheng et al. 2016; Gariepy et al. 2017; Tsui et al. 2010). Similarly, regression analysis also shows that a higher SES, planned pregnancies, and no previous history of miscarriage are associated with a positive emotional state during the 3rd trimester. All these factors associated with prenatal anxiety suggest that it is important for public health systems to provide a great deal of preventive information, make preventive assessments and conduct exhaustive follow-ups to women at risk.

Some limitations of the present study should be noted. First of all, it would have been interesting to have information about previous history of mental illnesses, particularly whether the women had been diagnosed with an anxiety or depressive disorder. It would also have been interesting to take measures of prenatal anxiety at different moments of gestation, assess prenatal depression symptoms, and evaluate depression at different times during postpartum. Similarly, it would have been interesting to record whether the women

participated in the birth preparation sessions so as to compare the percentage of participation in each sample and assess its possible relationship with levels of anxiety and depression. Other relevant variables, such as previous birth trauma and socio-familial risk factors that could cause stress situations, were not collected. These variables could be related to the presence of perinatal anxiety and depression symptoms and even to the higher rates of cesarean sections. Another limitation could be that the evaluations were carried out by several researchers from different specialties, which can lead to differences in data collection. However, all the researchers were familiar with the study protocol and had been trained in how to conduct it. Moreover, despite our efforts, it was very difficult to assess the Italian participants at the postpartum level, which unfortunately led to a considerable reduction in the size of the sample. Indeed, another limitation is that the Spanish sample was twice as large as the Italian one. The significantly negative emotional states experienced by the Italian mothers may have influenced this low participation. In any case, it is widely known that follow-up studies have high dropout rates.

Finally, we conclude from our results that the high levels of prenatal anxiety and the considerable number of unplanned pregnancies in the Italian sample require the activation of more special counseling and support services. As other authors have suggested, screening women with certain risk predictors (such as previous miscarriages or low socioeconomic environments) may be the best way to intervene early so that the incidence of unplanned pregnancies or emotional symptoms can be reduced, appropriate care can be provided to women during pregnancy, and the negative consequences for the health of the mothers and their offspring can be avoided (du Toit et al. 2018). Pregnancy, which involves many physiological and psychological changes, is considered a stressful life event for women (Bhat et al. 2015; Çalıkoğlu et al. 2018; Hodgkinson et al. 2014). Since it may also involve significant anxiety levels, it is important that professionals who are in contact with pregnant

women should be sensitive to their doubts and fears, provide good support, especially when problems arise, and provide as much information as possible. They should also assess the presence of emotional symptoms at different times during pregnancy and postpartum. In this regard, our findings showed postpartum depression rates of around 31%. This frequency cannot be underestimated. Professionals need to go one step beyond controls with regard to physiological aspects of pregnancy and emphasize the perinatal psychological aspects more strongly. Future follow-up protocols should therefore pay more attention to these issues. Another important result is that in Italy there is an excessive use of surgical delivery. Both Italy and Spain should work on this issue and attempt to adjust to the ideal rates recommended by the WHO. In short, given the proximity of the two countries, it would be interesting to work together to improve the monitoring protocols during pregnancy, childbirth, and postpartum so that future adverse outcomes can be reduced and women's emotional wellbeing during pregnancy can be maximized.

Acknowledgments

This study is financially supported by a grant (PI12/02777) from the Health Research Fund of the Ministry of Health and Consumption (Madrid, Spain). [Instituto de Salud Carlos III, Fondo de Investigación Sanitaria, Ministerio de Sanidad y Consumo].

Declaration of interest statement

The authors report no conflicts of interest.

References

Alderdice, F., & Lynn, F. (2011). Factor structure of the prenatal distress questionnaire. *Midwifery*, *27*, 553-559. doi:10.1016/j.midw.2010.05.003

Andersson, L., Sundström-Poromaa, I., Bixo, M., Wulff, M., Bondestam, K., & Åström, M. (2003). Point prevalence of psychiatric disorders during the second trimester of pregnancy: a population-based study. *American Journal of Obstetrics and Gynecology*, *189*, 148-154. doi:10.1067/mob.2003.336

Arija, V., Fargas, F., March, G., Abajo, S., Basora, J., Canals, J., Ribot, B., Aparicio, A., Serrat, N., Hernández-Martínez, C., & Aranda, N. (2014). Adapting iron dose supplementation in pregnancy for greater effectiveness on mother and child health: protocol of the ECLIPSES randomized clinical trial. *BMC Pregnancy and Childbirth*, *14*, 2-10. doi:10.1186/1471-2393-14-33

Austin, M. P. V., Hadzi-Pavlovic, D., Priest, S. R., Reilly, N., Wilhelm, K., Saint, K., & Parker, G. (2010). Depressive and anxiety disorders in the postpartum period: how prevalent are they and can we improve their detection?. *Archives of Women's Mental Health*, *13*, 395-401. doi:10.1007/s00737-010-0153-7

Barton, K., Redshaw, M., Quigley, M. A., & Carson, C. (2017). Unplanned pregnancy and subsequent psychological distress in partnered women: a cross-sectional study of the role of relationship quality and wider social support. *BMC Pregnancy and Childbirth*, *17*, 44. doi:10.1186/s12884-017-1223-x

Bayrampour, H., Heaman, M., Duncan, K. A., & Tough, S. (2012). Comparison of perception of pregnancy risk of nulliparous women of advanced maternal age and younger age. *Journal of Midwifery & Women's Health*, *57*, 445-453. doi:10.1111/j.1542-2011.2012.00188.x

Bayrampour, H., McDonald, S., & Tough, S. (2015). Risk factors of transient and persistent anxiety during pregnancy. *Midwifery*, *31*, 582-589. doi:10.1016/j.midw.2015.02.009

Benvenuti, P., Ferrara, M., Niccolai, C., Valoriani, V., & Cox, J. L. (1999). The Edinburgh postnatal depression scale: validation for an Italian sample. *Journal of Affective Disorders*, *53*, 137-141. doi:10.1016/S0165-0327(98)00102-5

Berrington, A. (2020). Expectations for family transitions in young adulthood among the UK second generation. *Journal of Ethnic and Migration Studies*, *46*, 913-935. doi: 10.1080/1369183X.2018.1539276

Biaggi, A., Conroy, S., Pawlby, S., & Pariante, C. M. (2016). Identifying the women at risk of antenatal anxiety and depression: a systematic review. *Journal of Affective Disorders*, *191*, 62-77. doi:10.1016/j.jad.2015.11.014

Bhat, N. A., Hassan, R., Shafiq, M., & Sheikh, S. (2015). Sociodemographic factors: a major predictor of anxiety and depression among pregnant women. *Delhi Psychiatry Journal*, *18*, 86-94.

Buela-Casal, G., Guillén-Riquelme, A., & Seisdedos Cubero, N. (2011). Cuestionario de ansiedad estado-rasgo: Adaptación española. Madrid: TEA Ediciones.

Dennis, C. L., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *The British Journal of Psychiatry*, *210*, 315-323.doi:10.1192/bjp.bp.116.187179

Don, B. P., Chong, A., Biehle, S. N., Gordon, A., & Mickelson, K. D. (2014). Anxiety across the transition to parenthood: change trajectories among low-risk parents. *Anxiety, Stress, & Coping*, *27*, 633-649. doi:10.1080/10615806.2014.903473

Çalıkoğlu, E. O., Bedir, B., Aydın, A., & Yılmaz, S. (2018). An investigation of the prevalence of depression and related factors in pregnant women living in the province of Erzurum. *The European Research Journal*, *4,* 381-389. doi: 10.18621/eurj.370640

Canals, J., Esparó, G., & Fernández-Ballart, J. D. (2002). How anxiety levels during pregnancy are linked to personality dimensions and sociodemographic factors. *Personality and Individual Differences*, *33*, 253-259. doi: 10.1016/S0191-8869(01)00149-0

Cheng, T. S., Loy, S. L., Cheung, Y. B., Godfrey, K. M., Gluckman, P. D., Kwek, K., Saw, S.M., Chong, Y.S., Lee, Y. S., Yap, F., Chan, J.K.Y., Lek, N. on behalf of the GUSTO study group (2016). Demographic characteristics, health behaviors before and during pregnancy, and pregnancy and birth outcomes in mothers with different pregnancy planning status. *Prevention Science*, *17*, 960-969. doi:10.1007/s11121-016-0694-8

Corbani, I. E., Rucci, P., Iapichino, E., Quartieri Bollani, M., Cauli, G., Ceruti, M. R., ... & Bassi, M. (2017). Comparing the prevalence and the risk profile for antenatal depressive symptoms across cultures. *International Journal of Social Psychiatry*, *63*, 622-631. doi: 10.1177/0020764017725543

Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry*, *150*, 782-786. doi:10.1192/bjp.150.6.782

De Cates, A., Stranges, S., Blake, A., & Weich, S. (2015). Mental well-being: an important outcome for mental health services?. *The British Journal of Psychiatry*, *207*, 195-197. doi:10.1192/bjp.bp.114.158329

Ding, X. X., Wu, Y. L., Xu, S. J., Zhu, R. P., Jia, X. M., Zhang, S. F., Huang, K., Zhu, P., HuHao, J., & Tao, F. B. (2014). Maternal anxiety during pregnancy and adverse birth outcomes: a systematic review and meta-analysis of prospective cohort studies. *Journal of Affective Disorders*, *159*, 103-110. doi:10.1016/j.jad.2014.02.027

Furtado, M., Chow, C. H. T., Owais, S., Frey, B. N., & Van Lieshout, R. J. (2018). Risk Factors of New Onset Anxiety and Anxiety Exacerbation in the Perinatal Period: A

Systematic Review and Meta-Analysis. *Journal of Affective Disorders*, *238*, 626-635. doi:10.1016/j.jad.2018.05.073

Garcia-Esteve, L., Ascaso, C., Ojuel, J., & Navarro, P. (2003). Validation of the Edinburgh postnatal depression scale (EPDS) in Spanish mothers. *Journal of Affective Disorders*, *75*, 71-76. doi:10.1016/S0165-0327(02)00020-4

Gariepy, A., Lundsberg, L. S., Vilardo, N., Stanwood, N., Yonkers, K., & Schwarz, E. B. (2017). Pregnancy context and women's health-related quality of life. *Contraception*, *95*, 491-499. doi:10.1016/j.contraception.2017.02.001

Giardinelli, L., Innocenti, A., Benni, L., Stefanini, M. C., Lino, G., Lunardi, C., Svelto, V., Afshar, S., Bovani, R., Castellini, G., & Faravelli, C. (2012). Depression and anxiety in perinatal period: prevalence and risk factors in an Italian sample. *Archives of Women's Mental Health*, *15*, 21-30. doi:10.1007/s00737-011-0249-8

Hernández-Martínez, C., Val, V. A., Murphy, M., Cavallé, P., & Sans, J. C. (2011). Relation between positive and negative maternal emotional states and obstetrical outcomes. *Women & Health*, *51*, 124-135. doi:10.1080/03630242.2010.550991

Hodgkinson, E. L., Smith, D. M., & Wittkowski, A. (2014). Women's experiences of their pregnancy and postpartum body image: a systematic review and meta-synthesis. *BMC Pregnancy and Childbirth*, *14*, 330. doi:10.1186/1471-2393-14-330

Hu, R., Li, Y., Zhang, Z., & Yan, W. (2015). Antenatal depressive symptoms and the risk of preeclampsia or operative deliveries: a meta-analysis. *PloS one*, *10*, e0119018. doi:10.1371/journal.pone.0119018

Huizink, A. C., Menting, B., De Moor, M. H. M., Verhage, M. L., Kunseler, F. C., Schuengel, C., & Oosterman, M. (2017). From prenatal anxiety to parenting stress: a longitudinal study. *Archives of Women's Mental Health*, *20*, 663-672. doi: 10.1007/s00737-017-0746-5

Huizink, A. C., Menting, B., Oosterman, M., Verhage, M. L., Kunseler, F. C., & Schuengel, C. (2014). The interrelationship between pregnancy-specific anxiety and general anxiety across pregnancy: a longitudinal study. *Journal of Psychosomatic Obstetrics & Gynecology*, *35*, 92-100. doi: 10.3109/0167482X.2014.944498

Ignaszak-Kaus, N., Ozegowska, K., Piekarski, P., Pawelczyk, L., & Jędrzejczak, P. (2018). Planning and preparation for pregnancy among women with and without a history of infertility. *Ginekologia Polska*, *89*, 74-79. doi: 10.5603/GP.a2018.0013

Kang, Y. T., Yao, Y., Dou, J., Guo, X., Li, S. Y., Zhao, C. N., Han, H.Z., & Li, B. (2016). Prevalence and risk factors of maternal anxiety in late pregnancy in China. *International Journal of Environmental Research and Public Health*, *13*, 468. doi:10.3390/ijerph13050468

Koletzko, S. H., La Marca‐Ghaemmaghami, P., & Brandstätter, V. (2015). Mixed Expectations: Effects of Goal Ambivalence during Pregnancy on Maternal Well‐Being, Stress, and Coping. *Applied Psychology: Health and Well‐Being*, *7*, 249-274. doi:10.1111/aphw.12047

Lederman, R., & Weis, K. (2009) Psychosocial adaptation to pregnancy: seven dimensions of maternal role development. Springer, New York

Liou, S. R., Wang, P., & Cheng, C. Y. (2016). Effects of prenatal maternal mental distress on birth outcomes. *Women and Birth*, *29*, 376-380. doi: 10.1016/j.wombi.2016.03.004

Lobel, M., DeVincent, C. J., Kaminer, A., & Meyer, B. A. (2000). The impact of prenatal maternal stress and optimistic disposition on birth outcomes in medically high-risk women. *Health Psychology*, *19*, 544. doi:10.1037/0278-6133.19.6.544

Lobel, M., & Dunkel-Schetter, C. (2016). Pregnancy and prenatal stress. In H. S. Friedman (Ed.), Encyclopedia of mental health (2nd ed., vol. 3, pp. 318–329). Waltham, MA: Academic Press.

Martini, J., Petzoldt, J., Einsle, F., Beesdo-Baum, K., Höfler, M., & Wittchen, H. U. (2015). Risk factors and course patterns of anxiety and depressive disorders during pregnancy and after delivery: a prospective-longitudinal study. *Journal of Affective Disorders*, *175*, 385-395. doi: 10.1016/j.jad.2015.01.012

McCarthy, F. P., Moss‐Morris, R., Khashan, A. S., North, R. A., Baker, P. N., Dekker, G., Poston, L., McCowan, L., Walker, J.J., Kenny, L.C., & O'Donoghue, K. (2015). Previous pregnancy loss has an adverse impact on distress and behaviour in subsequent pregnancy. *BJOG: An International Journal of Obstetrics & Gynaecology*, *122*, 1757-1764. doi: 10.1111/1471-0528.13233

Míguez, M. C., Fernández, V., & Pereira, B. (2017). Depresión postparto y factores asociados en mujeres con embarazos de riesgo. *Psicología Conductual*, *25*, 47.

Molgora, S., Fenaroli, V., Prino, L. E., Rollè, L., Sechi, C., Trovato, A., ... & Tambelli, R. (2018). Fear of childbirth in primiparous Italian pregnant women: The role of anxiety, depression, and couple adjustment. *Women and Birth*, *31*, 117-123. doi: 10.1016/j.wombi.2017.06.022

O'hara, M. W., & McCabe, J. E. (2013). Postpartum depression: current status and future directions. *Annual Review of Clinical Psychology*, *9*, 379-407. doi: 10.1146/annurev-clinpsy-050212-185612

Pedrabissi, L., & Santinello, M. (1989). Inventario per l'ansia di «Stato» e di «Tratto»: nuova versione italiana dello STAI Forma Y: Manuale. *Firenze: Organizzazioni Speciali*, *44*.

Phua, D. Y., Kee, M. K., Koh, D. X., Rifkin-Graboi, A., Daniels, M., Chen, H., Chong, Y.S., Broekman, B.F.P., Magiati, I., Karnani, N., Pluess, M., Meaney, M.J., and The Growing Up In Singapore Towards Healthy Outcomes Study Group. (2017). Positive maternal mental health during pregnancy associated with specific forms of adaptive

development in early childhood: Evidence from a longitudinal study. *Development and Psychopathology*, *29*, 1573-1587. doi: 10.1017/S0954579417001249

Poels, M., van Stel, H. F., Franx, A., & Koster, M. P. (2018). The effect of a local promotional campaign on preconceptional lifestyle changes and the use of preconception care. *The European Journal of Contraception & Reproductive Health Care*, *23*, 38-44. doi:10.1080/13625187.2018.1426744

Rees, S., Channon, S., & Waters, C. S. (2019). The impact of maternal prenatal and postnatal anxiety on children's emotional problems: a systematic review. *European Child & Adolescent Psychiatry*, *28*, 257-280. doi: 10.1007/s00787-018-1173-5

Rodríguez-Muñoz, M.F., Le, H. N., de la Cruz, I. V., Crespo, M. E. O., & Méndez, N. I. (2017). Feasibility of screening and prevalence of prenatal depression in an obstetric setting in Spain. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, *215*, 101-105. doi: 10.1016/j.ejogrb.2017.06.009

Rubertsson, C., Hellström, J., Cross, M., & Sydsjö, G. (2014). Anxiety in early pregnancy: prevalence and contributing factors. *Archives of Women's Mental Health*, *17*, 221-228. doi:10.1007/s00737-013-0409-0

Shakeel, N., Eberhard-Gran, M., Sletner, L., Slinning, K., Martinsen, E. W., Holme, I., & Jenum, A. K. (2015). A prospective cohort study of depression in pregnancy, prevalence and risk factors in a multi-ethnic population. *BMC Pregnancy and Childbirth*, *15*, 5. doi:10.1186/s12884-014-0420-0

Shapiro, G. D., Séguin, J. R., Muckle, G., Monnier, P., & Fraser, W. D. (2017). Previous pregnancy outcomes and subsequent pregnancy anxiety in a Quebec prospective cohort. *Journal of Psychosomatic Obstetrics & Gynecology*, *38*, 121-132. doi:10.1080/0167482X.2016.1271979

Sharapova, A., & Goguikian Ratcliff, B. (2018). Psychosocial and sociocultural factors influencing antenatal anxiety and depression in non-precarious migrant women. *Frontiers in Psychology*, *9*, 1200. doi:10.3389/fpsyg.2018.01200

Shorey, S., Ing, C. C. Y., Ng, E. D., Huak, C. Y., San, W. T. W., & Seng, C. Y. (2018). Prevalence and incidence of postpartum depression among healthy mothers: A systematic review and meta-analysis. *Journal of Psychiatric Research*, *104,* 235-248. doi: 10.1016/j.jpsychires.2018.08.001

Smorti, M., Ponti, L., & Tani, F. (2019). The effect of maternal depression and anxiety on labour and the well-being of the newborn. *Journal of Obstetrics and Gynaecology*, *39,* 1-6. doi: 10.1080/01443615.2018.1536697.

Soto-Balbuena, C., Rodríguez-Muñoz, M.F., Escudero Gomis, A. I., Ferrer Barriendos, F. J., & Le, H. N. (2018). Incidence, prevalence and risk factors related to anxiety symptoms during pregnancy. *Psicothema*, *30*, 257-263. doi:10.7334/psicothema2017.379

Spielberger CD, Gorsuch RL, Lushene RE. Cuestionario de ansiedad estado-rasgo. Madrid: TEA Ediciones, 1988

Takehara, K., Tachibana, Y., Yoshida, K., Mori, R., Kakee, N., & Kubo, T. (2018). Prevalence trends of pre-and postnatal depression in Japanese women: A population-based longitudinal study. *Journal of Affective Disorders*, *225*, 389-394. doi:10.1016/j.jad.2017.08.008

Tearne, J. E., Robinson, M., Jacoby, P., Allen, K. L., Cunningham, N. K., Li, J., & McLean, N. J. (2016). Older maternal age is associated with depression, anxiety, and stress symptoms in young adult female offspring. *Journal of Abnormal Psychology*, *125*, 1. doi:10.1037/abn0000119

Torres, R., Goyal, D., Burke-Aaronson, A. C., Gay, C. L., & Lee, K. A. (2017). Patterns of Symptoms of Perinatal Depression and Stress in Late Adolescent and Young Adult Mothers. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *46*, 814-823. doi: 10.1016/j.jogn.2017.08.002

Tsui, A. O., McDonald-Mosley, R., & Burke, A. E. (2010). Family planning and the burden of unintended pregnancies. *Epidemiologic Reviews*, *32*, 152-174. doi: 10.1093/epirev/mxq012

Underwood, L., Waldie, K., D'Souza, S., Peterson, E. R., & Morton, S. (2016). A review of longitudinal studies on antenatal and postnatal depression. *Archives of Women's Mental Health*, *19*, 711-720. doi:10.1007/s00737-016-0629-1

Vázquez, M. B., & Míguez, M. C. (2019). Validation of the Edinburgh postnatal depression scale as a screening tool for depression in Spanish pregnant women. *Journal of Affective Disorders*, *246*, 515-521. doi: 10.1016/j.jad.2018.12.075

Voellmin, A., Entringer, S., Moog, N., Wadhwa, P. D., & Buss, C. (2013). Maternal positive affect over the course of pregnancy is associated with the length of gestation and reduced risk of preterm delivery. *Journal of Psychosomatic Research*, *75*, 336-340. doi:10.1016/j.jpsychores.2013.06.031

Wall, V., Premji, S. S., Letourneau, N., McCaffrey, G., & Nyanza, E. C. (2018). Factors associated with pregnancy-related anxiety in Tanzanian women: a cross sectional study. *BMJ Open*, *8*, e020056. doi:10.1136/bmjopen-2017-020056

Table 1. Descriptive statistics of prenatal and birth variables

	Total (*n* = 305)	**Spanish sample (*n* = 202)**	**Italian sample (*n* = 103)**	***p***
PRENATAL VARIABLES				
Parity *n* (%)				
Nulliparous	132 (46.2)	92 (50.3)	40 (38.8)	.063
Multiparous	154 (53.8)	91 (49.7)	63 (61.2)	
Previous miscarriage *n* (%)				
Yes	87 (29.0)	54 (27.4)	33 (32.0)	.402
No	213 (71.0)	143 (72.6)	70 (68.0)	
Planned pregnancy *n* (%)				
Yes	224 (78.3)	153 (83.6)	71 (68.9)	**.004**
No	62 (21.7)	30 (16.4)	32 (31.1)	
SES *n* (%)				
High	52 (17.0)	33 (16.3)	19 (18.4)	.630
Medium	114 (37.4)	73 (36.1)	41 (39.8)	
Low	139 (45.6)	96 (47.5)	43 (41.7)	
BIRTH VARIABLES				
Mothers' age (years) *mean* (SD)	31.5 (5.4)	31.5 (5.1)	31.7 (5.8)	.748
Gestational age (weeks) *mean* (SD)	39.6 (1.4)	39.8 (1.3)	39.1 (1.5)	**.001**
Infants' weight (grams) *mean* (SD)	3278.9 (445.7)	3298.4 (430.3)	3226.9 (479.2)	.243
Infants' gender *n* (%)				
Boys	141 (46.2)	103 (51.0)	38 (47.5)	.597
Girls	141 (46.2)	99 (49.0)	42 (52.5)	
Type of delivery *n* (%)				
Eutocic	186 (66.4)	140 (70.0)	46 (57.5)	**.001**
Instrumental	28 (9.2)	28 (14.0)	-	
Cesarean	66 (23.6)	32 (16.0)	34 (42.5)	

SES socioeconomic status

Table 2. Prenatal and postnatal STAI and EPDS scores: Comparison between Spain and Italy

	Total sample Mean (SD)	**Spanish sample Mean (SD)**	**Italian sample Mean (SD)**	***p***
STAI PRENATAL	***n* = 305**	***n* = 202**	***n* = 103**	
STAI State	19.9 (9.8)	18.6 (9.5)	22.5 (9.9)	**.001**
STAI Trait	18.3 (8.8)	17.9 (9.6)	19.0 (7.0)	.278
STAI factor 1	8.2 (5.7)	7.2 (5.2)	10.0 (6.1)	**.001**
STAI factor 2	18.2 (5.1)	18.7 (5.3)	17.4 (4.7)	**.045**
STAI factor 3	11.7 (6.0)	11.6 (6.6)	11.9 (4.7)	.611
STAI factor 4	14.4 (3.9)	14.7 (4.0)	14.0 (3.5)	.128
STAI POSTNATAL	***n* = 179**	***n* = 151**	***n* = 28**	
STAI State	16.3 (9.3)	16.5 (9.4)	15.6 (8.9)	.645
STAI Trait	16.0 (8.7)	15.7 (8.7)	17.7 (8.5)	.261
STAI factor 1	6.4 (5.1)	6.4 (5.1)	6.6 (5.3)	.822
STAI factor 2	20.1 (5.4)	19.9 (5.5)	21.0 (4.6)	.312
STAI factor 3	10.0 (5.8)	9.9 (5.9)	10.9 (5.7)	.424
STAI factor 4	15.1 (4.0)	15.2 (4.0)	14.2 (3.8)	.200
	***n* = 182**	***n* = 153**	***n* = 29**	
EPDS	7.2 (5.2)	7.1 (5.3)	7.3 (4.6)	**.849**
EPDS ≥ 10 *n* (%)	57 (31.3)	48 (31.4)	9 (31.0)	**.971**

STAI *State-Trait Anxiety Inventory*; EPDS *Edinburgh Postnatal Depression Scale*

Table 3. STAI and EPDS scores: Comparison between prenatal and postnatal period for Spain and Italy

Whole sample (*n* = 179)			
	Mean PRE (SD)	**Mean POST (SD)**	***p***
STAI State	19.2 (9.8)	16.3 (9.3)	**.001**
STAI factor 1	7.8 (5.6)	6.4 (5.1)	**.001**
STAI factor 2	18.6 (5.2)	20.1 (5.4)	**.001**
STAI factor 3	11.6 (6.2)	10.0 (5.8)	**.001**
STAI factor 4	14.6 (3.8)	15.1 (4.0)	.078
Spanish sample (*n* = 151)			
STAI State	18.6 (9.4)	16.5 (9.4)	**.004**
STAI factor 1	7.4 (5.2)	6.4 (5.1)	**.006**
STAI factor 2	18.8 (5.2)	19.9 (5.5)	**.011**
STAI factor 3	11.5 (6.3)	9.9 (5.9)	**.001**
STAI factor 4	14.7 (3.9)	15.2 (4.0)	.071
Italian sample (*n* = 28)			
STAI State	22.4 (11.1)	15.6 (8.9)	**.003**
STAI factor 1	10.0 (7.0)	6.6 (5.3)	**.021**
STAI factor 2	17.6 (5.6)	21.0 (4.6)	**.004**
STAI factor 3	12.1 (5.5)	10.9 (5.7)	.146
STAI factor 4	13.9 (3.1)	14.2 (3.8)	.747

Table 4. Multiple linear regression models (adjusted and unadjusted models) of the variables associated with the presence of prenatal negative and/or positive emotional states

	State Anxiety	STAI factor 1	STAI factor 2	STAI factor 3	STAI factor 4
Adjusted models					
Spain	SES; B = .178, p = .001***	SES; B = .069, p = .023*	SES; B = -.108, p = .001***	NS	SES; B = -.084, p = .001**
Italy	NS	NS	NS	Mothers' age; B = -.232, p = .001 Previous miscarriage; B = 2.318, p = .020**	NS NS
Total	NS	NS	SES; B = -.078, p = .001**	NS	SES; B = -.058, p = .002**
Unadjusted models					
Spain					
Mothers' age	NS	B = -.150, p = .035*	NS	NS	NS
SES	B = .169, p = .001***	B = .082, p = .001***	B = -.087, p = .001***	B = 8.856, p = .001***	B = -.071, p = .001***
Previous miscarriage	NS	NS	NS	NS	NS
Parity	NS	NS	NS	NS	NS
Planned pregnancy	B = -4.504, p = .017*	NS	B = 2.650, p = .010**	NS	NS
Italy					
Mothers' age	NS	NS	NS	B = -.218, p = .006**	NS
SES	NS	NS	NS	NS	NS
Previous miscarriage	NS	NS	NS	B = 2,151, p = .03*	B = -1,607, p = .027*
Parity	NS	NS	NS	NS	NS
Planned pregnancy	NS	NS	NS	NS	NS
Total					
Mothers' age	NS		NS		NS
SES	B = .113, p = .005**	B = .048, p = .04*	B = -.065, p = .002**	B = .069, p = .005**	B = -.054, p = .001**
Previous miscarriage	NS	NS	NS	NS	NS
Parity	NS	NS	NS	NS	NS
Planned pregnancy	NS	NS	B = 1,466, p = .043*	NS	NS

NS not significant model, SES socioeconomic status
Model significance levels: $p \leq .05$*; $p \leq .01$**; $p \leq .001$***