Research paper

Promoting the well-being of mothers with multidisciplinary psychosocial interventions in the perinatal period

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ABSTRACT

Background: Antenatal depressive and anxiety symptoms are common and may persist over time after delivery, with negative consequences on the mothers and their children. Evidence on the efficacy of psychological and pharmacological interventions during pregnancy aimed at preventing post-partum depression is controversial.
Methods: A consecutive sample of 318 women presenting for scheduled obstetric visits during pregnancy was screened for risk factors and anxiety or depressive symptoms. Based on the screening results, women were classified into three groups at increasing risk of post-partum depression (PPD) and were offered different interventions.
Results: Depressive or anxiety symptoms were found in 91 (28.6%) women, 89 (28.0%) had low risk of PPD and 138 (43.4%) had no risk of PPD. The multidisciplinary psychosocial interventions offered to women with clinical symptoms were well accepted, with an uptake of 76/91 (83.5%). Thirty-three women who did not improve with psychotherapy were offered sertraline or paroxetine as a second-line treatment: 7 accepted and 26 (78.8%) refused. Eleven women already on medication at baseline continued their treatment along with the MPI. The MPI interventions had some positive effects in terms of post-partum recovery, symptom reduction, and in preventing a new onset of depression. Among the 227 non-symptomatic during pregnancy, only 5 (2.2%) developed symptoms in the post-partum period. At 12 months post-partum, 84.6% of women who were symptomatic at 2 months post-partum recovered.
Limitations: Our results should be interpreted in light of important limitations, including the lack of a control group that was not offered the MPI, the lack of information on the reasons for refusal and discontinuation and on the number of psychotherapy sessions attended.
Conclusions: Our findings underscore the potential usefulness of MPI in recognizing early signs or symptoms during pregnancy and the advantage of building specific interventions for preventing post-natal depression. The MPI has positive effects on women with depressive or anxiety symptoms during pregnancy, that however did not exceed significantly those observed in women who refused the intervention. Thus, in the absence of a control group, our results are preliminary and warrant confirmation and testing in future randomized clinical trials.

1. Introduction

The perinatal period, extending from pregnancy to the first year of life of the child, is universally recognized as one of the most significant periods in a woman's life.

The most frequent disorders in the perinatal period are anxiety and depression: about one woman in six has anxiety symptoms (Fairbrother et al., 2016; Grant et al., 2008), while one in ten has depressive symptoms (Milgrom et al., 2008).

In particular, the prevalence of antenatal depression (AND) has been estimated to range between 7% and 20% in high-income countries (Andersson et al., 2003; Evans et al., 2001; Gavin et al., 2005; Lee et al., 2007; Marcus et al., 2003; Melville et al., 2010) and to be higher in socio-economically disadvantaged and immigrant women (Corbani et al., 2017). Post-partum depression (PPD) prevalence has been estimated at 13%, with a range from 10% to 15% in a meta-analysis of 59 studies (O'Hara and Swain, 1996).

Converging evidence (Lancaster et al., 2010; Norhayat et al., 2015)

indicates that antenatal depression and anxiety are the most significant risk factors for postnatal depression in both developed and developing countries, together with a previous history of psychiatric illness, poor marital relationship, stressful life events, a negative attitude towards the pregnancy, and lack of social support.

Maternal depression, anxiety and stress during pregnancy have negative long-term effects on both mother and child (Dunkel Schetter and Tanner, 2012; Glover, 2015). In fact, antenatal anxiety or stress have been linked with physical defects in the child (Hansen et al., 2000), low birth weight (Hedegaard et al., 1993), fetal activity and development (Di Pietro et al., 2002).Moreover, perinatal psychiatric disorders compromise the quality of maternal care and negatively affect the mother-child relationship (Highet et al., 2014; Leigh and Milgrom, 2008; Murray et al., 1996), and children's cognitive and emotional development (Glover, 2014; Goodman et al., 2011; Howard et al., 2014; Kingston et al., 2012; Van den Bergh et al., 2005) and behavioral/emotional problems (Grote et al., 2010; O'Connor et al., 2002; Kingston et al., 2018; van Ravesteyn et al, 2017).

These findings underscore the need to prevent rather than treat PPD once it is established.

A meta-analysis of psychosocial and psychological interventions during the antenatal and postnatal period (Dennis, 2005) reported that interventions delivered to women "at risk" had more success in preventing PPD (RR = 0.67, 95% CI 0.51–0.89) than those delivered to women from the general population (RR = 0.87, 95% CI 0.66–1.16). Subsequently, a review of RCTs comparing psychosocial or psychoeducational interventions to control conditions in women with antenatal depressive symptoms (Clatworthy et al, 2012) showed that 5/7 studies including psychological interventions proved to be effective compared with 2/5 studies reporting psychosocial/educational interventions. In addition, Sockol et al. (2011) reported that interventions including an interpersonal therapy component had greater effect sizes (Hedges' g = 0.96), compared to control conditions, than interventions including a cognitive-behavioral component (Hedges' g = 0.40) and that individual psychotherapy was superior to group psychotherapy with regard to changes in symptoms from pretreatment to posttreatment.

A Cochrane review of 28 trials (Dennis and Dowswell, 2013) found that women who received a psychosocial or psychological intervention were significantly less likely to develop post-partum depression compared with those receiving standard care (average RR 0.78, 95% CI 0.66–0.93). Promising interventions include intensive, professionally-based post-partum home visits, telephone-based peer support, and interpersonal psychotherapy.

Concerning anxiety disorders, a recent systematic review of psychological treatments for clinical anxiety during the perinatal period based on 5 studies showed positive results in reducing perinatal anxiety symptoms (Loughnan et al., 2018). However, the small sample size of the studies, the heterogeneity of diagnoses and interventions, including group-based CBT (2 studies) or mindfulness-based CBT (one study), SSRI + CBT (one study) and internet-delivered CBT (one study), the delivery model, and the use of different outcome measures do not allow to draw definite conclusions about the best treatment strategies.

Concerning pharmacological strategies, a recent multinational web-based study conducted across 12 European countries (Lupattelli et al., 2018) showed that women receiving antidepressant treatment at any time during pregnancy reported a significant postnatal symptom severity reduction compared with untreated women (adjusted $\beta = -0.34$, 95% CI $= -0.66 - -0.02$). Still, many pregnant women are reluctant to continue or start antidepressant medications due to concerns about impact on the fetus or later on the infant.

Despite the encouraging evidence on the effectiveness of psychological or pharmacological interventions, no consensus criteria are available to identify women at risk of PPD, who may benefit most from treatment. Biaggi et al. (2016) argued that a comprehensive and multidimensional psychosocial assessment (e.g., sources of support, quality of interpersonal relationships, recent life stressors) should be common practice for all women during the antenatal period. This assessment would help health professionals to identify women with a high-risk profile but not currently symptomatic, to whom preventive interventions should be offered.

To address the lack of consensus guidelines for assessing and treating depressive and anxiety symptoms during pregnancy, effective year 2009, the Department of Mental Health of the San Paolo Hospital, developed standardized multidisciplinary psychosocial interventions (MPI), based on a multi-component, collaborative care program. This program aimed at screening pregnant women for risk factors and anxiety or depressive symptoms and providing psychosocial interventions targeted to the level of risk. The program was funded by Lombardy Region in the framework of an innovative intervention project on prevention and treatment of perinatal disorders in Italian and immigrant women, in collaboration with the Department of Mental Health of the Niguarda Cà Granda Hospital in Milan.

The aim of this paper is to report on the acceptability and the effects of the MPI in terms of prevention of PDD in women at no/low risk and treatment of depressive and anxiety symptoms during pregnancy in women at high risk.

2. Methods

The study sample includes consecutive women presenting for the scheduled obstetric visits at the beginning of the second or third trimester of pregnancy at the Department of Obstetrics and Gynecology of the San Paolo Hospital between 2010 and 2016. Women were recruited two days a week when the ambulatory of pregnancy physiology was open.

The MPI were delivered by a dedicated team consisting of a psychiatrist and two clinical psychologists operating at the Unit for Prevention and Treatment of Perinatal Disorders.

The psychologists, including two authors of this paper (EI and MQB), are specialized in dynamic-relational psychotherapy, have a master in perinatal disorders, and have a long-standing experience with perinatal disorders (>10 years). During the treatment phase they were supervised by the psychiatrist (GC) who is also a psychotherapist with a specific experience in perinatal disorders.

The MPI consisted of screening, diagnostic assessment and interventions (Table 1). The aim of the screening was to stratify women according to the risk of PPD (high risk, low risk and no risk).

The high-risk group (HR) includes women with clinically significant depressive and/or anxiety symptoms, and/or suicide risk. The presence of antenatal depressive or anxiety symptoms (ADAS) was defined as a score of 12 or higher on the EPDS and/or a BDI-II score ≥14, and/or a score ≥40 on STAI and/or the presence of suicidality (a score >0 on EPDS item 10 or BDI-II item 7).

The low-risk group (LR) includes women without clinically significant depressive or anxiety symptoms but with a family or personal history of psychological or psychiatric disorders and at least one additional risk factor (major negative life events, low social support, poor partner support).

The no risk group (NR) included women without risk factors or clinically significant depressive or anxiety symptoms.

2.1. Screening and diagnostic assessment

The assessments were conducted at three time points: in the 2nd or 3rd trimester of pregnancy (T0), in the second months after delivery (T1) and one year post-partum (T2). All women were assessed at T1, only women with psychiatric symptoms at T0 or T1 were reassessed at T2.

At baseline (T0) women were seen by a psychologist of the clinical team who underscored the importance of screening depressive and anxiety symptoms to prevent post-partum depression and its possible consequences on the woman and child's well-being and asked them to

Table. 1
The multidisciplinary psychosocial intervention (MPI).

Pregnancy	II or III trimester: screening interview – Socio-demographic information – History of migration – Risk factors – Rating scales (EPDS, BDI-II, STAY Y1 and Y2)		
	High risk Diagnostic interview Interpersonal psychotherapy (12–24 weekly 50 min sessions) during pregnancy Psychiatric clinical monitoring Pharmacological intervention (when needed)	Low risk Psychosocial counseling (3/4 sessions – 50 min) and équipe clinical monitoring	No risk Educational intervention (one-hour session)

	Objectives of interpersonal psychotherapy:
	  – *to decrease psychological and relational distress;*
	  – *to provide problem-solving strategies;*
	  –*to improve internal and social protective factors;*
	  –*to improve the perception of couple and family support;*
	  –*to build maternal identity and to provide parental skills;*
	  –*to improve self-esteem;*
		Objectives of psychosocial counseling:
		  – *to help recognizing possible signs and symptoms of depression during the peripartum period;*
		  –*to improve personal and social protective factors;*
		  –*to improve the perception of social support and parental skills;*
		  –*to reduce the impact of risk factors;*
		  – *to build a support network.*
			Objectives of educational intervention:
			  – *to return the screening evaluation, personalized on the basis of the woman's history;*
			  –*to recognize possible signs and symptoms of depression during the peripartum period;*
			  –*to offer a possible support network if//when needed.*
			To give informational material of perinatal period and distress.

Post-partum	After delivery: Psychiatric and/ or psychological visit or telephone calling Follow up – 2nd month: – Rating scales (EPDS, BDI-II, STAY Y1 e Y2)		
	Post-partum depression Diagnostic interview Interpersonal Psychotherapy (24 biweekly 50 min sessions) Psychiatric clinical monitoring Pharmacological intervention (when needed) 12-month follow-up – EPDS	Low risk Psychosocial counseling (3/4 sessions – 50 min) and équipe clinical monitoring	No risk

participate in the study.

Women providing a written consent to participate were administered an ad hoc form to collect socio-demographic information, history of migration (for foreign-born women), risk factors and questionnaires on depressive and anxiety symptoms. The assessment of risk factors encompassed the history of psychiatric disorders and past psychological and/or pharmacological treatment, family history for psychological problems and psychiatric disorders, distressing life events in the past six months (financial problems, unemployment, change in work, change in residence, problems with partner and own or family illness, deaths in the family), pregnancy-related variables (physiological or pathological pregnancy, wanted or unplanned pregnancy, parity, past miscarriage or voluntary abortion, past delivery), delivery-related variables (natural delivery or planned or urgency cesarean, breastfeeding or artificial feeding and child health).

The perceived social support was assessed using the Social Provision Scale (Cutrona and Russell, 1987), a self-reporting scale consisting of 24 items. The total score ranges from 34 to 96. Higher scores denote higher perceived social support.

The assessment of depressive and anxiety symptoms included the Edinburgh Postnatal Depression Scale (EPDS), the Beck Depression Inventory-II (BDI-II), the State-Trait Anxiety Inventory I and II (STAI Y1-Y2). These instruments were administered in the woman's mother tongue and/or in the presence of a cultural mediator.

At baseline, the assessments included the EPDS, the BDI and the STAI, at 2 months the EPDS and the STAI and at 12 months only the EPDS, to minimize the burden on patients.

Recovery was defined as an EPDS score <12 or a STAI score <40.

The EPDS (Cox et al., 1987) is the most widely used measure of post-partum depression symptoms and is commonly used as a screening tool for prenatal depression as well (Gaynes et al., 2005). Each item is scored on a 4-point Likert scale from 0 to 3 with possible total scores ranging from 0 to 30. A higher score indicates higher reported frequency or severity of symptoms. The EPDS was validated in Italian and proved to have a good internal consistency (Cronbach $\alpha = 0.747$); a sensitivity of 0.556 and a specificity of 0.989 were associated with the

cut-off score of 11/12 (Benvenuti et al., 1999).

The BDI-II (Beck et al., 1961, 1996) is one of the most widely used self-rating scales for measuring depression. Beck and Steer proposed that this scale can be divided in two subscales: the cognitive-affective (items 1 to 13) and the somatic-performance (items 14–21). Each answer is scored from 0 to 3. A score ≥ 14 indicates the presence of depressive symptoms. Higher total scores indicate more severe depressive symptoms. In the present study we used the total score that ranges from 0 to 63.

The STAI Y1-2 (Spielberger et al., 1983) is a self-report scale that consists of 40 items, 20 items to assess trait anxiety (Y1) and 20 to assess state anxiety (Y2). Items are scored from 20 to 80 with a cut-off score ≥ 40 for both Y1 and Y2.

Women exceeding the cut-off score for anxiety or depressive symptoms underwent a diagnostic assessment based on ICD-10 diagnostic criteria. The diagnostic assessment was carried out by a psychiatrist and a psychologist.

2.2. Multidisciplinary psychosocial interventions

The MPI were offered proactively to all screened women and was aimed at improving the perception of social support and the resilience during the transition to parenthood. The main assumption underpinning MPI is that during pregnancy women experience significant psychological and physical changes that may affect their relationship with the partner and the family. The second assumption is that the post-partum period is crucial for the neurodevelopment of the child and for establishing a secure attachment relationship (Glover, 2015). All interventions were conducted in an empathic way to allow women to receive emotional and functional social support (Southwick et al., 2016), that encourage confidence, hope, comfort important to the motivation of care.

Interventions were delivered with a varying intensity according to the level of risk of PPD and had specific aims (Table 1).

The intervention was agreed with the woman and sometimes involved the partner or other family members. Women were offered

12–24 weekly interpersonal psychotherapy sessions and psychiatric monitoring twice a month during pregnancy and 24 bi-weekly IPT sessions in the first year post-partum if needed, when the woman was still symptomatic. Interpersonal psychotherapy was administered following the manual of Klerman et al. (1984) with some modifications to accommodate the postp-artum context (O'Hara et al., 2000). The initial sessions were devoted to identifying depression and placing symptoms in an interpersonal context. Subsequently, the therapist and patient collaborated to selecting the episode-related problems areas most related to the episode and setting treatment goals. During the intermediate sessions the therapist focused on the interpersonal difficulties concerning the post-partum period, including conflicts with the partner or the family, loss of social relationships and losses associated with the birth. In the final session the therapist reinforced the sense of competence as a person and as a mother and discussed plans for the termination of therapy. The specific objectives are described in Table 1.

Pharmacological treatment was offered as a second-line treatment to women not improving with interpersonal psychotherapy alone. Drug treatment was monitored on a regular basis once a week until stabilization of the psychopathological condition; pharmacological action was supported by a metacognitive intervention to improve clinical results and treatment compliance (Cauli 2008).

The low-risk group (LR) was offered psychosocial counseling by a clinical psychologist and/or a psychiatrist.

This intervention consisted of 7/8 sessions: the first 3/4 were scheduled after routine obstetric visits during pregnancy and additional 3/4 sessions were provided in the post-partum period if needed.

It is important to underscore that all women of the HR or LR groups who gave birth at San Paolo Hospital received a psychological and/or psychiatric visit in the post-partum. Women who delivered elsewhere received a telephone call for clinical monitoring and to provide them with social support.

The no risk group (NR) was offered an *educational intervention* of primary prevention by psychologists, to return the screening evaluation, to help them recognize possible signs and symptoms of depression during pregnancy and in the post-partum period, and to build a trustful relationship if support was needed during the perinatal period.

The study procedures were approved by the Ethics Committee of Niguarda Ca' Granda Hospital, Italy.

2.3. Statistical analysis

Continuous variables were compared among the three study groups using analysis of variance followed by post-hoc Tamhane's tests, and categorical variables were compared among groups using χ^2-test. Paired-samples *t*-test or Wilcoxon test were used to compare the scores of the depression and anxiety questionnaires during pregnancy and in the post-partum period in each group. Repeated-measure analysis of variance was used to compare the trend of EPDS scores over time between HR women who accepted MPI and those who refused the intervention.

Logistic regression was used to estimate the likelihood of being symptomatic at 2 months as a function of treatment and clinical characteristics.

3. Results

3.1. Study sample

Study participants included 318 women screened during pregnancy (Fig. 1). They had a mean age of 31.7 years (SD = 5.6), 70.1% were Italian-born, the large majority were living with their partner (95.7%), 72.1% had high school diploma or a University degree, 69.2% were working. Ninety-one women (28.6%) were classified into the HR group, 89 (28.0%) into the LR and 138 (43.4%) into the NR group. The diagnostic assessment in HR women showed that 59 (64.8%) had anxiety

and 32 (35.2%) depressive disorders. Six women (6.6%) had personality disorders co-occurring with depression ($N = 4$) or anxiety disorders ($N = 2$). Table 2 shows the characteristics of the three study groups. HR women were less likely to live with the partner and more likely to live with the original family compared with the other groups. As expected, risk factors concerning problems with the partner, with work, financial problems, personal or family history of depression and pregnancy-related variables were significantly more common in HR and LR groups than in NR women. About one third of HR women had a past history of pharmacological or psychological treatment. Moreover, HR women had significantly higher scores on EPDS, BDI and STAI scores and lower social support scores compared with the other two groups.

3.2. Treatment

3.2.1. High-risk women

The large majority of HR women (76/91, 83.5%) agreed to receive interpersonal psychotherapy. Seven discontinued IPT and started SSRI antidepressants (sertraline or paroxetine) as a second-line treatment because they did not improve with psychotherapy alone (see flow chart, Fig. 1). An additional group of 26 women not improving with psychotherapy was offered drug treatment and refused (see flow chart, Fig. 1).

Women who were already taking psychotropic drugs at the screening (paroxetine, citalopram, escitalopram or sertraline) continued their treatment during the study, except for one that was switched from venlafaxine to paroxetine and two in which benzodiazepines were discontinued and paroxetine treatment was given. All women on medication were compliant with treatment during the study. Table 3 provides detailed information on MPI uptake in women with depressive and anxiety disorders.

3.2.2. Low-risk women

Forty-two out of 89 (47.2%) of LR women agreed to receive the psychosocial intervention and 47 (52.8%) refused it; subsequently 11.9% (5/42 LR women) discontinued the intervention (see flow chart).

3.2.3. No-risk women

All women received one session of educational intervention and were assessed at 2 months post-partum.

3.3. Two-months post-partum outcomes

3.3.1. High-risk women

Of the 76 HR women who received the MPI, 51 (67.1%) recovered from depressive and/or anxiety symptoms while 25 (32.9%) remained symptomatic. Specifically, persistence of symptoms was found in 1/32 (3.1%) women treated with interpersonal psychotherapy alone, 14/26 (53.8%) of women treated with interpersonal psychotherapy who were offered pharmacological treatment but refused, in 3/7 (42.9%) women who started pharmacological treatment, in 7/11 (63.6%) women who were already taking medications at baseline.

Using a logistic regression model, we analyzed the likelihood of remaining symptomatic at 2 months as a function of diagnosis (depression vs. anxiety, treatment (IPT alone vs. SSRI), a past psychiatric history and a family history of mental disorders. Only depression (OR = 4.68, 95% CI 1.45–15.01) and a family history of mental disorders ((OR = 4.70, 95% CI 1.38–16.10) were associated with a higher likelihood of remaining symptomatic, while the use of SSRI (OR = 0.88, 95% CI 0.23–3.41) and a past psychiatry history (OR = 1.50, 95% CI 0.42–5.33) were unrelated to it.

Then we analyzed the outcomes of 14 women who had refused all interventions at baseline and found that 3 of them (21.4%) were still symptomatic at 2 months post-partum.
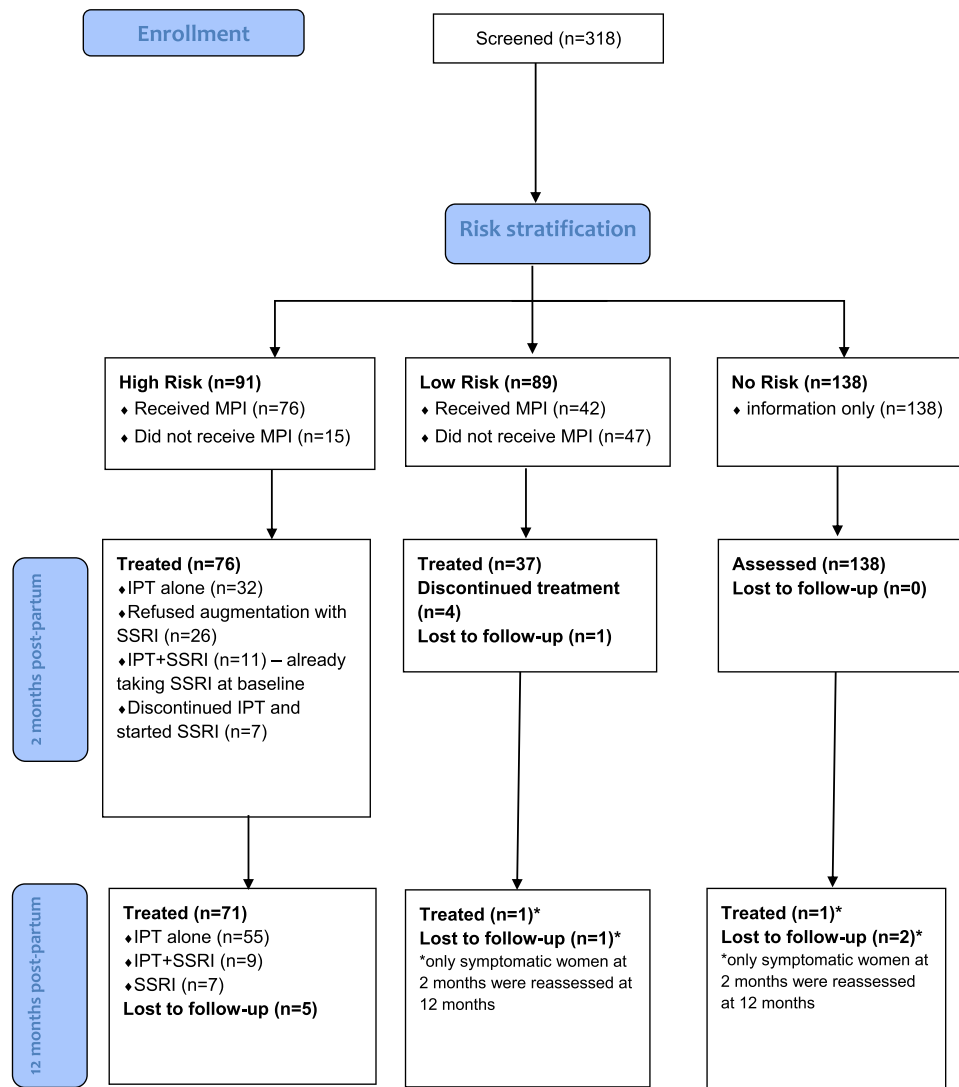
Fig. 1. Flow Diagram.

3.3.2. Low- and no-risk women

Eighty-eight LR and all NR women were assessed at 2 months post-partum. Three out of 138 NR women (2.2%) and two out of 88 LR women (2.3%) developed PPD during the post-partum period. In the NR group, 2 women had no risk factor and one had low social support; in the LR group, one had a physical illness and a family history for psychiatric disorders and one had multiple risk factors (unemployed, at risk pregnancy, past psychiatric history); both accepted the intervention during pregnancy but subsequently dropped out.

3.4. Twelve-month post-partum outcomes

We investigated whether symptomatic women at 2 months had persistent symptoms at 12 months.

3.4.1. High risk women

Of the 25 women receiving the MPI, 20 (80%) reached an EPDS score <12, 2 (8%) reported persistent depressive symptoms (EPDS $>= 12$) and 3 were lost to follow-up.

The persistence of symptoms from 2 to 12 months post-partum was unrelated to SSRI treatment (Fisher exact test, $p = 1$). The 2 women had a severe clinical condition including personality disorders. One of them had refused adjunctive drug treatment during pregnancy.

Of the 3 women not receiving the MPI, 1 had persistent depressive

symptoms and 2 were lost to follow-up.

3.4.2. Low- and no-risk women

Of the 5 women symptomatic at 2 months post-partum, 2 were no longer depressed at 12 months post-partum and 3 were lost to follow-up.

3.5. Changes in depression and anxiety scores over time

Fig. 2 shows the mean change in EPDS scores from pregnancy to the post-partum period in the three groups. In the HR group, and in two (one NR and one LR) women who developed post-partum depression, EPDS scores were collected also at 12 months. The EPDS scores of the NR and LR women at 12 months were respectively 5 and 8 and are not reported in Fig. 2.

Significant decreases in EPDS scores from baseline to 2 months post-partum were found in LR women (1 point on average, t-test = 2.7, $p < 0.01$), and in the HR group (about 5 points on average, t-test = 8.7, $p < 0.001$). In this latter group, scores continued to decrease significantly from 2 to 12 months post-partum (t-test = 4.5, $p < 0.001$).

BDI and STAI scores decreased significantly from pregnancy to the 2 months post-partum only in HR women (BDI: from 11.1 to 7.6; Wilcoxon test, $p < 0.001$; STAI: from 47.4 to 37.6; Wilcoxon test, $p = 0.002$), while scores did not change significantly in the other two

Table. 2
Characteristics of the study groups.

n (%)		No risk (138)	Groups Low risk (89)	High risk (91)	χ²	p-value
Citizenship					11.55	0.316
	Italy	98 (71)	61 (68.5)	64 (70.3)		
	Other European countries	21 (15.2)	13 (14.6)	9 (9.9)		
	Asia	3 (2.2)	1 (1.1)	5 (5.5)		
	Africa	4 (2.9)	3 (3.4)	7 (7.7)		
	Middle East	0 (0.0)	1 (1.1)	0 (0.0)		
	South America	12 (8.7)	10 (11.2)	6 (6.6)		
Education					1.14	0.887
	Secondary	39 (28.3)	25 (28.4)	24 (26.4)		
	High school	68 (49.3)	40 (45.5)	48 (52.7)		
	Univ. degree	31 (22.5)	23 (26.1)	19 (20.9)		
Work					7.33	0.501
	Housewife	13 (9.4)	6 (6.8)	7 (7.7)		
	Unemployed	23 (16.7)	25 (28.4)	19 (20.9)		
	Employed	91 (65.9)	50 (56.8)	59 (64.8)		
	Self-employed	8 (5.8)	7 (8.0)	5 (5.5)		
	Student	3 (2.2)	0 (0.0)	1 (1.1)		
Paid maternity leave	Yes	95 (70.4)	48 (57.1)	60 (65.9)	4.02	0.134
Living with	Partner	132 (95.7)	86 (96.6)	77 (84.6)	12.84	**0.002**
Marital status					16.39	.174
	Single	0 (0.0)	1 (1.1)	4 (4.4)		
	Engaged	4 (2.9)	2 (2.2)	5 (5.5)		
	Living with partner	47 (34.3)	28 (31.5)	25 (27.5)		
	Married	84 (61.3)	52 (58.4)	52 (57.1)		
	Separated	2 (1.5)	5 (5.6)	3 (3.3)		
	Divorced	0 (0.0)	0 (0.0)	1 (3.3)		
	missing	0 (0.0)	1 (1.1)	1 (3.3)		
General distress					49.27	**<0.001**
	Yes	41 (29.9)	21 (24.2)	22 (24.4)		
	No	90 (66.5)	33 (37.9)	37 (41.2)		
	Many	5 (3.6)	33 (37.9)	31 (34.4)		
Financial problems	Yes	10 (7.3)	26 (29.5)	25 (27.5)	22.50	**<0.001**
Problems with partner	Yes	9 (6.6)	10 (11.4)	16 (17.6)	6.75	**0.034**
Illness	Yes	5 (3.6)	11 (12.5)	11 (12.1)	7.42	**0.024**
Change in residence	Yes	5 (3.6)	15 (17.0)	12 (13.2)	11.88	**0.003**
Unemployed	Yes	10 (7.3)	19 (21.6)	16 (17.6)	10.13	**0.006**
Change in work	Yes	6 (4.4)	13 (14.9)	11 (12.2)	7.91	**0.019**
Psychiatric history	Yes	3 (2.2)	47 (52.8)	61 (67.0)	118.26	**<0.001**
Previous treatment					45.31	**<0.001**
	Psychotherapy	2 (1.5)	11 (12.4)	12 (13.2)		
	Drug	2 (1.5)	4 (4.5)	4 (4.4)		
	Both	0 (0.0)	8 (9.0)	16 (17.6)		
	None	133 (97.1)	66 (74.2)	59 (64.8)		
Family history	Yes	5 (3.7)	31 (35.2)	34 (37.4)	50.65	**<0.001**
Trimester					4.68	0.321
	First	11 (8.0)	10 (11.2)	8 (8.8)		
	Second	71 (51.8)	47 (52.8)	58 (63.7)		
	Third	55 (40.1)	32 (36.0)	25 (27.5)		
Type of pregnancy					6.76	**0.034**
	Physiological	118 (85.5)	69 (78.4)	65 (71.4)		
	At risk	20 (14.5)	19 (21.6)	26 (28.6)		

Mean (SD)	No risk	Groups Low risk	High risk	ANOVA F-test	p-value	post > hoc (p = 0.017)
Age	31.4 (5.2)	31.7 (6.0)	32.1 (5.7)	0.432	0.650	
EPDS	3.8 (2.7)	5.2 (3.0)	12.3 (4.0)	198.2	<0.001	High > low, no; low > no
BDI	3.3 (2.9)	4.2 (3.0)	11.1 (6.2)	80.16	<0.001	High > low, no
STAI1	30.4 (5.3)	28.3 (5.8)	47.3 (8.6)	114.16	<0.001	High > low, no
SPS	84.4 (6.6)	83.7 (7.4)	77.4 (10)	77.4	<0.001	High < low,no

Table 3
Acceptability of the MPI in the HR group according to the diagnosis.

	Depressive disorders		Anxiety disorders	
	Total $N = 32$	Number dropped out from MPI	Total $N = 59$	Number dropped out from MPI
Refused any intervention	3	–	12	–
Improved with psychotherapy alone	9	0	23	2
Did not improve with psychotherapy alone and initiated drug	5	0	2	0
Already taking medications at baseline	6	2	5	0
Did not improve with psychotherapy but refused drug treatment	9	2	17	1

groups.

We carried out secondary analyses to determine the extent to which the depressive symptom improvement could be attributed to the MPI among high-risk women. Specifically, we compared the EPDS scores during pregnancy and at 2 and 12 months between women who accepted the MPI and those who refused it using repeated-measures analysis of variance. Fig. 3 indicates that women who accepted the MPI had higher mean EPDS baseline scores and higher improvements over time compared with those who refused the interventions. The repeated-measure analysis of variance indicates a significant reduction of EPDS scores over time ($F = 59.0$, $p < 0.001$), that did not differ between women who accepted the MPI and those who did not ($F = 1.554$, $p = 0.216$). When analyses were replicated excluding women with personality disorders, results were overlapping with those of the full HR sample (data not shown).

4. Discussion

Parenthood is a major life transition and a substantial number of women have difficulty coping with this experience. While the majority of women are resilient to the negative consequences of stress, a significant minority develop psychological symptoms that markedly interfere with their functional capacity; others may initially develop symptoms and recover, or develop delayed symptoms over time (Southwick et al., 2016).

For this reason, it is important to identify the level of risk of each woman in pregnancy and support them to improve their resilience and social and environmental conditions. A large body of research (National Scientific Council on the Developing Child, 2010) found that social and environmental conditions can support the development of individual attributes and skills commonly associated with resilience. In particular, there is substantial evidence that one of the most effective ways to increase resilience in a child is to focus on the well-being and child-rearing skills of his/her parents (Anacker et al., 2014).

In order to identify and/or prevent depressive and anxiety disorder
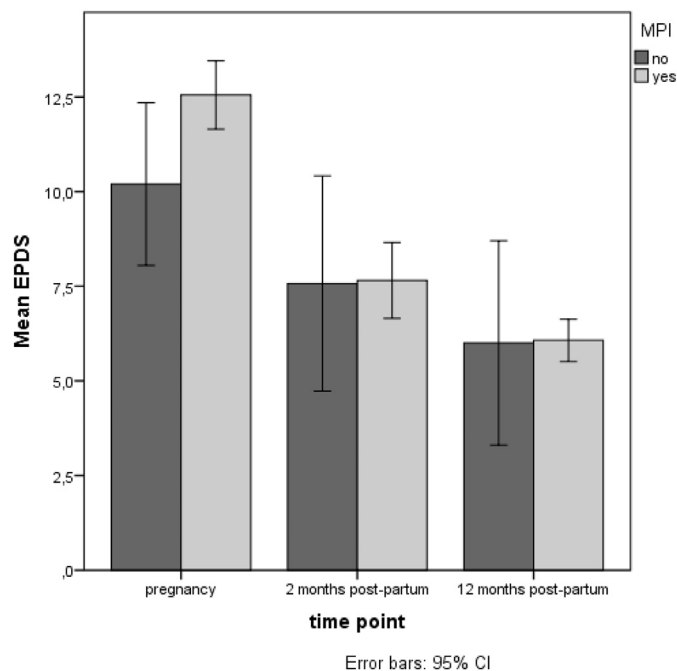
Fig. 3. EPDS scores during pregnancy and in the post-partum in HR women who accepted and in those who refused the MPI.

during pregnancy that may have a potential disruptive effect on the mother and the child, we developed a multidisciplinary psychosocial intervention model differentiated according to the presence of psychosocial risk factors and/or antenatal depression of anxiety symptoms. For women without risk factors or symptoms, the intervention was only educational. Our approach is consistent with the broad theoretical and practical approach of antenatal maternal mental health and well-being advocated by the National Institute for Health and Care
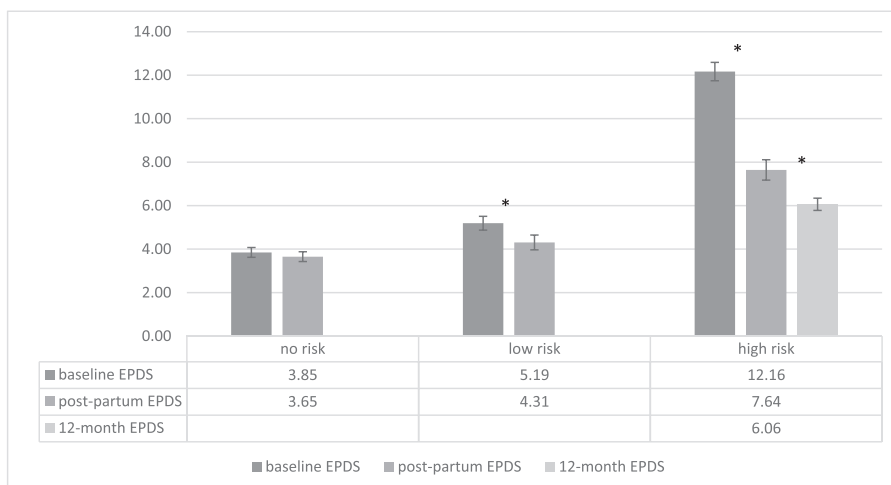
Fig. 2. Mean EPDS scores during pregnancy and in the post-partum in the study groups.

Excellence (2014) (Fontein-Kuipers, 2015) that recommend universal (assessment at first contact for mental health and well-being), selective (assessment and referral for additional support of women with personal or family history of mental illness), and indicated prevention (referral for additional help and support of women with suspicion or symptoms of mental illness).

Concerning the prevalence of antenatal symptoms, our results indicate that 28.6% of pregnant women had significant depressive (10%) or anxiety symptoms (18.6%), 28% had risk factors and a minority (43.4%) had neither symptoms nor risk factors. Our global percentage of prevalence of antenatal symptoms is consistent with literature data (Dennis et al., 2017; Fairbrother et al., 2016).

The MPI offered to women with high risk was in general well accepted, with an uptake of 83.5% and a discontinuation rate of 9.2%. The acceptance rate of the psychological intervention is more than twice as high as that reported by Banti et al. 2011 (34.8%). A possible reason for the high uptake of our MPI is that it was offered proactively, while in Banti et al. it was delivered on women's request.

Among low-risk women, 47% accepted the psychosocial intervention. This result can be explained by the lower motivation of non-symptomatic women in engaging in a therapeutic relationship.

The MPI proved to have a positive effect in terms of recovery, symptom reduction and in preventing a new onset of depression.

In the HR group, the MPI consisted in the large majority of IPT alone (58/76, 76.3%): women receiving this treatment were either those who benefited from monotherapy or those who were offered augmentation with SSRI and refused. Refusal of pharmacotherapy as a second line treatment was common, indicating concerns about possible side effects of drugs on the newborn.

The rest of the sample (23.7%) accepted SSRIs as a second line treatment or continued the ongoing treatment with IPT + SSRIs.

Only one third of HR women treated with MPI (25/76, 32.9%) remained symptomatic at 2 months post-partum: treatment with SSRI was unrelated with outcome, after controlling for diagnosis, past psychiatric history and family history, suggesting that it did not confer an additional benefit over IPT alone.

The large majority of HR women (20/25, 80%) recovered at the one-year follow-up. On average there was no worsening of clinical symptoms, indicating that the intervention had at least a stabilizing effect.

Our findings concerning the effect of MPI treatment in symptomatic women are consistent with previous literature findings (Clatworthy, 2012; O'Hara et al, 2000; Appleby et al., 1997). It is worth remarking that the majority of women had anxiety disorders, that usually remit in a short time when treated.

As to the preventive effect of the MPI, our results indicate that among non-symptomatic women, only 2.2% developed depressive symptoms in the post-partum.

This incidence is lower than that reported in an Italian cohort study (2.2% during pregnancy and 6.8% in the post-partum, Banti et al. 2011), in which psychotherapy and drug treatment were delivered to pregnant women with minor or major depression and no psychosocial intervention was given to non-symptomatic women.

Thus our findings that the psychosocial interventions delivered to non-symptomatic women with risk factors (LR) had a preventive effect is consistent with Milgrom et al. (2011) findings. A recent review on depression prevention in low-risk women lends support to the use of preventive interventions (Van der Waerder et al., 2011).

Gagnon and Sandall (2007) reported that educational interventions have no preventive effect on PPD onset. However, our intervention differs from the educational programs reported by the literature because it is not only intended to provide information on the PPD but to increase the women's perception of the social support, by working on the social network, the family network and offering a support network when needed.

5. Limitations

Our results should be interpreted in light of some important limitations. One is the lack of a control group that was not offered the MPI. Although we tried to address this limitation by comparing the trend of EPDS scores between women who accepted the MPI with those who refused, we failed to find a significant difference. A possible explanation is that both groups women received a feedback on the screening results and information about post-partum depression and its consequences on the mother and the child at study entry. It is possible that being involved in the study procedures had an effect per se and mitigated the differences with the active MPI intervention.

The second is the low recruitment rate, related to budget constraints on the study personnel. However, this latter limitation has no effect on the representativeness of women, who presented to the hospital for the routine obstetrical visits provided free of charge during pregnancy by the National Health System. The third limitation is that the reasons for refusal and discontinuation of MPI have not been recorded in the database and are not available. The fourth limitation is that the actual number of psychotherapy sessions is not available because linkage with the administrative database of the mental health system, where psychological and psychiatric services are recorded, could not be performed for privacy reasons.

6. Conclusions

The MPI is a structured assessment and psychosocial intervention addressed to women during the perinatal period. Because it is aimed to prevent the onset and the effects of post-partum depression on the mother and the child, it has important public health implications in terms of promoting resilient communities and reducing the intergenerational transmission of psychopathology vulnerability (Bouvette-Turcot et al., 2015). The MPI program contributed to the definition of regional guidelines on the diagnostic-therapeutic pathway for women with risk factors for perinatal disorders and to promoting the sensitization of health care professionals on this topic.

Our findings underscore the potential usefulness of MPI in recognizing early signs or symptoms during pregnancy and the advantage of building specific interventions for preventing post-natal depression. Concerning the effects of MPI among symptomatic women, our results suggest some benefits of the intervention, that however did not exceed significantly those observed in the small subgroup of women who refused the intervention. Thus, in the absence of a control group, our results are preliminary and warrant confirmation and testing in future randomized clinical trials.

Author contribution

Gilla Cauli and Elena Iapichino wrote the first draft of the paper and carried out the literature review. Paola Rucci conducted the statistical analyses and contributed to the paper writing. Marta Quartieri Bollani, Anna Maria Marconi, Mariano Bassi, Costanzo Gala revised the paper and provided important intellectual contributions. All the authors approved the final version.

Conflict of interest

The authors have no conflicts of interest to declare in relation to the present work.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2018.12.028.

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