Is the effect of postpartum depression on mother-infant bonding universal?

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A B S T R A C T

Purpose: Although the negative consequences of maternal depression on infants has been documented in several Western societies, similar studies have not been conducted in Middle-Eastern countries where cultural norms and traditions may differ. The main objective of this study was to determine the risk factors for postpartum depression (PPD) and its relationship to mother−infant bonding in a Lebanese population.
Methods: One hundred and fifty participants were administered the Edinburgh Postpartum Depression Scale (EPDS), and the social support scale at 2–3 days postpartum. At 10–12 weeks mother–infant bonding using the Postpartum Bonding Questionnaire (PBQ) and depression using the Beck Inventory (BDI-II) were assessed during a telephone interview.
Results: The prevalence of depression was 19% with an average score of 10.9 ± 6.02 on the EPDS. At 10–12 weeks 2.7% of the whole sample was depressed with an average score of 18.60 ± 16.87 on the BDI-II. Risk factors of PPD on the EPDS were; history of alcohol use, complications during pregnancy, not a good marital relationship, baby admitted to an intensive care unit, history of depression and low social support. Risk factors for impaired bonding were age, history of depression, BDI-II scores above 20 and low social support. The multiple regression analysis found that impaired bonding was associated with older age, history of depression and low social support, which explained 39% of the variance, F = 7.12, p = 0.02.
Conclusion: The prevalence of PPD was higher than previously reported at day 2–3 post-delivery, but lower at 10–12 weeks postpartum. Impaired mother- infant bonding was associated older mothers, history of depression, low social support and BDI-II scores above 20 which should alert practitioner to assessing these factors in post-partum mothers.

1. Introduction

The effect of maternal depression on infants has been documented for decades in several studies mostly in the Western world (Beeghly et al., 2017; Closa-Monasterolo et al., 2017; Dubber, Reck, Müller, & Gawlik, 2015). Depressed mothers have a difficult time adjusting to motherhood, are less sensitive to their infant cues, resulting in less than optimal attachment to their infants (Miklush & Connelly, 2013; Tietz, Zietlow, & Reck, 2014). Even mild depressive symptoms in the postpartum period can influence mother-infant attachment and child development (Behrendt et al., 2016; Deave, Heron, Evans, & Emond, 2008; Nieto, Lara, & Navarrete, 2017). A negative mother infant relationship in the early years of the infant's life has long lasting negative consequences emotionally, socially and cognitively (Abdollahi, Etemadinezhad, & Lye, 2016; Choi, Sikkema, Vythilingum, Geerts, & Watt, 2017; Kerstis et al., 2016).

One of the objectives of the *Healthy People 2020* is to decrease the number of women who experience postpartum depression (PPD) after delivery. Although some countries have reported a decline in the prevalence of PPD in the past decade (Ko, Rockhill, Tong, Morrow, & Farr, 2017), similar declines have not be universal. Prevalence of PPD varies across and within countries from 0 to 15% in some high income countries to 10–60% in low income countries (Gelaye, Rondon, Araya, & Williams, 2016). Unfortunately, few mothers are diagnosed which may lead to chronic depression and a disturbed mother infant relationship. This is especially true for developing countries where mental health remains a stigma and is not covered by most insurance programs or governmental agencies (Gearing et al., 2015). In the Middle East, Chaaya et al. (2002) found a PPD prevalence of 21.3% among 396 Lebanese women while a recent study from Jordan reported a prevalence of 25% in 315 women (Safadi, Abushaikha, & Ahmad, 2016) and in Qatar the prevalence was 17.6% in 1379 women (Burgut, Bener, Ghuloum, & Sheikh, 2013)

The detection of PPD and its effect on the mother infant relationship may differ among cultures and is of paramount importance to clinicians in order to provide the necessary referrals and sensitive interventions. Factors noted in previous studies to influence PPD and the mother-infant relationship were assessed in this study and included: age, parity, education, type of delivery, complications during pregnancy, happy with pregnancy, infant's gender, social support,history of alcohol use and depression and having a sick newborn (Dennis & Ross, 2006; Dubber et al., 2015; Ko et al., 2017).

The main objective of this study was to investigate whether postpartum depression has an effect on mother-infant bonding at 10–12 weeks after delivery. The secondary objectives were to assess the effect of potential confounders; age, parity, education, type of delivery, pregnancy complications marital relationship, happy about pregnancy, gender of baby, desired gender, presence of support systems, mother's history of alcohol use and depression and infant's admission to the Neonatal Intensive Care Unit (NICU) on PPD and mother-infant bonding. The results may provide information for the development of effective, culturally relevant psychosocial interventions that promote a healthy mother-infant relationship. The research questions were:

1) What is the prevalence of PPD in women delivering at a university hospital in Lebanon?
2) What are the risk factors for developing PPD?
3) What are the associations between the confounding variables, the EPDS, BDI-II scores and mother infant bonding?
4) What are the best predictors for mother infant bonding?

2. Methods & materials

2.1. Design

A prospective longitudinal study using surveys was used with data collected between July1, 2014 to June 30, 2016.

2.2. Setting

The study was conducted at a tertiary referral 420 bed University Medical Center in Lebanon, a small middle-income country on the Eastern Mediterranean, with an estimated population of 4 million people (Hajj et al., 2015). The hospital provides all kinds of medical, surgical and specialized services to the people of Lebanon and the region with around 30,000 patients a year (Hajj et al., 2015). It is JCI and ACGME-I accredited and Magnet designated. The obstetric unit where the participants were recruited has 24 beds, with around 100 deliveries a month. Outpatient and inpatient management of mental illness is mostly not covered by Ministry of Health or by private insurance companies (Chahine & Chemali, 2010).

2.3. Sample

A convenience sample of 150 women between the ages of 18 and 45 were recruited. Sample size was determined based on a previous study with a prevalence of 21.3% (Chaaya, El Kak, Shaar, & Harb, 2002) a power of 80%, and a 0.05 significnae. All women had recently delivered, were between the ages of 18–45 years, had a live birth during the study period and were willing to participate. Women were excluded if they had severe chronic illnesses such as epilepsy, COPD, Hepatitis C or cancer. From the 200 women approached, 150 (75%) agreed to participate. At 10–12 weeks after delivery, 125 (83%) women were contacted, an attrition rate of 17%. Of the 29 depressed women after delivery, we were able to contact 25, an attrition rate of 9%. Attrition was due to incorrect phone numbers or moving out of the country.

2.4. Instruments

Two instruments were used to assess depression, the Edinburgh Postnatal Depression Scale (EPDS) and the Beck Depression Inventory-II (BDI-II). Although both instruments are highly correlated and accurate in diagnosing PPD, the EPDS has been used mostly in the early post-partum period. Thus, we opted to use the BDI-II at 10–12 weeks which corresponds to the criteria for DSM-IV depressive diagnoses and more likely to be accepted by our psychiatrists for referral (Chaudron et al., 2010; Moraes, Lorenzo, Pontes, Montenegro, & Cantilino, 2017; Sit, & Wisner, 2009)

The Edinburgh Postnatal Depression Scale (EPDS) was used to assess maternal depression.The EPDS is the most commonly used instrument to assess PPD, it is written at a fourth-grade reading level, can be completed in 5–7 min with ten items ranging from zero (no symptom) to three (severe symptoms), with a final score from 0 to 30 points (Cox, Holden, & Sagovsky, 1987; Dennis & Ross,

2006). The EPDS has been used and validated in various ethnic and socioeconomic groups (Gelaye et al., 2016; Hanusa, Scholle, Haskett, Spadaro, & Wisner, 2008; Khalifa, Glavin, Bjertness, & Lien, 2015) We used the previously validated EPDS Arabic version (Ghubash, Abou-Saleh, & Daradkeh, 1997) with a cut off score of "13 or more" as recommended by several studies (Aydin, Inandi, Yigit, & Hodoglugil, 2004; Chaaya et al., 2002). For this study the Cronbach's alpha for the Arabic EPDS was r = 0.82.

The Beck Depression Inventory-II (BDI-II) was used for mothers who score above 13 on the EPDS. The BDI-II is a self-assessment tool that consists of 21 items which evaluate depressive symptoms such as sadness, guilt, punishment, and suicide. A total score of 0–13 is considered to be within the 'minimal' range, 14–19 is 'mild,' 20–28 is 'moderate,' and 29–63 is 'severe' depression (Beck, 2001). The Beck was translated to Arabic (West, 1985) with adequate reliability and validity in several Arabic countries (Al Alansari, 2006). The Cronbach's alpha of the BDI-II in this study was r = 0.93.

Social support was measured using, the Multidimensional Perception of Social Support (MSPSS) which assesses perceived social support from family, friends and significant others (Zimet, Dahlem, Zimet, & Farley, 1988). It includes 12 items, each scored on a seven-point Likert-type response (1 = very strongly disagree; 7 = very strongly agree). The total score ranges between 12 and 84, with higher reflecting higher perceived social support; scores of 13–48 indicate a low social support, scores of 49–68 indicate moderate social support and scores of 69–84 indicate a high social support. The MSPSS has 3 subscales; support from family (4 items) support from friends 4 items and support from significant other (4 items). The reliability and validity of this scale has been confirmed in several studies (eg. Bruwer, Emsley, Kidd, Lochner, & Seedat, 2008). The MSPSS has been translated into Arabic and used by several researchers with good reliability and validity (eg. Aroian, Templin, & Ramaswamy, 2010). For this study the Cronbach's alpha was r = 0.91.

Mother-infant bonding was assessed by the abridged 16 item version of the Postpartum Bonding Questionnaire (PBQ) (Reck et al., 2006). Seven of the 16 items with positive responses, such as "I enjoy playing with my baby", are reversed while negative responses, such as "I am afraid of my baby", are scored from 5 ('always') to zero ('never') resulting in sum scores between 0 and 80 points. Higher scores indicate impaired bonding. The PBQ-16 has been validated with good internal consistency of Cronbach's of 0.85 and 0.83 (Dubber et al., 2015; Reck et al., 2006). The PBQ was translated to Arabic by the principal investigator (LKB) and back translated to English by a nurse researcher and validated on a sample of ten women. The Cronbach's alpha internal consistency in this study was r = 0.79.

Socio-demographic data was obtained from mothers and their medical records and included: age, parity, level of education, type of delivery, pregnancy complications, martial relationship (good, not good), whether the mother was happy with the pregnancy, gender and whether the infant was the gender they/she wanted, history of alcohol use and depression and whether the infant was transferred to the NICU.

2.5. Data collection

Mothers who deliver at our center are often discharged on the second or third day after delivery for an uncomplicated delivery and on the third or fourth day for a complicated delivery or a C-section. Women were informed about the study via flyers and by the nurses on the unit. After signing the written consent form; women were interviewed face to face in their private rooms by two research nurses who completed the EPDS, the social support questionnaire and the socio-demographic data sheet. All mothers were contacted at 10–12 weeks after delivery via phone in order to administer the postpartum bonding questionnaire (PBQ); those who scored above 13 on the EPDS were asked to complete the BDI-II. Mothers with EPDS scores above 13 or BDI-II scores above 20 were instructed to contact their obstetrician or the psychiatry department for follow-up and their obstetrician was notified.

2.6. Data analysis

Data was analyzed using SPSS version 24 (Chicago, SPSS Inc). The sample characteristics were described using means and standard deviations. For missing data on 16 participants, person mean substitution (PMS) was conducted to impute the value for a variable in cases with less than 20% of data missing (Hawthorne & Elliott, 2005). Prevalence was calculated based on the percent of women with PPD. Bivariate analyses for the risk factors for depression on the EPDS were performed using chi-square tests (χ^2) and Odds ratio (OR). Years of education and age were grouped into three categories for ease of analysis and social support on the MSPSS was divided into 2 categories, below and above the sample mean. Bivariate analysis for the outcome variable "maternal-infant bonding" was performed using ANOVA. Variables identified as significant risk factors on the bivariate analyses with a $p \leq 0.1$ were carried forward into multivariate analysis to obtain the best predictors of mother-infant bonding at 10–12 we The majority (62%) claimed that the infant was the gender they wanted.

3. Results

3.1. Background characteristics

of the participants are noted in Table 1. The mean age was 30.65 ± 4.92, years of education was 13.25 ± 7.23, with the 63% of mothers having a university degree or postgraduate degrees. Fifty six mothers (37%) were primi-paras, 46 (31%) had complications during pregnancy, all were married and 89 (61%) indicated they had a good marital relationship. More than half (59%) said they were very happy with their pregnancy; 74 (49%) were boys, 93(62%) indicated it was the gender they wanted, 25 (16%) had a personal history of depression and 26 mothers (17%) admitted to alcohol use during pregnancy. Forty infants (27%) were admitted to

Table 1
Characteristics of participants N = 150.

Variable	Mean (SD)	N	%
Mother's age	30.65 ± 4.92		
Years of Education	13.25 ± 7.23		
Parity			
1st child		56	37
2nd child		67	45
Type of Delivery			
Vaginal		91	61
C/section		59	39
Complication in pregnancy (yes)		51	34
Marital Relations (good)		89	59
Happy with pregnancy (yes)		92	61
Gender of child			
Boy		74	49
Girl		76	51
Desired gender of child (yes)		93	62
Alcohol use (yes)		26	17
H x of Depression (yes)		25	16
Baby in the NICU		40	27

the NICU.

3.2. EPDS

The mean values for the EPDS, the BDI-II at 10–12 weeks, the MSPSS scores and mother-infant bonding (PBQ) are noted in Table 2. The mean score on the EPDS was 10.9 ± 6.02, for the BDI-II, which was assessed on the 25 mothers with EPDS scores above 13, the mean was 16.60 ± 12.87, two mothers (8%) had a scores above 29 (severe depression). For the Postpartum Bonding Questionnaire (PBQ) the total score was 46.48 ± 12.44. The total score for social support on the MSPSS was 68.15 ± 10.82 with the highest score for friends 25.57 ± 7.563.

3.3. What is the prevalence of PPD in women delivering at a university hospital in Lebanon?

The prevalence of PPD after delivery was 19% and at 10–12 weeks it was 2.7%. The majority of mothers with scores above 13 in the EPDS either had a history of depression (76%) or had an infant in the NICU (76%).

3.4. What are the risk factors for developing PPD?

In terms of the relationship between the background characteristics and postpartum depression on the EPDS, five variables were significant (Table 3). These variables were: complications during pregnancy, OR = 3.62 (1.56–8.38), $p = 0.02$, history of alcohol use, OR = 17.626 (6.53–48.01), $p = 0.00$, history of depression, OR = 18.85 (4.25–33.59), $p = 0.00$, a bad martial relationship, OR = 3.57 (1.53–8.38), $p = 0.02$, baby admitted to the NICU, OR = 17.98 (CI = 6.70–48.25), $p = 0.00$ and low social support, OR = 6.92 (1.56–30.54), $p = 0.003$. For depression at 10–12 weeks the only variables that remained significant were history of

Table 2
Scores on the instruments used.

Instruments	N	%	
EPDS N = 150			**Mean +/− SD**
0−9	65	43	10.9 ± 6.02
10–12	56	38	
> 13	29	19	
BDI − II N = 25			18.60 ± 16.87
0−13	18	15	72
14–19	3	2	12
20–28	2	8	8
> 29	2	8	8
			Total score +/− SD
Social support MSPSS total score N = 150			68.15 ± 10.82
Friends			25.57 ± 7.563
Family			22.34 ± 6.23
Significant others			20.24 ± 5.45
PBQ N = 125 total score			46.48 ± 12.44

Table 3
Risk Factors for PPD on the EPDS for scores above 13.

Variable	Yes PPD N = 29	No PPD N = 121	X^2/OR (CI)	p value
Age			0.19	0.91
18–25	8	62		
26–35	7	45		
36	4	24		
Education			2.44	0.29
0−9	3	15		
10–12	7	30		
> 13	9	86		
Parity			1.91	0.38
1	11	47		
2	9	53		
3 or more	9	22		
Type of Delivery			1.94 (0.85–4.40)	0.11
C/section	16	43		
Vaginal	13	78		
Complication of pregnancy			3.62 (1.56–8.38)	
Yes	17	34		
No	12	87		0.02
Marital Relationship			3.57 (1.53–8.38)	
Good	10	79		
Not good	19	42		0.02
Happy with pregnancy			0.53(0.24–1.19)	
Yes	14	78		
No	17	51		0.12
Gender of child			0.93 (0.43–2.10)	
Boy	15	59		
Girl	16	60		0.09
Gender is what you wanted			0.99 (0.26–1.25)	
Yes	14	79		
No	15	42		0.09
Alcohol use			17.626 (6.53–48.01)	
Yes	17	9		
No	12	112		0.00
H x of Depression			18.85 (4.25–33.59)	
Yes	22	3		
No	7	118		0.00
Baby in NICU			17.98 (6.70–48.25)	
Yes	22	18		
No	7	103		0.00
Social Support			6.92 (1.56–30.54)	
High	2	41		
low	27	80		0.003

depression, OR = 5.11 (CI = 1.11–6.23), p = 0.01 and low social support, OR = 4.45 (1.89–9.24), p = 0.03.

3.5. What are the associations between socio-demographic variables, the EPDS, BDI-II scores and mother infant bonding (PBQ)?

Less optimal bonding was significantly correlated with maternal age (F (3/121) = 6.54, p = 0.02), with older mothers having higher scores on PBQ; history of depression (F(2/122) = 17.30, p = 0.00) with depressed mothers having higher PBQ scores; low social support (F 2/122 = 18.67, p = 0.00) where less support was associated with higher PBQ scores. Depression on the BDI-II was significantly related to bonding with moderately and severely depressed mothers having higher PBQ scores at F (2/122) = 5.85, p = 0.02 (Table 4). The same significance was not noted between the EPDS scores and bonding.

3.6. What are the best predictors for mother infant bonding?

The main effects of the multivariable analysis as noted in Table 5 showed three predictor variables to be significantly associated with bonding; mothers' age (t = 2.14, p = 0.002), history of depression (t = −2.13, p = 0.037), and social support (t = −2.56, p = 0.012). These three predictors explained 39% of the variance, F = 7.12, p = 0.02.

4. Discussion

The main objective of this study was to determine if post-partum depression after birth in addition to maternal characteristics were related to maternal infant bonding at 10–12 weeks in a Lebanese population. The study also investigated factors that are related

Table 4

ANOVA for Risk factors for bonding on the PBQ.[a]

Variable	PBQ scores	F value	P values
Age		6.54	0.02
18–25	8.23 ± 2.54		
26–35	10.88 ± 3.11		
>36	11.22 ± 4.22		
Education		2.67	0.11
0−9	12.13 ± 3.76		
10–12	10.22 ± 2.98		
>13	9.46 ± 3.12		
Parity		1.91	0.38
1	10.23 ± 3.24		
2	11.56 ± 4.15		
> 3	10.67 ± 2.46		
Type of Delivery		1.37	0.24
C/section	8.72 ± 4.38		
Vaginal	11.92 ± 6.44		
Complications during pregnancy: Yes No	10.55 ± 4.32	0.44	0.85
	10.69 ± 3.95		
Marital Relationship: Good	9.65 ± 4.24	1.43	0.24
Not Good	11.78 ± 5.44		
Happy with pregnancy: Yes	9.45 ± 3.69		0.25
No	11.26 ± 5.46	1.85	
Gender of child		2.67	
Boy	10.21 ± 2.45		
Girl	9.34 ± 3.99		0.11
Gender is what you wanted: Yes	9.84 6.64	2.26	0.14
No	12.14 5.44		
Alcohol use: yes	9.97 ± 3.78	0.23	0.63
No	10.86 ± 5.22		
History of depression: Yes	12.34 ± 2.33	17.3	0
No	9.45 ± 4.22		
Social Support: High	8.43 ± 3.22	18.67	0
Low	12.98 ± 4.12		
EPDS Scores > 13	12.45 ± 6.13	1.94	0.15
< 13	9.56 ± 4.90		
BDI-II scores > 20	12.35 ± 4.33	5.85	0.02
< =20	8.58 ± 2.96		
Baby in NICU: Yes	12.34 ± 2.78	0.99	0.32
No	9.48 ± 5.97		

[a] PBQ higher scores indicate impaired bonding.

Table 5

Multiple linear regression with Mother infant Bonding as the outcome.

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	33.75	3.74		9.02	0.000
EPDS above13	0.63	0.77	0.08	0.82	0.413
BDI-II	0.89	0.65	0.12	1.34	0.210
Age in years	0.16	0.07	0.22	2.14	0.036
Gender of child	0.25	0.46	0.06	0.56	0.577
Desired gender	−2.08	1.15	−0.19	−1.81	0.074
History of depression	−2.26	1.06	−0.23	−2.13	0.037
Social support	−0.65	0.25	−0.27	−2.56	0.012

$R^2 = 0.39$, F = 7.12, $p = 0.02$.

to depression in a Lebanese population. The characteristics of the sample are not very different from previous studies conducted in Lebanon in university hospitals (eg. El-Hachem et al., 2014; Osman, Saliba, Chaaya, & Naasan, 2014). The prevalence of PPD in our study was 19% after delivery which is higher than that reported in Lebanon by El-Hachem et al. (2014) at 12.8% and closer to what was reported by Chaaya et al. (2002) at 16% in the city of Beirut. The prevalence reported in several countries in the Middle East range between 19–25% (Abdollahi et al., 2016; Safadi et al., 2016). The differences in rates could be attributed to several factors including the method and timing of data collection and the inclusion of high risk mothers. Chaaya et al. (2002) in accordance with our study collected the data using face to face interviews while Hashem et al., used self- reporting. It is possible that face to face

interviews elicited more accurate information which is contrary to what most researchers postulate that self-report yields higher rates. Moreover, some studies (eg. El-Hachem et al., 2014) included mothers whose infants were transferred to the NICU, while others did not account for this variable (eg. Abdollahi et al., 2016; Chaaya et al., 2002) which may affect the results.

The 2.7% prevalence of depression at 10–12 weeks is much lower than what has been reported in studies of postpartum depression in the Middle East (Alfayumi-Zeadna, Kaufman-Shriqui, Zeadna, & Lauden, 2015; Bener, Burgut, Ghuloum, & Sheikh, 2012; Khalifa et al., 2015). Several explanations are plausible. First we had a loss to follow up of 9% or 4 out of 29 depressed mothers, if all four were depressed our prevalence would have been higher. Second, the cut of point of 13 or more on the EPDS may have masked the prevalence of depression in several women with scores between 10 and 13 and which we did not follow up. Cut off scores have varied across studies with some studies using a cutoff score of 9 or 10 and others using a cut off score of 13 which may have a substantial effect on prevalence rates (Alfayumi-Zeadna et al., 2015; El-Hachem et al., 2014; Khalifa et al., 2015; Sit & Wisner, 2009, 2015). Third we assessed depression at 10–12 weeks postpartum which may have not captured mothers who show signs of depression later on. For example, Mohammed et al. (2014) reported that the onset of depressive symptoms in Egyptian mothers occurred between the second and third months postpartum. This was attributed to the help a new mother gets from her family after childbirth which many delay the onset of depression. Another explanation may be the fact that the majority of depressed mothers (79%) assessed 2–3 days post-partum were mothers whose infants were transferred to the NICU by 2–3 months these infants were mostly stable with mothers who are not as anxious or depressed. Lastly it is possible that women in Lebanon who have lived with continuous bouts of violence for over 20 years are clinically depressed (Talih, Warakian, Ajaltouni, Shehab, & Tamim, 2016) and self-medicate masking an accurate assessment of depression or they may deny their depression for fear of stigma (Ramadan, El Khoury, Deeb, & Sheikh-Taha, 2016).

Factors associated with postpartum depression on the EPDS included complications during pregnancy, bad marital relations, low social support history of depression, and alcohol use and the infant admitted to the NICU which are in concordance with several previous studies (Alfayumi-Zeadna et al., 2015; Burgut et al., 2013; El-Hachem et al., 2014; Ko et al., 2017; Tebeka, Le Strat., & Dubertret, 2016; Vigod, Villegas, Dennis, & Ross, 2010). Social support was significantly also related to depression at 10–12 weeks which is well supported in studies across cultures (Alfayumi-Zeadna et al., 2015; Chaaya et al., 2002; Ganann, Sword, Thabane, Newbold, & Black, 2015). For example, a study in Canada of immigrant women found that lack of social support was strongly associated with PPD at one year after childbirth (Ganann et al., 2015), while a study of 156 Mexican women and 130 Chinese women noted that low social support increased the risk of depression (Gao, Chan, & Mao, 2009; Nieto et al., 2017). An interesting finding in this study was that support from friends received the highest scores. Although most studies have not differentiated between the kinds of support received, it is worth noting that in this highly educated urban sample, women friends were perceived as providing more support than family members or a significant other which is supported by one study in Italy (Grussu and Quatraro, 2009). A history of depression was associated with post-partum depression and depression at 10–12 weeks months which is in accordance with a majority of research findings (Chaaya et al., 2002; ; Hanusa et al., 2008; Ko et al., 2017).

Factors not related to depression were the gender of the child, the desired gender, mode of delivery, happy with pregnancy and education which is supported by some earlier reports (El-Hachem et al., 2014; Sword et al., 2009) and not others (Fisher et al., 2012; Gelaye et al., 2016). The incongruent findings may be due to fact that the majority of women in our study were older, highly educated with probably less traditional perceptions on gender or mode of delivery and are more likely to have a planned pregnancy.

Factors related to mother-infant bonding in the bivariate analysis were older age, history of depression, and social support and scores above 20 on the BDI-II which are consistent with previous studies (Behrendt et al., 2016; Choi et al., 2017; Dubber et al., 2015; Tester-Jones, O'Mahen, Watkins, & Karl, 2015), albeit, inconsistent findings are reported in terms of age. While some studies report that younger mothers are less bonded to their infants (eg Calışır & Karaçam, 2011) others find no relationship between age and bonding (eg. Figueiredo, Costa, Pacheco, & Pais, 2009). Impaired bonding in older mothers in our sample may be due to the fact that they were on average older having their first baby which may have resulted in anxiety and less feelings of bonding. The relationship between history of depression and bonding is well documented in the literature (Beeghly et al., 2017; Closa-Monasterolo et al., 2017). It is postulated that depression prenatally may have a negative effect on child development even before birth via alterations of hormones the intrauterine environment which may have lasting effects on the mother infant relationship (Deave et al., 2008; Meltzer-Brody, 2011)

Interestingly scores on the EPDS were not associated with mother infant bonding which is unlike most studies published earlier (eg. Behrendt et al., 2016; ; Kerstis et al., 2016; Tietz et al., 2014). Nevertheless, a recent large cohort study in the Netherlands found that maternal depressive symptoms in the prenatal do not predict infant-mother attachment quality (Tharner et al., 2012) and a study in Japan found weak correlations between depression and mother infant bonding (Ohoka et al., 2014). A large cohort study of over 1000 women in Spain reported that at age eight children of mothers who had PPD did not differ from children of healthy mothers if mothers did not have current mental problems (Closa-Monasterolo et al., 2017). Several explanations are possible, it could be that levels of depressive symptoms were not clinically significant to result in an impaired mother-infant relationship or that women in different cultures with various support systems may not be affected by depression equally. Thus, the ample social support mothers in Lebanon receive from their families and friends buffers them against any negative consequences related to their relationship with their infants. The employment of foreign maids in childcare, a common practice in the Middle-East, may have also help mothers not feel overwhelmed in caring for their infants (Al-Matary & Ali, 2013). Moderately or severely depressed mothers with scores above 20 on the BDI-II scores was related to impaired bonding which is expected and supported by several previous studies (Beeghly et al., 2017; Muzik et al., 2017) however, it was not found to be a predictor in the multivariate analysis.

The variables that remained significant in predicting maternal infant bonding in the multivariate analysis were age, history of depression, and social support (Behrendt et al., 2016; Choi et al., 2017; Dubber et al., 2015; Kerstis et al., 2016; Tester-Jones et al.,

2015). Unlike previous studies, neither depression scores on the EPDS or the BDI-II were predictive of mother infant bonding which could be explained by the fact that history of depression is more difficult to be alleviated by environmental factors such as social support and has a more significant effect on maternal infant bonding than PPD which may be transient.

5. Limitations

Although this study is the first to look at the relationship between post-partum depression and mother infant bonding in a Middle Eastern population there are several limitations worth noting. First the sample is rather small and included women from one referral university hospital in the city which may be different than a sample obtained from different hospitals across the country explaining the high rate of caesarean sections and the high level of education in women which limits generalizations. Second based on the design of this study, causality of the observed relationships between the variables cannot be ascertained limiting the interpretation of findings. Larger samples are recommended to better elucidate on the relationships among variables. Third, the phone interview at 10–12 weeks may not have provided accurate data or different data that was obtained during the face to face interview which warrants further studies with more uniform data collection methods for ease of comparisons.

6. Conclusions

Mother infant bonding may not be affected by PPD when other variables such as social support and history of depression are taken into account. A history of depression and high social support tend to have a stronger effect on mother infant bonding in a Middle Eastern society where cultural norms and traditions are unlike those of Western societies. Further studies with larger samples in different cultures are needed to provide validity to the results of this study. Finally although we did not find a relationship between PPD and bonding, this finding does negate the importance of including the EPDS as a screening tool for all mothers after delivery in order to monitor mothers with high scores.

Ethical approval

Ethical approval was obtained for the IRB of the American University of Beirut (NU.LB.04).

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