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Positive screening and risk factors for postpartum depression

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1. Introduction

The birth of a child may lead to the onset of psychopathological symptoms in the mother that vary in frequency and intensity [1,2], and to short/long-term effects on the mother's and/or child's health [3–7].

These symptoms usually regard some form of anxiety and depression which may cause little alarm but in some cases indicate serious problems. These include the condition defined as baby blues, which is short lasting, and characterized by mild symptoms and a minimal impact on functioning [8]. Postpartum psychosis [9,10] is definitely a more serious disorder, with a prevalence that can range between 0.1 to 0.2% [11], and an increased risk of suicide and infanticide [12]. From a clinical and statistical point of view, postpartum depression (PPD) is the most important psychological complication related to childbirth.

Research studies have demonstrated that approximately 10–15% of women who give birth are affected by PPD, with some variability in prevalence across different geographical locations and population groups [13–17]. There is also a substantial percentage of women who suffer postpartum anxiety, many of whom experience comorbid depressive symptoms. Literature regarding perinatal anxiety disorders reports a prenatal prevalence of 9–22%, and a postpartum prevalence of 11–21% [18].

The key risk factors linked with poorer postpartum mental health are well documented [19–22] and include: a past history of depression and/or anxiety [23–25], relationship problems with one's partner [26], domestic violence [27], lack of social support [28,29], stressful events [26], isolation [23], negative attitude toward pregnancy [30] and personality vulnerabilities [13,21]. Mothers of infants who suffer from a medical pathological condition [31], or are born prematurely [31] or with a difficult temperament [28] are more at risk of PPD. Physical health problems [23,32], low acceptance of one's body and body weight [33] are also found to be associated with PPD in women from both industrialised and developing countries.

This suggests that identifying perinatal psychological and social risk factors may be important. In fact, it is increasingly acknowledged that perinatal mental health includes far more than the simple diagnosis of PPD. The concept of *psychosocial assessment* involves a broad focus of inquiry concerning past and current risk factors which makes it possible to produce a more detailed profile during a woman's perinatal period while including screening for possible current depression [34]. In order to carry out a psychosocial assessment, a number of structured psychosocial assessment tools have been developed. These include The Antenatal Psychological Health Assessment (ALPHA) [35], Antenatal Risk Questionnaire (ANRQ) [36], Predictive Index of PND [37], and the Antenatal Psychological Questionnaire [38]. The Antenatal Risk Questionnaire (ANRQ) is a highly acceptable self-report psychosocial assessment tool which helps predict which women will develop PPD [36].

The objective of the present study was to examine the psychosocial risk profile of a sample of postnatal women who had attended childbirth classes during their pregnancy, in Italy. There have been very few population studies in Italy that have investigated the association between depression or anxiety symptoms and psychosocial related risk factors among perinatal women and this work aims to close this knowledge gap and

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contribute to a better understanding of factors that increase the risk of PPD in our country. More specifically, the authors examined psychosocial variables which were associated with elevated scores on the Edinburgh Postnatal Depression Scale (EPDS) [39]. For this purpose, a questionnaire, which we adapted from the ANRQ was administered, together with EPDS, after child birth. This was done in order to cover many of the domains which were considered in the ANRQ but also to include some further questions in order to collect information on delivery and new-born health.

2. Methods

2.1. Outline of the study

The study was conducted as part of the *Prevenzione e intervento precoce per il rischio di depressione postpartum* (Prevention and early intervention for risk of postpartum depression) project funded by the Ministry of Health. The objectives of the project were to define acceptable screening procedures in the Italian setting in order to identify women at risk of postpartum depression, and to assess the feasibility and effectiveness of psychological intervention and services, which were developed by Milgrom et al. [40]. The project was assessed and approved by the Ethical Committee of the Italian National Institute of Health with the registration number CE/12/369.

2.2. Sample

Enrolment of most women took place during the 158 childbirth classes held during an approximately 2-year period (2012–2014), 84 of which held in the "Treviglio Caravaggio Hospital" and in the Oderzo ASL (local health unit) in the province of Bergamo, 63 held in the ASL 9 in Treviso and 11 in the family counselling and other territorial offices in the Campobasso health district. During one of the scheduled meetings for childbirth courses, the project was presented to the pregnant women (by psychiatrists, psychologists, obstetricians or gynaecologists). The other part of the sample was mostly approached in a hospital obstetrics ward, in the Campobasso health district, during the 2 days immediately following childbirth, while the remaining cases were directly referred by the family doctor. All the women involved were provided with a pamphlet developed as part of the project, entitled "*Come prevenire la Depressione Postpartum e sentirsi nuovamente se stesse*" (How to Avoid Postpartum Depression and Feel Yourself Again). It also contained phone numbers of the facilities involved in the project, providing women with the chance to contact them when necessary. Pregnant women who wished to participate in the project were asked to provide their personal information (name and phone number) and the expected delivery date in order to be contacted by a research psychologist assistant during the screening period (between the 6th and 12th week following childbirth) in order to fill out the pertaining scheduled assessment instruments. At the scheduled dates, women who confirmed they wanted to be involved in the project and definitively agreed to participate signed an informed consent form. Then, they were invited to self-complete the assessment instruments. However, a research assistant was available to provide help if required. All research assistants had previously received detailed instructions about how to give the assessment instruments, and how to answer possible questions.

2.3. Assessment instruments

2.3.1. Current PPD symptoms

The EPDS [39] was employed as a test for the assessment of current symptoms of depression [41]. The Italian version validated by Benvenuti [42] and Cox was employed. The chosen cut-off score was 12 or above, optimal for assessing the risk of major depression [40], ensuring a 56% sensitivity rate, 99% specificity and a positive predictive value equal to 91% [42]. Therefore, women who tested positive at the EPDS (score 12 or more) were considered as having current PPD symptoms.

2.3.2. Psychosocial assessment

A special questionnaire was prepared to identify some psychosocial variables, which are summarized in five different sections:

- information regarding delivery and new-born health: possible complications during childbirth (e.g., elective caesarean, emergency caesarean, excess blood loss, vaginal tearing, adverse effects of epidural analgesia, forceps, greater than 36-hour labour, preterm birth and low birth weight, emotional distress during labour or delivery); maternal health problems early after childbirth (e.g., anaemia, anal fissure, mastitis, and caesarean section complications such as the risk of wound dehiscence, chronic incision pain, sinus infection, baby blues); maternal sleeping problems after childbirth; health of the new-born at birth (e.g., shoulder dislocation, curved foot, hypoglycaemia, hyperglycaemia, infections, respiratory problems such as transient tachypnoea, anaemia, jaundice) new-born's health problems (e.g., urinary tract infections, inflammatory injuries such as bronchiolitis or enterocolitis, other clinical problems present at birth that persist through the first 1–3 months of life); new-born's sleeping problems (new-born who has trouble falling asleep and remaining asleep, as well as problems going back to sleep once awaken); type of feeding (breastfeeding or not); new-born's difficult temperament (new-born that cry a lot, cry loudly, or is hard to soothe);
- information regarding pre-delivery and pregnancy periods: having had previous pregnancies; having resorted to assisted reproductive technology for the present pregnancy; pregnancy at risk for health problems (e.g., gestational hypertension, gestational diabetes, toxaemia, chronologically prolonged pregnancy); pregnancy at risk for genetic problems (e.g., chromosomal or genetic abnormalities or disorders such as thalassemia or Down syndrome);
- details of any stressful events during the previous 12 months (disease, accidents, bereavement in the family, job loss or change, relocation, sexual problems, economic problems, theft, relationship problems with one's partner, interruption of a marital/sentimental relationship);
- information on mental health condition prior to the present pregnancy (having experienced a period of at least 2 consecutive weeks in which nearly every day and for most of the day woman felt sad, blue or depressed during her present pregnancy, or during the course of her lifetime; having experienced lost interest in things during her present pregnancy, or during the course of her lifetime; and having experienced a period of at least six consecutive months when woman felt apprehensive, anxious, easily worried about many things and more than usual during her present pregnancy, or during the course of her lifetime; current use of psychotropic drugs);
- information on perceived family and social network support. Within this section, five questions were posed regarding counting on friends and family for practical help, counting on friends and family for psychological support, being satisfied with one's own sentimental relationship, counting on husband when woman feels nervous or worried, counting on husband for practical help.

The questionnaire also included a set of sociodemographic variables (age, nationality, educational level, professional status, economic status, marital status).

2.4. Statistical analysis

The data collected were analysed using SPSS for Windows, version 22.0 (SPSS Inc, Chicago, IL). First, the sociodemographic and psychosocial characteristics of women with current PPD symptoms and women without were summarised using descriptive statistics. The Student's *t*-test or Chi^2 test (or Fisher exact test) were used to test for differences between the two groups of women. Unadjusted odds ratios (ORs) and their correspondent CIs were also calculated for each characteristic, using ordinary logistic regression models. After univariate estimations were calculated, a multiple logistic regression model was constructed in which current PPD served as the dependent variable, while a number of women's demographic and psychosocial characteristics were entered as independent variables. A criterion of $P \leq 0.001$ was used to select the independent variables to be included in the multivariate model among those that found to be significantly associated with PPD in the univariate analyses. Due to the large sample size and the numerous tests carried out, a strict *P*-value criteria was used when evaluating the univariate results [43].

Finally, the accuracy of the model in discriminating between women with and without current PPD symptoms was quantified by estimating the area under the receiver operating characteristic curve (ROC area).

3. Results

A total of 2668 women were asked to participate in the project. Of these, 2211 (82.9%) preliminarily agreed to join and provided their contact information. Contact procedures were established at the scheduled date for 2113 (95.6%) of these women and 1558 (73.8%) confirmed they would accept to participate in the study, and fill out the scheduled assessment instruments, while 555 (26.2%) refused, or could not be traced, or did not show up at the meeting that had been scheduled for the completion of the assessment instruments. Given that the socio-demographic characteristics together with the psychosocial characteristics were assessed only among women who definitively accepted to participate in the study, it was not possible to evaluate whether women who agreed to participate did not differ from those who had refused.

3.1. Sociodemographic characteristics, pregnancy and delivery details of participants

Overall, the women screened ($n = 1558$) were in their thirties (mean age: 32.5 years; SD = 4.8 years; range: 17–51 years). Most of them were from Italy and well educated. In fact, most of them had a senior high school certificate or higher; the majority were employed in paid work, and only a few had serious economic difficulties. The majority of them were married or lived with their partner. Most women were at their first pregnancy.

Socio-demographic, pregnancy and delivery characteristics in women who scored positive at the EPDS and women who scored negative are shown in detail in Table 1. No significant differences between women with a positive score and women who scored negative were found regarding age, educational level, professional and marital status. Furthermore, no significant differences between the two groups were found with regard to pregnancy and delivery health problems or complications. However, they differed with regard to nationality, economic condition and some immediately following delivery problems, in that women who screened positive were more likely to be of non-Italian nationality, be in economic difficulty, suffer from health problems or personal/new-born's sleeping disorders, or have problems with the baby's feedings or with the baby's temperament.

3.2. EPDS scores and psychosocial profile of participants

At EPDS, 110 women (7.1%) tested as positive for the presence of PPD. About 1/4 of these had had thoughts of self-harm (Table 2). The stressful events that in the previous 12 months mostly regarded the women who tested positive included changing or losing one's job ($P = 0.001$), problems with their partner ($P = 0.042$), having had sexual problems ($P = 0.011$), having been in economic difficulty ($P = 0.031$) or the interruption of a marital/sentimental relationship ($P = 0.045$).

Women who scored positive at the EPDS were more likely to report: having had thoughts of self-harm (as assessed by question 10 of the EPDS); having experienced a period in which they felt depressed during their present pregnancy, or during the course of their lifetime; having experienced loss of interest during their present pregnancy, or during the course of their lifetime; and having experienced a period when they felt anxious, during their present pregnancy, or during the course of their lifetime. Compared to the women who scored negative at the EPDS, women who scored positive also reported more frequently that they took psychotropic drugs. Furthermore, women who scored positive were more likely not to be able to count on friends, relatives or partners in times of need, for practical help or psychological support, or to be completely satisfied with their sentimental relationship (Table 2).

3.3. Risk factors for the presence of current PPD (as assessed with EPDS): results of multiple logistic regression analysis

As already mentioned, in this analysis, the presence of PPD served as the dependent variable, while the highly significant psychosocial risk factors identified in the univariate analysis were entered as independent variables. Among the socio-demographic factors, we included nationality and economic status, while among delivery factors, we included personal health problems after the child's birth, personal sleeping disorders after the child's birth, new-born's sleeping disorders, new-born's feeding difficulties and new-born's temperament problems. Among psychosocial factors, we included feeling sad, during the lifetime, having lost interest, during the lifetime, feeling anxious, during the lifetime, feeling sad, during the present pregnancy, having lost interest, during the present pregnancy, feeling anxious, during the present pregnancy, counting on friends and family for practical help, counting on friends and family for psychological support, being satisfied with one's sentimental relationship, counting on one's husband when the woman feels nervous or worried, counting on one's husband for practical help. Finally, among the stressful events, we included job loss or change. On the other hand, we did not include taking psychotropic drugs and having scoring > 0 for question 10 of the EPDS, which are likely to be interpreted as mere correlations of depression and may also lead to collinearity problems, as they displayed very strong positive associations.

Table 3 summarizes the results of the multiple logistic regression analysis, in which a test of the full model with all nineteen independent variables was highly significant (Chi^2 test = 275.8, df = 25, $P < 0.0001$), with a high area under the ROC curve of 0.888 (95% CI: 0.855–0.922), thus exhibiting a good performance of accuracy (Fig. 1) [44].

Having suffered from loss of interest during pregnancy and not being able to count on family and friends for psychological support were the strongest predictors of PPD symptoms, with an odds ratio of 3.62 and 3.50, respectively (Table 3). Having suffered from

Table 1
Sociodemographic, pregnancy and delivery characteristics of participants ($n = 1558$). Number (valid percentage), odds ratio (95% confidence interval), P = statistical significance for the comparison between negative EPDS screening and positive EPDS screening results. Missing ≤ 0.3%.

Variables	Categories	M (SD)			P
Age	EPDS score ≥ 12	32.7 (5.0)			0.645
	EPDS score < 12	32.4 (4.7)			
		n (valid percentage)		OR (95% CI)	P
		Negative EPDS	Positive EPDS		
Nationality					
Italian		1378 (95.2)	96 (87.3)	1.0	
Non-Italian		70 (4.8)	14 (12.7)	2.9 (1.6–5.3)	0.002
Education					
Elementary or middle school education		153 (10.6)	19 (17.3)	2.1 (1.2–3.8)	
High school education		718 (49.6)	57 (51.8)	1.3 (0.9–2.1)	0.040
Bachelor degree		577 (39.8)	34 (30.9)	1.0	
Professional status					
Unemployed		177 (12.2)	20 (18.2)	1.8 (1.0–3.0)	
Housewife		107 (7.4)	13 (11.8)	1.9 (1.0–3.6)	
Student		22 (1.5)	2 (1.8)	1.4 (0.3–6.2)	0.108
Temporary work		119 (8.2)	10 (9.1)	1.3 (0.7–2.6)	
Permanent work		1023 (70.6)	65 (59.1)	1.0	
Economic status					
A lot of problems or some problems (limits on daily expenses, no holiday)		164 (11.4)	25 (22.7)	4.7 (2.2–10.0)	
A few problems without specific difficulties		975 (67.3)	75 (68.2)	2.4 (1.2–4.6)	0.000
Average-high status		309 (21.3)	10 (9.1)	1.0	
Marital status					
Single		42 (2.9)	6 (5.5)	1.9 (0.2–16.9)	
Common law or married		1393 (96.2)	103 (93.6)	1.0 (0.1–7.4)	0.327
Separated or divorced		13 (0.9)	1 (0.9)	1.0	
Previous pregnancies					
No		996 (68.8)	76 (69.1)	0.9 (0.4–2.0)	
One pregnancy		355 (24.5)	26 (23.6)	0.9 (0.4–2.0)	0.959
Two or more pregnancies		97 (6.7)	8 (7.3)	1.0	
Resorting to assisted reproductive technology					
No		1390 (96.1)	103 (94.5)	1.0	
Yes		56 (3.9)	6 (5.5)	1.5 (0.6–3.4)	0.401
Pregnancy at risk for health problems					
No		1339 (92.5)	98 (89.1)	1.0	
Yes		109 (7.5)	12 (10.9)	1.5 (0.8–2.8)	0.201
Pregnancy at risk for genetic problems					
No		1396 (96.4)	108 (98.2)	1.0	
Yes		52 (3.6)	2 (1.8)	0.5 (0.1–2.1)	0.327
Complication during childbirth					
No		1121 (77.4)	78 (70.9)	1.0	
Yes		327 (22.6)	32 (29.1)	1.4 (0.9–2.2)	0.118
Breastfeeding					
No		440 (30.4)	37 (33.6)	1.0	
Yes		1008 (69.6)	73 (66.4)	0.9 (0.6–1.3)	0.479
Health of the new-born at birth					
Good		1319 (91.1)	101 (91.8)	1.0	
With a few problems		115 (7.9)	9 (8.2)	1.0 (0.5–2.1)	0.584
With serious problems		14 (1.0)	0 (0.0)	0.0	
Personal health problems after the child's birth					
No		1227 (84.7)	71 (64.5)	1.0	
Yes		221 (15.3)	39 (35.5)	3.1 (2.0–4.6)	0.000
Personal sleeping disorders after the child's birth					
No		1107 (76.5)	43 (39.1)	1.0	
Yes		341 (23.5)	67 (60.9)	5.1 (3.4–7.6)	0.000
Newborn's health problems					
No		1310 (90.5)	91 (82.7)	1.0	
Yes		137 (9.5)	19 (17.3)	2.0 (1.2–3.4)	0.010
Newborn's sleeping problems					
No		1266 (87.5)	73 (66.4)	1.0	
Yes		181 (12.5)	37 (33.6)	3.5 (2.3–5.4)	0.000
Newborn's feeding difficulties					
No		1213 (83.8)	75 (68.2)	1.0	
Yes		235 (16.2)	35 (31.8)	2.4 (1.6–3.7)	0.000
Newborn's difficult temperament					
No		1312 (90.7)	75 (68.2)	1.0	
Yes		135 (9.3)	35 (31.8)	4.5 (2.9–7.0)	0.000

Table 2
EPDS scores and psychosocial profile of participants ($n = 1558$). Odds ratio (95% confidence interval), P = statistical significance for the comparison among categories. Missing ≤ 0.3%.

Variables	Categories			M (SD)
EPDS continuous scores	EPDS score ≥ 12			15.3 (3.7)
	EPDS score < 12			4.4 (3.0)
		n (%)		
		Negative EPDS (score < 12)	Positive EPDS (score ≥ 12)	OR (95% CI)	*P*
Proportion of women scoring as positive or negative, on the basis of the chosen EPDS cut-off		1448 (92.9)	110 (7.1)		
Proportion of women who scored > 0 to the question 10 of the EPDS (thoughts of self harm)					
No		1439 (99.4)	84 (76.4)	1.0	
Yes		9 (0.6)	26 (23.6)	49.5 (22.5–109.0)	0.000
Feeling sad, blue or depressed for at least two weeks in a row, before the present pregnancy, during the course of lifetime					
No		1057 (73.0)	55 (50.0)	1.0	
Yes		391 (27.0)	55 (50.0)	2.7 (1.8–4.0)	0.000
Having lost interest for at least 2 weeks in a row in the things, before the present pregnancy, during the course of lifetime					
No		1203 (83.1)	73 (66.4)	1.0	
Yes		245 (16.9)	37 (33.6)	2.5 (1.6–3.8)	0.000
Feeling more apprehensive, anxious and easily worried than usual for at least 6 months in a row, before the present pregnancy, during the course of lifetime					
No		1278 (88.4)	77 (70.0)	1.0	
Yes		167 (11.6)	33 (30.0)	3.3 (2.1–5.1)	0.000
Feeling sad, disheartened or depressed for at least 2 weeks in a row, during the present pregnancy					
No		1288 (89.0)	57 (51.8)	1.0	
Yes		160 (11.0)	53 (48.2)	7.5 (5.0–11.3)	0.000
Having lost interest for at least 2 weeks in a row in the things during the present pregnancy					
No		1362 (94.1)	69 (62.7)	1.0	
Yes		86 (5.9)	41 (37.3)	9.4 (6.0–14.7)	0.000
Feeling more apprehensive, anxious and easily worried than usual for at least 6 months in a row, during the present pregnancy					
No		1368 (94.6)	76 (69.1)	1.0	
Yes		78 (5.4)	34 (30.9)	7.8 (4.9–12.5)	0.000
Use of psychotropic drugs					
No		1435 (99.1)	98 (89.1)	1.0	
Yes		13 (0.9)	12 (10.9)	13.5 (6.0–30.4)	0.000
Counting on friends and family for practical help					
A lot		1003 (69.3)	45 (40.9)	1.0	
Enough		318 (22.0)	33 (30.0)	2.3 (1.5–3.7)	0.000
Not at all or a little		126 (8.7)	32 (29.1)	5.7 (3.5–9.2)	
Counting on friends and family for psychological support					
A lot		862 (59.6)	35 (31.9)	1.0	
Enough		420 (29.1)	27 (24.5)	1.6 (0.9–2.6)	0.000
Not at all or a little		163 (11.3)	48 (43.6)	7.2 (4.5–11.6)	
Being satisfied with sentimental relationship					
A lot		1195 (82.5)	66 (60.0)	1.0	
Enough		220 (15.2)	28 (25.5)	2.3 (1.4–3.7)	0.000
Not at all or a little		33 (2.3)	16 (14.5)	8.8 (4.6–16.8)	
Counting on husband/partner when woman feels nervous or worried					
A lot		1020 (70.4)	57 (52.3)	1.0	
Enough		336 (23.2)	23 (21.1)	1.2 (0.7–2.0)	0.000
Not at all or a little		93 (6.4)	29 (26.6)	5.6 (3.4–9.1)	
Counting on husband/partner for practical help					
A lot		1000 (69.1)	61 (55.5)	1.0	
Enough		350 (24.2)	27 (24.5)	1.3 (0.8–2.0)	0.000
Not at all or a little		96 (6.6)	22 (20.0)	3.8 (2.2–6.4)	

anxiety, or a sense of depression during pregnancy and having changed or lost one's job were also found to be related to a greater risk of depression. Moreover, women who after childbirth suffered from personal health problems, or sleep disorders, or whose child had a difficult temperament, were found to have a greater risk of depression symptoms. The same was demonstrated with women who felt they could not count on their own partner for emotional support when they were nervous or worried.

4. Discussion

In the present study, the proportion of women with PPD symptoms at the 6th–12th postpartum week was 7.1%. This proportion seems lower that those reported in other studies conducted in other countries [13–17,19]. Among the reasons that may have influenced the above-mentioned estimate, we would like to report:

- cut-off score adopted in a conservative manner was less sensitive (but more specific) than the one usually employed (9–10);
- the sample was primarily made up of women who participated in childbirth classes and in better health conditions compared to the general population of pregnant women;
- most of the women lived in small towns where the local and socio-cultural characteristics facilitate the intervention and help

Table 3
Variables associated with current symptoms of postpartum depression as assessed with EPDS: results of multiple logistic regression analysis.

Variable	Categories	Adjusted odds ratio (95% CI)	*P*-value (Wald-test)
Nationality	Italian	1.00	
	Non-Italian	1.62 (0.68–3.89)	0.277
Economic status	Average-high status	1.00	
	A few problems	2.17 (0.99–4.74)	0.052
	A lot or some problems	2.16 (0.87–5.37)	0.097
Having changed or lost one's job	No	1.00	
	Yes	2.81 (1.53–5.17)	
Personal health problems after the child's birth	No	1.00	
	Yes	2.19 (1.31–3.69)	0.003
Personal sleeping disorders after the child's birth	No	1.00	
	Yes	2.52 (1.49–4.27)	0.001
Newborn's sleeping problems	No	1.00	
	Yes	1.58 (0.85–2.97)	0.151
Newborn's feeding difficulties	No	1.00	
	Yes	1.34 (0.76–2.35)	0.315
Newborn's difficult temperament	No	1.00	
	Yes	1.98 (1.05–3.73)	0.036
Lifetime depressed mood	No	1.00	
	Yes	1.52 (0.79–2.93)	0.213
Lifetime loss of interest	No	1.00	
	Yes	0.81 (0.38–1.72)	0.582
Lifetime anxiety	No	1.00	
	Yes	1.48 (0.76–2.87)	0.245
Depressed mood, during pregnancy	No	1.00	
	Yes	1.99 (1.13–3.50)	0.018
Loss of interest, during pregnancy	No	1.00	
	Yes	3.62 (1.97–6.67)	0.000
Anxiety, during pregnancy	No	1.00	
	Yes	3.06 (1.61–5.81)	0.001
Counting on friends and family for practical help	A lot	1.00	
	Enough	1.20 (0.61–2.38)	0.591
	Not at all or a little	1.53 (0.68–3.44)	0.301
Counting on friends and family for psychological support	A lot	1.00	
	Enough	1.32 (0.66–2.63)	0.428
	Not at all or a little	3.50 (1.61–7.58)	0.002
Being satisfied with one's sentimental relationship	A lot	1.00	
	Enough	0.96 (0.47–1.96)	0.916
	Not at all or a little	1.46 (0.50–4.27)	0.488
Counting on husband/partner when woman feels nervous or worried	A lot	1.00	
	Enough	0.71 (0.34–1.47)	0.355
	Not at all or a little	2.59 (1.06–6.28)	0.036
Counting on husband/partner for practical help	A lot	1.00	
	Enough	0.89 (0.47–1.68)	0.712
	Not at all or a little	0.97 (0.43–2.20)	0.937

from family, friends and neighbours. In other words, there is a greater degree of "social support", which, as has been already mentioned, is strongly related to the risk of depression;

- the percentage of women who refused or were unavailable was relatively high (26%). Various studies have demonstrated how people who abandon a mental health survey usually have significantly higher rates of mental illness [45].

As regards the variables associated to PPD, they are quite consistent with those reported in literature and they agree with indicating the bio-psychosocial paradigm as the most recognised key factor in interpreting depression problems related to childbirth. The strongest relationships were observed for depression and anxiety during pregnancy, and lack of psychological support from family and friends. These findings confirm previous cross-sectional and longitudinal studies which found that a reported history of depression [21,46,47] and lack of social support [48,49] are associated to PPD. The co-morbid relationship between anxiety and PPD is also well documented [50] and our results confirm that relationship. On the other hand, in our study, lifetime depression and lifetime anxiety were not significant in the final multivariate model even though significant relationships in the univariate models were detected. These results could indicate that there is no evidence to support an association between lifetime depression or anxiety and PPD once anxiety and depression during pregnancy are taken into account. On the other hand, these results could be attributable to the use of cross-sectional data, which mean it is not possible to give an accurate interpretation of the reports about women's experiences in their whole life, given that they could be subjected to recall bias.

Similarly to a recent large-scale study by Milgrom et al. [21] which examined the relationship between several risk factors during pregnancy and PPD in Australian women, we found that lack of partner support was also associated with PPD. On the contrary, socio-demographic characteristics such as income, education, age and marital status did not remain in the final model. This finding is consistent with those reported in a recent longitudinal study [47]. However, it seems to contradict the findings of other studies [20,51], which indicate that socio-demographic characteristics are associated with PPD. Yet, as previously said, our sample was primarily composed of women in better socio-economic conditions compared to the general population of pregnant women. Finally, our findings indicated that experiences of stress immediately following delivery such as problems related to infant's temperament and difficulties in recovering one's physical health and sleeping problems following delivery also play an important role in PPD.

As previously mentioned, the impact of psychosocial factors has already been well documented in numerous previous studies, a few of which were prospective longitudinal studies [21,47]. These

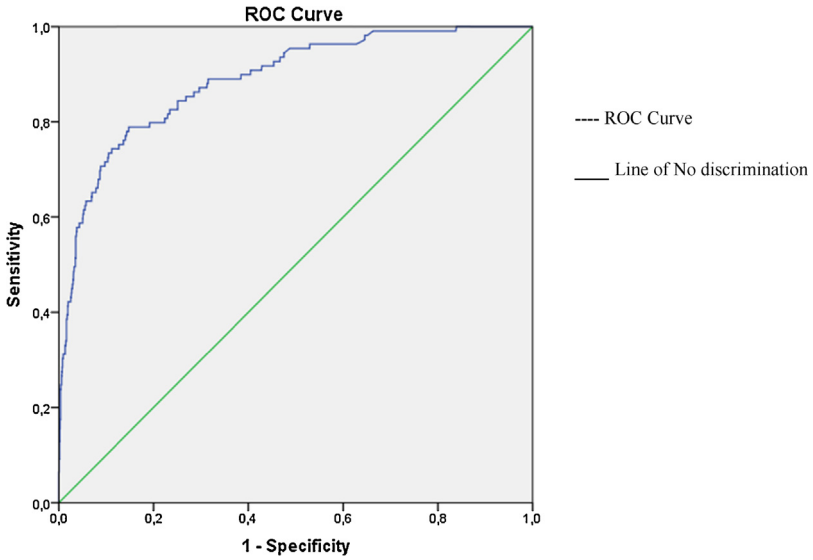

Fig. 1. Area under the ROC curve of the final model developed for the presence of current PPD (as evaluated with EPDS).

latter demonstrated that some adverse psychosocial risk factors which occurred earlier in life and/or during pregnancy may be associated with an increased risk of new onset psychiatric episodes, especially major depression and puerperal psychoses, in the first few months postpartum. These studies provide clear indications regarding the importance of investigating psychosocial risk factors earlier in life and during pregnancy in order to prevent first incidences of mental health problems.

In our opinion, our findings, together with previous literature provide additional evidence for the development of clinical guidelines regarding the implementation of psychosocial risk factor assessment in pregnancy and early postnatal periods in order to facilitate help seeking, provide timely support and, ultimately, prevent the occurrence of a mental health problem.

International guidelines, which have been developed in several countries (e.g., Australia, UK), have taken various positions regarding the implementation of psychosocial risk factor assessment in perinatal mental health. In spite of the fact that the Australian Clinical Practice Guidelines for perinatal depression (2011) [52] declare that the use of universal psychosocial assessment is good practice, neither the Scottish [53], nor British [54] guidelines suggest its use, although they do recommend routine inquiry about the personal or family history of serious mental disorders. Therefore, there is currently considerable uncertainty about whether the ascertainment of psychosocial risk factors should be recommended in perinatal mental health. The main topics currently debated around psychosocial assessment in perinatal period are the same as for the screening of depression and concern whether it should be systematically implemented and whether the potential advantage of systematic assessment goes beyond the cost of such a strategy [55]. Like in screening for depression, potential inaccuracy represents a major challenge given that false positives may provoke stigmatization and incur substantial financial costs for the health system.

In support of psychosocial assessment, the International Marcé Society has clearly underlined the importance of the early identification of psychosocial risk as part of routine care. A strong argument for considering such assessment is the fact that, in contrast to screening, psychosocial assessment does not attempt to identify women with a possible diagnosis of a particular psychiatric condition at the time of assessment. Instead, it provides health professionals with a composite portrait of a woman's possible risks, which can be used to facilitate help seeking and aid decisions regarding best care options [56]. This suggests that psychosocial assessment may be useful even before screening and also in the absence of a diagnosable condition.

Similarly to the International Marcé Society, we consider investigating the emotional state as part of broader maternity and postnatal routine care. Primary care visits during pregnancy may provide important opportunities for health education and the detection of psychosocial risk. In fact, typically, pregnant women and new parents are more likely to seek help in perinatal care settings than in special mental health settings and are often highly motivated to modify their risk factors for their own child's wellbeing. The perinatal period may thus provide clinicians with a unique opportunity to address the psychological and social aspects of their clients' health and to tackle modifiable risk factors.

4.1. Limitations

This study has some limitations that should be kept in mind when considering the findings. First, the sample was non-random, which may limit the generalizability of the results and might have introduced some form of bias, as the levels of depression or adverse risk factors experienced by women may have affected their interest in and their capacity to participate in the study.

Moreover, due to the restrictions of our sample of women when recruited from childbirth classes, we were unable to generalize our findings and apply them to the entire population of postnatal women because women who attend childbirth classes in Italy tend to have more protective psychosocial factors compared to the general population. In Italy, women attending these classes comprise about 25% of the overall population of pregnant women. They tend to be well educated, primigravidae and resident in the North [57]. A further limitation of this study is the use of a self-report instrument of PPD as the outcome variable. However, there is evidence of construct validity for the instrument used, which rules out substantial method effects. Finally, firm conclusions about the direction of causality of associations between variables are precluded by the cross-sectional design of the study.

5. Conclusions

Despite its limitations, to the best of our knowledge, this study is the first in Italy that examines the relationships between

psychosocial risk factors and PPD in a broad sample of women. Therefore, one of the strengths of this paper was the use of data collected from a large sample of postnatal Italian women. Although the relationships between PPD and women's characteristics, such as education level and economic condition, are likely to be underestimated due to the restrictions of our sample, with regard to mental and social support factors, our findings are consistent with those found in previous studies conducted on general population samples, suggesting that the past history of a mental health condition and lack of social support are risk factors also among women who have a better socio-economic situation. Poor quality intimate partner relationships and experiences of stress directly following delivery were also shown to be important in our study. As regards stressful experiences, our study examined a comprehensive set of events that may occur after delivery such as maternal health problems and new-born's health and temperament. To the best of our knowledge, no studies to date have examined these events.

Finally, our study evaluated psychosocial risk factors in clinical practice in ordinary centres, an approach that consumes few professional and financial resources and which requires only brief simple training. Thus, this study shows that psychosocial assessment can be feasible, albeit a little difficult, because it requires integrated health care which provides collaborative and multidisciplinary care.

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Disclosure of interest

The authors declare that they have no competing interest.

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