

The Associations between Insecure Attachment, Rooming-in and Postpartum Depression: A two months' longitudinal study

Maayan Molmen Lichter, Yoav Peled, Sigal Levy, Arnon Wiznitzer, Haim Krissi, Jonathan E.

Handelzalts

**Maayan Molmen Lichter-**

School of behavioral Sciences, The Academic College of Tel-Aviv Yaffo, Tel-Aviv, Israel.

**Yoav Peled-**

The Helen Schneider Hospital for Women, Rabin Medical Center, Petach Tikva, Israel.

Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

**Arnon Wiznitzer-**

The Helen Schneider Hospital for Women, Rabin Medical Center, Petach Tikva, Israel.

Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

**Sigal Levy-**

Statistics Education Unit, The Academic College of Tel-Aviv Yaffo, Tel-Aviv, Israel.

**Haim Krissi-**

The Helen Schneider Hospital for Women, Rabin Medical Center, Petach Tikva, Israel.

Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

**Jonathan E. Handelzalts-**

School of behavioral Sciences, The Academic College of Tel-Aviv Yaffo, Tel-Aviv, Israel.

Department of Psychiatry, University of Michigan – Michigan Medicine, Ann Arbor, MI.

USA

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Correspondence concerning this article should be addressed to Jonathan E. Handelzalts- School of behavioral Sciences, The Academic College of Tel-Aviv Yaffo, 14 Rabenu Yeruham St. Tel-Aviv, Israel,68114 . Email: [jhandelzalts@gmail.com](mailto:jhandelzalts@gmail.com).

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# **The Associations between Insecure Attachment, Rooming-in and Postpartum Depression: A two months' longitudinal study**

## **Abstract**

Postpartum depression (PPD) is the most common complication of childbearing and recent studies have attempted to examine risk factors associated with it. The main study hypothesis was that a protective situational factor at a sensitive time period (full rooming-in postpartum) would moderate the associations between insecure attachment dimensions and PPD. Three-hundred and twelve women, in either full or partial rooming-in, participated in a longitudinal study at the maternity ward of a tertiary health care center. A Demographic questionnaire and the Experiences in Close Relationships Scale were administered at 1-4 days postpartum, and the Edinburgh Postnatal Depression scale at two months postpartum. PPD was significantly associated with both anxious and avoidant attachment dimensions, but not with rooming-in conditions. In addition, women in partial rooming-in showed a positive correlation between insecure attachment dimensions and PPD, while no such correlation was found for full rooming-in women. A situational factor such as full rooming-in, which occurs at a critical time point for the mother-infant relationship, can moderate the association between maternal avoidant or anxious attachment dimensions and the mother's PPD levels. Postpartum practices, such as rooming-in, can be personalized and thus beneficial in moderating personal risk factors for PPD.

**Keywords:** rooming-in, attachment, postpartum depression, childbirth

## **Introduction**

The perinatal period is a time of intense change and transition, leaving many women at risk for postpartum depression (PPD) which is the most common complication of childbearing and as such represents a considerable public health problem affecting women and their families (Warner, Appleby, Whitton & Faragher, 1996). A recent worldwide meta-

analysis found that the pooled prevalence of PPD was 17.7% ranging from 3% to 38% in different countries (Hahn-Holbrook, Cornwell-Hinrichs, & Anaya, 2018).

The consequences of PPD may include less sensitivity of the mothers and responsiveness of the infants and may contribute to poor child outcomes from infancy to adolescence (Hammen & Brennan, 2003; Netsi et al., 2018; Petterson & Albers, 2001). The occurrence of PPD can be detrimental to the mother, her marital relationship and her children, with possible adverse long-term effects if untreated (Grace, Evindar & Stewart, 2003; Robertson, Grace, Wallington & Stewart, 2004).

As to risk factors for PPD, studies have suggested that a history of depression as well as advanced maternal age, pregnancy complications, and obstetric factors such as cesarean or assisted delivery and preterm delivery are factors associated with increased PPD risk (Davé, Petersen, Sherr & Nazareth, 2010; Silverman et al., 2017). In addition, personality traits such as neuroticism, harm avoidance, introversion, dependency, self-criticism or perfectionism were also related to depressive illness risk (Dudley, Roy, Kelk & Bernard, 2001; Gunderson, Triebwasser, Phillips & Sullivan, 1999; Martin-Santos et al., 2012; Podolska et al. 2010).

In recent years, efforts have been made to identify protective factors that may moderate the harmful effect of risk factors contributing to the etiology of PPD. For example, it has been found that social support and optimism can have a protective effect, reducing the likelihood of PPD among women with stressful life events and high stress levels (Grote & Bledsoe, 2007; Schachman & Lindsey, 2013). Similarly, Hain, Oddo-Sommerfeld, Bahlmann, Louwen and Schermelleh-Engel. (2016), demonstrated in a longitudinal study of pregnant women from six weeks antepartum to 12 weeks postpartum that resilience buffered the impact of dysfunctional self-consciousness on antepartum depression, and that this effect is transmitted through antepartum depression to postpartum depression at six and 12 weeks.

The present study highlights the possible associations between risk and protective variables (situational as well as stable personality ones), and PPD. We were primarily concerned with personality factors, such as attachment dimensions, because they develop early in life and remain fairly constant and stable (Waters, Hamilton & Weinfield, 2000). We were further interested to test the possible association of a situational variable in a sensitive time period, namely rooming-in postpartum conditions, as well as its possible moderating effect on the attachment style-PPD association.

### **Attachment Dimensions**

A personality trait that develops following the relationship with the primary caregivers and can influence the mother-infant relationship is adult attachment style (Holmes, 1993). Children internalize attachment relationships with their primary caregivers, thus creating a prototype for later relationships (Bretherton, 1992). According to attachment theory, people develop beliefs about themselves and others, called 'internal working models' that come to shape their thoughts and behaviors in social interactions and relationships with others (Bowlby, 1973). This inner working model and its related behavioral patterns becomes a central personality trait, influencing future relationships (Bartholomew & Horowitz, 1991; Bretherton, 1992). Thus, a specific history of attachment experiences and the subsequent consolidation of internal working models lead to the formation of relatively stable measurable individual differences in attachment style- the habitual patterns of expectations, needs, emotions and social behavior in interpersonal interactions and close relationships (Mikulincer & Shaver 2007).

Secure attachment underlies effective emotion regulation that relieves stress, thereby contributing to adaptation and coping with emotionally stimulating situations (Shaver & Mikulincer, 2007) and was found to be protective against various stressors (Rholes, Simpson, Campbell, & Grich, 2001).

In contrast, insecure attachment includes anxious, avoidant (Hazan & Shaver, 1994), as well as disorganized subtypes (Main & Solomon, 1990). Avoidant attachment is thought to be characterized by the development of a regulatory strategy in which one minimizes or denies one's own emotional needs and relies exclusively on her/himself while maintaining distance from significant others (Bretherton, 1992). People high in avoidance develop internal working models characterized by distrust of relationship partners and a desire for self-reliance (Mikulincer & Shaver, 2007), thus remain largely unaware of their own distress (Rholes et al., 2001). Anxious attachment, on the other hand, is characterized by internal working models of helplessness and fear of being alone (Mikulincer & Shaver, 2007), while seeing others as unpredictable sources of support, causing people with high levels of attachment anxiety to pay excessive attention to their distress while worrying constantly about the availability and supportiveness of their attachment figures (Rholes et al., 2001).

### **Mother's Attachment and PPD**

The birth of a child and the prospect of raising him/her is considered a life stressor that may activate the attachment system- thoughts and memories concerning reliance or independence (Axfors, Sylvén, Ramklint & Skalkidou, 2017; Robakis et al., 2016; Trillingsgaard, Elklit, Shevlin & Maimburg, 2011). Further, attachment orientations were found to predict outcomes across the transition to parenthood (Simpson & Rholes, 2019). Specifically, studies have found that insecure attachment may increase the risk for PPD regardless of the specific insecure attachment style or dimension (Bifulco et al., 2004; McMahon, Barnett, Kowalenko & Tennant, 2005; Rholes et al., 2011), though a recent systematic review found that anxious attachment style was more frequently associated with PPD than avoidant attachment style (Warfa, Harper, Nicolais & Bhui, 2014). It should be noted that the lack of clarity as to the difference in association between different insecure attachment and PPD was attributed to the different measures of attachment used (Robakis et

al., 2016). Further, in general, although anxious attachment is more consistently and strongly associated with depression than avoidant attachment, when they are measured with relation to multiple depression facets, each of the insecure attachment dispositions was found to be associated with different facets. While anxiety is thought to be related to the interpersonal aspects of depression, avoidance is thought to be linked to the achievement-related aspects (Ein-Dor & Doron, 2015; Mikulincer & Shaver, 2007).

Both anxious and avoidant attachment dimensions were associated with high parenting stress at one year postpartum (Trillingsgaard et al., 2011), and although they may act through different mechanisms, both may be associated with postpartum mental health (Iles, Slade & Spiby, 2011). Evidence indicates the enhancing maternal sensitivity, it is possible to prevent the intergenerational cycle of insecure maternal attachment and that effective interventions were found to be aimed at increasing the physical closeness between the mother and the infant postpartum in order to increase maternal sensitivity (van IJzendoorn, Juffer & Duyvesteyn, 1995).

Thus, a situational protective factor that relates to maternity practices postpartum, such as full rooming-in which happens at a very sensitive period and increases physical proximity between mother and infant in the secured environment of the hospital's nursery, can possibly moderate the deleterious association between anxious and avoidant insecure attachment dimensions and PPD.

### **Rooming-in and PPD**

Rooming-in involves keeping the mother and the baby together in the same room postpartum for the duration of hospitalization, whereas separate care is keeping the baby in the hospital nursery and bringing her to the mother for breastfeeding (Sharifah, Lee & Ho, 2007).

In the past, when births occurred at home, mothers and their infants stayed together immediately after birth. With the transition to the medical model where births occurred in hospitals, infants were transferred to care by the medical staff after birth and were brought to the mother for feeding purposes only (Greenberg, Rosenberg & Lind, 1973). Over the years, more hospitals have reverted to the seemingly natural method, encouraging mothers to stay together with their infants after birth (Sharifah et al., 2007).

Nowadays, in most hospitals all over the world there is no complete separation after birth except in cases where the mother and/or infant require special medical attention (e.g. preterm infants) and rooming-in is either full or partial. In partial rooming-in, the infant stays with the mother most of the day and is transferred to the nursery at designated intervals of time, usually at night and at noon.

The recommendation of medical personnel for full rooming-in is based on evidence that this method has many benefits (Rice, 2000; Svensson, Matthiesen & Widström, 2005). Indeed, it was found that rooming-in allows more opportunities for successful breastfeeding and a chance to gain an understanding of the infant's natural physiology (Jaafar, Ho & Lee, 2016; Moore, Bergman, Anderson & Medley, 2012). Studies have shown that the closeness between the infant and mother in full rooming-in had positive effects on mother-infant interactions and maternal adjustment to infant needs (Dumas et al., 2013). To the best of our knowledge, no studies have examined the association of rooming-in and PPD though it was found that mothers whose infants were in the nursery experienced more depressive symptoms during the ten days after birth than mothers who were fully rooming-in (Sakumoto, Masamoto & Kanazawa, 2002).

### **Current Study**

The aim of this study was to examine the associations between insecure attachment style levels (both anxious and avoidant), rooming-in (full vs. partial) and PPD, while taking

into consideration other demographic and obstetrical variables. We speculated that full rooming-in would provide a unique opportunity for the formation of a mother-infant relationship, thus possibly moderating the deleterious association of insecure attachment dimensions with PPD. Specifically, although the underlying mechanisms and regulatory process of anxious and avoidant attachment are different, we speculated that the unique moment in time of becoming a mother and being with one's new baby in constant proximity, while being in the protective environment of the maternity ward in the constant presence of caring personnel, for the first few days, may be a corrective experience for women high in anxious or avoidant attachment, thus possibly moderating the association between both insecure attachment dimensions and PPD. In addition, we aimed to examine, for the first time to our knowledge, the possible association between rooming-in and PPD.

### **Hypotheses**

1. PPD scores at two months postpartum will be positively associated with anxious and avoidant attachment.
2. Women in full rooming-in will exhibit lower levels of PPD at two months postpartum than women in partial rooming-in.
3. Interactions will be found between insecure attachment dimensions and rooming-in such that:
  - a. Among women who practiced partial rooming-in, higher anxious attachment will be correlated with higher PPD scores at two months postpartum, while among women who practiced full rooming-in there will be no such correlation.
  - b. Among women who practiced partial rooming-in, higher avoidant attachment will be correlated with higher PPD scores at two months



postpartum, while among women who practiced full rooming-in there will be no such correlation.

## Method

### Sample

The final study sample included 312 post-partum women who gave birth in the maternity wards of the Rabin Medical Center, a large tertiary health center in Israel. Eligibility criteria included at least 37 weeks gestation, a singleton pregnancy and Hebrew speaking. Rooming-in was defined by the health-center's policy. Full rooming-in was defined as a 24-hour period where the infant stays beside the mother; partial rooming-in was defined as the condition where the infant is transferred to the nursery at designated time intervals according to the departmental procedures (e.g., at noon and at night). Mothers were allocated to rooming-in conditions according to their choice.

The average age of the participants was 31.64 ( $\pm 4.87$ ), most (93.6%) were married, 84% were born in Israel and 91.9% were Jewish. Participants reported their income as below average (22.1%), average (36.5%), or above average (41.4%). Most of the participants (70.1%) had acquired university education. On average, they were recruited for the initial time point of the study at 3.04 ( $\pm 1.31$ ) days post-partum, 29.4% were primiparous (30.1% had one previous delivery, 25.2% had two, 9.1% had three and 6.2% had four or more). Seventy-six percent had vaginal delivery, 8.3% had elective cesarean section, 9.6% had emergency cesarean sections, and 6.1% had an assisted vaginal delivery. Fifty-seven point four percent were administered Epidural, and 46.2% Pitocin.

Demographic information on the study participants, according to rooming-in group, is presented in Table 1. Differences according to rooming-in were observed in women's education and income level such that there were more women with education below university level and income below average in the partial rooming-in group.

## Recruitment and Procedure

The study is part of a larger longitudinal study aimed at understanding associations between factors associated with delivery and postpartum mental health during the first 6 months postpartum between 7/2018 and 7/2019. Ethical approval for this study was obtained from the Rabin Medical Center IRB. Information about recruitment, data collection and dropout rate can be seen in Figure 1. The research assistants approached all women at the maternity ward on a random day of the week and after giving informed consent, the participants answered questionnaires at two time points-

T0 (1-4 days postpartum) in person at the maternity ward- obstetric data were taken from the medical files and women completed demographic questionnaire and the Experiences in Close Relationships Scale (ECR).

T1 (two months postpartum) using online questionnaires the participants completed the Edinburgh Postnatal Depression Scale (EPDS). Participants who did not respond to the email invitation were reminded once with a phone call. Questionnaires and data output were generated using Qualtrics© 2015 (Qualtrics, Provo, UT, USA. <http://www.qualtrics.com>).

We examined whether there were demographic differences between the participants who comprised the final sample (N = 312) and those who dropped out after the first time point (N = 296). There were significant differences in education level ( $t_{(550)} = -3.75, p < .01$ ) and income level ( $t_{(550)} = -2.96, p < .01$ ), so that the participants who were included in the final sample were more educated and with a higher income level than those who dropped out.

## Measures

*Sociodemographic questionnaire* Included questions about age, education level, income level, religious affiliation, country of origin and the existence of psychiatric disorders.

*Obstetric data* Included questions about the number of previous births, infertility treatments, pregnancy risks, past abortions or miscarriage, and current labor data: mode of delivery, and the administration of Epidural and Pitocin.

*Postpartum depression* was assessed by The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, and Sagovsky, 1987) that was developed as a screening tool for postpartum depression and was translated to Hebrew by Glasser and Barell (1999). The scale consists of 10 items rated on a 4-point scale, ranging from 0 to 3, with a maximum score of 30 with higher score meaning high depression (e.g., "I have been so unhappy that I have been crying"). The internal reliability of the original questionnaire was  $\alpha = .87$  and for the current study-  $\alpha = .86$

*Attachment* dimensions were assessed by The Experiences in Close Relationships Scale (ECR). The questionnaire was developed by Brennan, Clark and Shaver (1998), for assessing the dimensions of anxious and avoidant in adult attachment, and translated to Hebrew by Mikulincer and Florian (2000). We used an abbreviated version which was validated in the study of Tzur-Schwartz (2013) which consists of 24 items that are divided into two dimensions: anxious (12 items, e.g., "I worry about being abandoned"), and avoidant (12 items, e.g., "I feel discomfort when others get close to me"). Participants rated the extent to which an item described themselves on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicated higher anxious or avoidant attachment. In the current study, the internal reliability was  $\alpha = .83$  for anxiety and  $\alpha = .83$  for avoidance.

### **Statistical Analysis**

Data were analyzed using the statistical software package SPSS 25.0 (SPSS Inc., Chicago, IL). Pearson correlation coefficients and independent T-tests were calculated between study variables. We conducted two linear regressions to examine the hypothesis

regarding the association between anxious and avoidant attachment (separately) and PPD.

Second, we conducted a linear regression to examine the hypothesis regarding the association between rooming-in and PPD. Lastly, we conducted a moderation analysis (model 1) by Process software (PROCESS V3.3 by Hayes), to examine the main hypothesis about interaction between rooming-in, insecure attachment and PPD. The moderation analysis was performed twice: once, with anxious attachment as an independent factor, and second, with avoidant attachment as an independent variable.

## Results

### Associations between the Study Variables

Pearson correlations between the study variables are presented in Table 2. PPD positively correlated with anxious and avoidant attachment. We calculated Pearson correlations between the demographic variables collected and PPD. PPD levels were significantly negatively correlated with income level ( $r_{(309)} = -.13, p = .03$ ), and past/present psychiatric diagnosis ( $r_{(309)} = -.23, p < .01$ ), and therefore these variables were included as covariates in the further analyses. To examine differences between rooming-in groups in the main variables we performed independent samples t-tests. The associations were non-significant with PPD ( $t_{(307)} = -1.41, p = .16$ ), anxious attachment ( $t_{(284)} = -1.50, p = .13$ ) as well as avoidant attachment ( $t_{(284)} = -1.88, p = .06$ ).

### Insecure Attachment and PPD

To test whether insecure attachment predicted PPD scores two months postpartum, we performed two linear regressions. The first regression, with anxious attachment as the independent variable, and second regression, with avoidant attachment as the independent variable. Income level and psychiatric diagnosis variables were also included in the analyses due to their correlation with the dependent variable. The regression model in which the predictor was anxious attachment was significant ( $R^2 = .17, F_{(3, 267)} = 17.67, p < .01$ ), such that

the higher the level of anxious attachment, the higher the EPDS score two months postpartum, ( $\beta = .28, t = 4.93, p < .01$ ). The second regression model in which the predictor was avoidant attachment was also significant ( $R^2 = .16, F_{(3, 267)} = 16.42, p < .01$ ) such that the higher the level of avoidant attachment, the higher the EPDS score two months postpartum, ( $\beta = .26, t = 4.58, p < .01$ ).

### **Rooming-in and PPD**

To test the second hypothesis, we performed a linear regression, with rooming-in (full/partial) being an independent dummy variable and PPD as the dependent variable. Income level and psychiatric diagnosis variables were again included in the analyses due to their correlation with the dependent variable. The regression model was significant ( $R^2 = .09, F_{(3, 291)} = 9.85, p < .01$ ). Nevertheless, the rooming-in effect was non-significant ( $\beta = .06, t = 1.14, p = .25$ ).

In addition, we performed a Chi-square test to examine whether the prevalence of PPD at two months postpartum significantly differed by the type of rooming-in (see Table 3), according to the diagnostic thresholds set in literature. Mothers scoring above the threshold of '10' - raise a suspicion for depression, and above '13' - are most likely to be suffering from a depressive illness of varying severity (Cox et al., 1987). There was a significant difference in the incidence between full and partial rooming-in ( $\chi^2_{(1)} = 5.92, p = .01$ ) for the threshold of '10' and a non-significant difference in the prevalence of full versus partial rooming-in ( $\chi^2_{(1)} = 2.80, p = .09$ ) for the threshold of '13'.

### **Insecure Attachment Dimensions, Rooming-in and PPD**

To test the main hypothesis regarding the interaction between rooming-in, attachment and PPD scores, we used the moderation model with Process software. We performed two separate analyses, one with anxious attachment and the other with avoidant attachment as the independent variables. Rooming-in was the moderator and PPD score was the dependent

variable in both analyses. Income level and psychiatric diagnosis variables were also included in the analyses as covariates due to their correlation with the dependent variable.

#### **Anxious attachment, rooming-in and PPD**

This analysis yielded a significant model ( $R^2 = .21$ ,  $F_{(5,275)} = 14.29$ ,  $p = .00$ ) with a significant interaction between anxious attachment and rooming-in ( $\beta = .16$ ,  $t = 3.96$ ,  $p = .001$ ) (see Figure 2). Examining the simple effects showed that in full rooming-in the effect of anxious attachment on PPD score was non-significant ( $\beta = .00$ ,  $t = .01$ ,  $p = .99$ ), while in partial rooming-in the effect of anxious attachment on PPD scores was significant ( $\beta = .16$ ,  $t = 6.68$ ,  $p = .00$ ). That is, the positive association between anxious attachment and PPD was found only for women who were partially rooming-in.

#### **Avoidant attachment, rooming-in and PPD**

This analysis yielded a significant model ( $R^2 = .17$ ,  $F_{(5,275)} = 10.77$ ,  $p < .01$ ) with a significant interaction between avoidant attachment and rooming-in ( $\beta = .09$ ,  $t = 2.08$ ,  $p = .05$ ) (see Figure 3). Examining the simple effects showed that in full rooming-in the effect of avoidant attachment on PPD score was non-significant ( $\beta = .05$ ,  $t = 1.34$ ,  $p = .16$ ), while in partial rooming-in the effect of avoidant attachment on PPD score was significant ( $\beta = .14$ ,  $t = 5.06$ ,  $p = .00$ ). That is, the positive association between avoidant attachment and PPD was found only for women who were partially rooming-in.

#### **Discussion**

The current study investigated the associations between insecure attachment (avoidant and anxious) as a personality factor, rooming-in conditions (full vs. partial) as a situational factor and PPD scores at two months postpartum, taking into account demographic and obstetric variables as covariates.

The study findings confirm our first hypothesis regarding the positive association between insecure attachment and PPD scores. The more the mother attachment was anxious or avoidant, the higher were PPD scores at two months postpartum, controlling for history of psychiatric disorders and income level. This result is consistent with previous studies (Bifulco et al., 2004; Rholes et al., 2011; Robakis et al., 2016). Further, this association between insecure attachment dimensions and PPD remained significant even when controlling for a history of mood disorders, which were discussed in literature as a main predictor of PPD (Bloch, Rotenberg, Koren & Klein, 2005; Davé et al., 2010).

We believe that the fact that both anxious and avoidant insecure attachment were associated with PPD is of importance. Although the literature suggests that anxious attachment was more consistently associated than avoidant attachment with depression in general and PPD in particular (Ein-Dor & Doron, 2015; Warfa et al., 2014), there are studies that report on the avoidant attachment association with PPD (Ein-Dor & Doron, 2015). Although we have used the ECR (Brennan et al., 1998) for the measurement of attachment, which was found to be a good tool for measuring the anxiety and avoidance dimensions distinctively (Cameron, Finnegan & Morry, 2012), the different yet similar associations for the different insecure attachment dimensions with PPD should be further explored in future research. This could be done using other measurements of attachment such as the adult attachment interview that will allow measuring other classifications such as disorganized attachment, which may be relevant in the study of PPD as well as parenting.

Studies have shown that not only can insecure attachment predict PPD but it can also have clinical implications on the prognosis of this disorder. It was found that in stressful situations, insecure attachment is associated with a tendency to ruminate on negative thoughts and preserve depression symptoms (Mikulincer & Florian, 1998). Anxious attachment in particular predicted more persistent PPD symptoms (McMahon et al., 2005). It was suggested

that interventions that would be effective for the treatment of PPD should include strengthening maternal interpersonal relationships and attachment (Robakis et al., 2016). Indeed, interventions such as interpersonal psychotherapy (IPT) that is based on the interpersonal and attachment theories was found effective for the treatment of PPD (Miniati et al., 2014; Werner et al., 2015).

One of the aims of the present study was to examine the possible associations between rooming-in and PPD. Contrary to our hypothesis, we found no difference between PPD mean scores of women in the full versus partial rooming-in conditions. However, we found significant differences in the prevalence of women who exceeded the low clinical threshold of the EPDS questionnaire (10), so there was a higher prevalence of women who scored above the clinical low cut off score in partial versus full rooming-in groups.

The non-significant difference between the mean PPD symptoms can be explained by several factors. Although rooming-in was associated with depressive symptoms (Sakumoto et al., 2002), rooming-in is a situational factor and its effect in itself, if any, may be small and short lasting and therefore not found to be associated with PPD in the two months postpartum period. Second, we based our hypothesis on studies which claimed that full rooming-in is associated with positive outcomes, specifically raising breastfeeding rates (Dumas et al., 2013; Smith et al., 2012), which can be a protective factor vis-à-vis PPD (Dias & Figueiredo, 2015; Lancaster et al., 2010). However, emerging research suggests that the direction and precise nature of the breastfeeding-PPD associations are not yet clear (Borra, Iacovou & Sevilla, 2015) and might be more complex, thus, further examination is needed. Moreover, there are studies that show that full rooming-in also predicts negative outcomes such as postpartum fatigue and the inability to recover properly from birth (Thach, 2014).

Interestingly, cumulative fatigue after delivery is considered one of the major predictors of PPD (Bozoky & Corwin, 2002). Thus, the relationship between rooming-in and PPD which,



to the best of our knowledge, was tested for the first time in this study should be re-examined in further studies.

Our main hypothesis was that there would be a significant interaction between insecure attachment, rooming-in and PPD scores was confirmed for the two types of insecure attachment dimensions- anxious and avoidant. Thus, rooming-in moderated the relationship between anxious and avoidant attachment and PPD. Mothers who stayed in full rooming-in exhibited similar PPD levels, regardless of their levels of insecure attachment. According to this finding, it appears that a situational variable, which occurs at a sensitive time point that is essential to the mother-infant relationship (Bystrova et al., 2009; Crenshaw, 2007), can moderate the negative deleterious associations between insecure maternal attachment dimensions and the mother's mental state and specifically depressive symptoms at two months postpartum.

This finding could also be explained by the fact that in a recent study the most cited reasons for choosing full rooming-in were the promotion of mother-infant bonding, increased confidence in taking care of the baby and ability to recognize baby's feeding cues (Consales et al., 2020). Thus, women who may hold such views regarding full-rooming-in, may choose this option and self-allocate themselves to full rooming-in conditions, and by that moderate the insecure attachment-PPD associations.

This is a significant finding as it was found that a decrease in PPD levels can possibly prevent future adversities, such as poor child outcomes from infancy to adolescence (Hammen & Brennan, 2003; Netsi et al., 2018; Petterson & Albers, 2001) and disturbances in mother-infant bonding as well as child attachment disorders (Murray, Cooper, Wilson & Romaniuk, 2003; Ohoka et al., 2014).

Past studies attempted to formulate clinical implications from the evidence accumulated regarding the risk factors for PPD, such as the combination of personality predisposition and situational factors associated with childbirth (Robakis et al., 2016). The result regarding the identified interaction is indeed compatible with this view. Particularly, these findings emphasize the specific mechanism of symptoms manifestation and prevention, where a predisposed personality trait (i.e. insecure attachment) that was found to increase the risk for PPD was moderated by a situational protective factor regarding maternal practices after birth (i.e. rooming-in).

### **Strengths, Limitations and Future research**

This was a large longitudinal study, measuring for the first time, to the best of our knowledge the associations of attachment, rooming-in and PPD scores while controlling for several possible confounding variables. Taken together, the results of this study point to the complexity of the associations between rooming-in conditions, attachment, and PPD.

This complexity is demonstrated in the main limitation of our study, the fact that women self-selected their rooming-in conditions and this selection could have been a result of different factors. As mothers are unlikely to consent to be randomly allocated to one of the groups it is impossible to conduct a randomized control trial (RCT) of rooming-in. Therefore, although we measured demographic as well as obstetric variables, other confounding variables may have influenced group allocation and, in turn, our results. For example, rooming-in choices could have been affected by prepartum depression levels, fatigue and knowledge regarding rooming-in possible benefits, amongst other possible confounding variables. In addition, more women in the partial rooming-in group were with lower levels of education and below average income, though education level was not associated with PPD and income level was entered to the final regression as covariate. Future longitudinal studies starting from pregnancy could shed light on possible reasons for women to choose specific

rooming-in type and help us better understand the complexity of women's selections with regard to their specific feelings regarding the transition to motherhood.

Another possible limitation concerns the drop-out from the first to the second time point, it was found that women who were included in the final sample were more educated and their income level was higher than women who dropped-out, thus limiting generalization. Our generalization was further compromised by the fact that the participants were sampled only from one health center. Future studies should aim for a more representative sample of different populations.

Although the self-report scales used for this research are valid, reliable and widely used in the literature, a different measurement of attachment (such as the adult attachment interview measuring attachment representations) could augment the reliability of the results by avoiding the possible effect PPD may have on self-report measures as well as broadening the scope beyond the anxious and avoidant attachment continuums. Different measures of attachment could tap into attachment styles such as disorganized attachment that may be highly relevant in the context of PPD and parent-infant relationships (Nonnenmacher et al., 2016; Paetzold, Rholes & Kohn, 2015).

Lastly, we addressed the rooming-in variable based on the specific hospital's policy regarding the period of the infant's stay with the mother. Rooming-in practices are different in other countries and even in particular health systems and women may be offered different options in addition to diversity in cultural preferences. Our division to rooming-in (i.e. full versus partial) relied on the mother's self-report and self-selection and the data provided by the maternity ward. It may be possible to develop a more accurate measurement for rooming-in practices, perhaps in a continuous and non-dichotomous way that could be used in future research.

## **Clinical Implications**

The main implication of our research findings is that postpartum practices, such as rooming-in, can be beneficial in moderating personal risk factors for PPD and thus, our findings suggest that the recommendations for those rooming-in practices could be personalized.

In recent years, many disciplines have tried to adapt to more individualized treatments that encompass the use of new diagnostics and therapeutics targeted to the needs of a patient based on her own genetic, biomarker, phenotypic, or psychosocial characteristics (Jameson & Longo, 2015; Schork, 2015). The midwifery field could adapt a similar approach, considering the mother's individual traits for prevention and treatment of PPD. Nowadays, women are persuaded by medical staff to opt for full rooming-in (Rice, 2000; Svensson et al., 2005), a practice which might not be suitable for all women because apart from having advantages, full rooming-in may have also negative implications such as fatigue or a cause a barrier for postpartum recovery (Thach, 2014). As was shown in this study, in the context of PPD, full rooming-in was found to be beneficial particularly for mothers with insecure attachment, though in light of the women's self-allocation to rooming-in conditions limitation, this result should be further researched.

## **Conclusions**

In the present study we examined a personality variable that is available for screening during pregnancy or postpartum. Thus, women with increased risk for PPD based on their personality traits (e.g. insecure attachment) can be identified so that full rooming-in could be particularly effective for them in the context of PPD.

In general, the sweeping recommendation for full rooming-in and other postpartum practices can sometimes cause increased stress for women who are unable or not eager to perform them (Rice, 2000; Svensson et al., 2005). Therefore, we suggest that these

recommendations could be based on the mother specific characteristics. This may also optimize the effect that these practices can create, and not less important, reduce the increasing pressure to meet standards that may not be suitable for all postpartum women.

We suggest that it is important to inquire and ask women as to their reasons for the rooming-in selections they make, and offer them the support in making the appropriate decision for them, based on their perceptions of the different rooming-in conditions and their feeling regarding transition to motherhood in light of their attachment style.

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**Table 1.** Demographics data according to rooming-in group (full versus partial)

		Total (N = 312)	Full rooming- in (N = 142)	Partial rooming- in (N = 170)	Statistical value
<b>Age</b>	Mean (SD)	31.64 (4.87)	31.59 (4.92)	31.68 (4.84)	$t = -.17$
<b>Religion</b>	n (%)				$\chi^2 = 1.99$
	Non Jewish	25 (8.06)	8 (5.67)	17 (10.06)	
	Jewish	285 (91.93)	133 (94.33)	152 (89.94)	
<b>Education</b>	n (%)				$\chi^2 = 11.21^{**}$
	Below university level education	93 (29.90)	29 (20.42)	64 (37.87)	
	University level education	218 (70.10)	113 (79.58)	105 (62.13)	
<b>Marital status</b>	n (%)				$\chi^2 = .95$
	Unmarried	20 (6.41)	7 (4.93)	13 (7.65)	
	Married	292 (93.59)	135 (95.07)	157 (92.35)	
<b>Income level</b>	n (%)				$\chi^2 = 10.74^{**}$
	Average and below	180 (58.63)	68 (48.57)	112 (67.06)	

Above average	127 (41.37)	72 (51.43)	55 (32.93)	
<b>Primiparous</b>	n (%)			$\chi^2 = .37$
Yes	87 (27.88)	42 (29.58)	45 (26.47)	
No	225 (72.12)	100 (70.42)	125 (73.53)	
<b>Psychiatric diagnosis</b>	n (%)			$\chi^2 = .00$
Yes	11 (3.63)	5 (3.62)	6 (3.64)	
No	292 (96.37)	133 (96.38)	159 (96.36)	
<b>Mode of delivery †</b>	n (%)			$\chi^2 = 2.74$
Planned delivery	263 (84.29)	125 (88.03)	138 (81.18)	
Unplanned delivery	49 (15.71)	17 (11.97)	32 (18.82)	

\*\*  $p < .01$

† We treated "Mode of delivery" as a dichotomous variable for statistical reasons, and according to relevant literature which claims that the importance of the mode of delivery variable is whether it was planned or not (Handelzalts et al., 2017; Zanardo et al., 2016; Kjerulff & Brubaker, 2018). Thus, vaginal delivery and elective cesarean sections are considered "Planned delivery", while emergency cesarean section and vaginal assisted delivery are considered "Unplanned delivery".

We coded dummy variables for religion, education, marital status and income level, such that- Jewish, academic education, married and above average income level, were coded as "1".

**Table 2.** Pearson correlation coefficients between study variables (N = 312)

	1	2	3	4
1. Postpartum depression	-			
2. Anxious attachment style	.34**	-		
3. Avoidant attachment style	.28**	.53**	-	
Mean	2.98	2.61	2.55	
Standard deviation	3.59	1.06	.92	

\*\*  $p < .01$

**Table 3.** PPD prevalence at two months after birth according to rooming-in group

	<b>Total</b> (N = 312) n (%)	<b>Full</b> <b>rooming-in</b> (N = 142) n (%)	<b>Partial</b> <b>rooming-in</b> (N = 170) n (%)
<b>EPDS score <math>\geq 10</math></b>	14 (4.5)	2 (1.4)	12 (7.2)
<b>EPDS score <math>&lt; 10</math></b>	298 (95.5)	140 (98.6)	158 (92.8)
<b>EPDS score <math>\geq 13</math></b>	10 (3.2)	2 (1.4)	8 (4.8)
<b>EPDS score <math>&lt; 13</math></b>	302 (96.8)	140 (98.6)	162 (95.2)

### Key Findings and their Implications for Practice/Policy

#### Key Finding 1

PPD was associated with insecure attachment, but not with rooming-in. Therefore, insecurely attached women are at risk for developing PPD and should be followed up.

#### Key Finding 2

Women in partial rooming-in exhibited a correlation of insecure attachment and PPD while no insecure attachment and PPD correlation was found for women in full rooming-in.



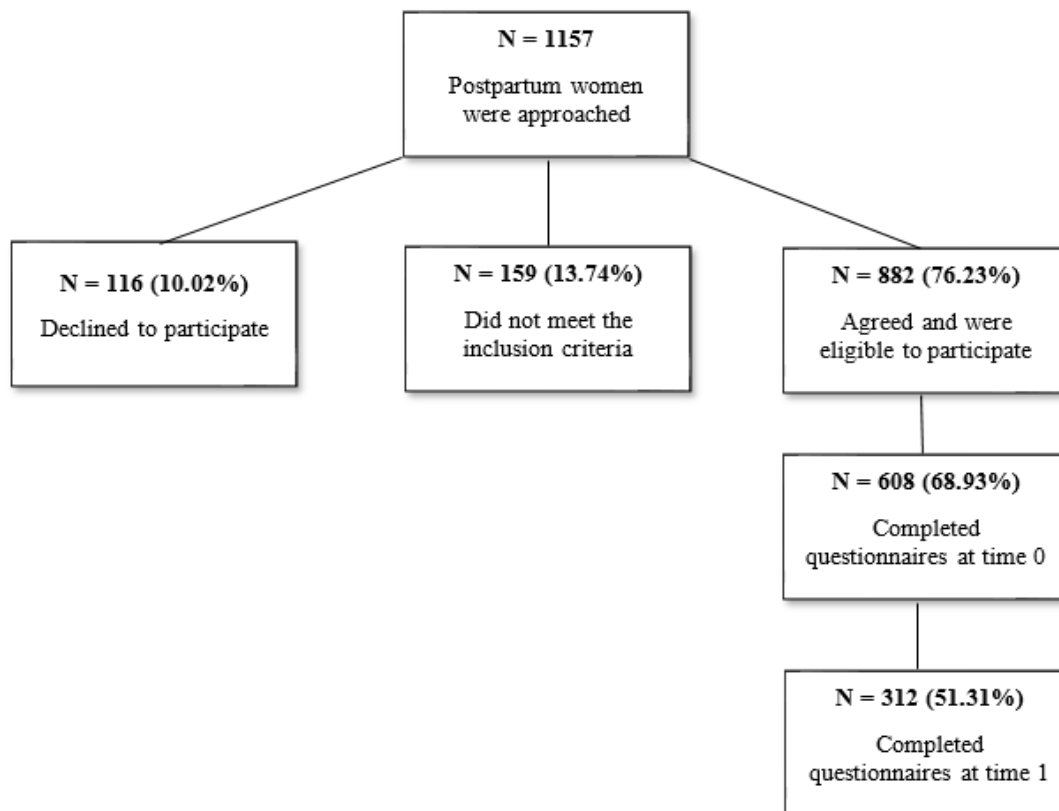
### Key Finding 3

Full rooming-in can be beneficial in moderating personal risk factors for PPD.

#### Statement of Relevance to the field of Infant and Early Childhood Mental Health

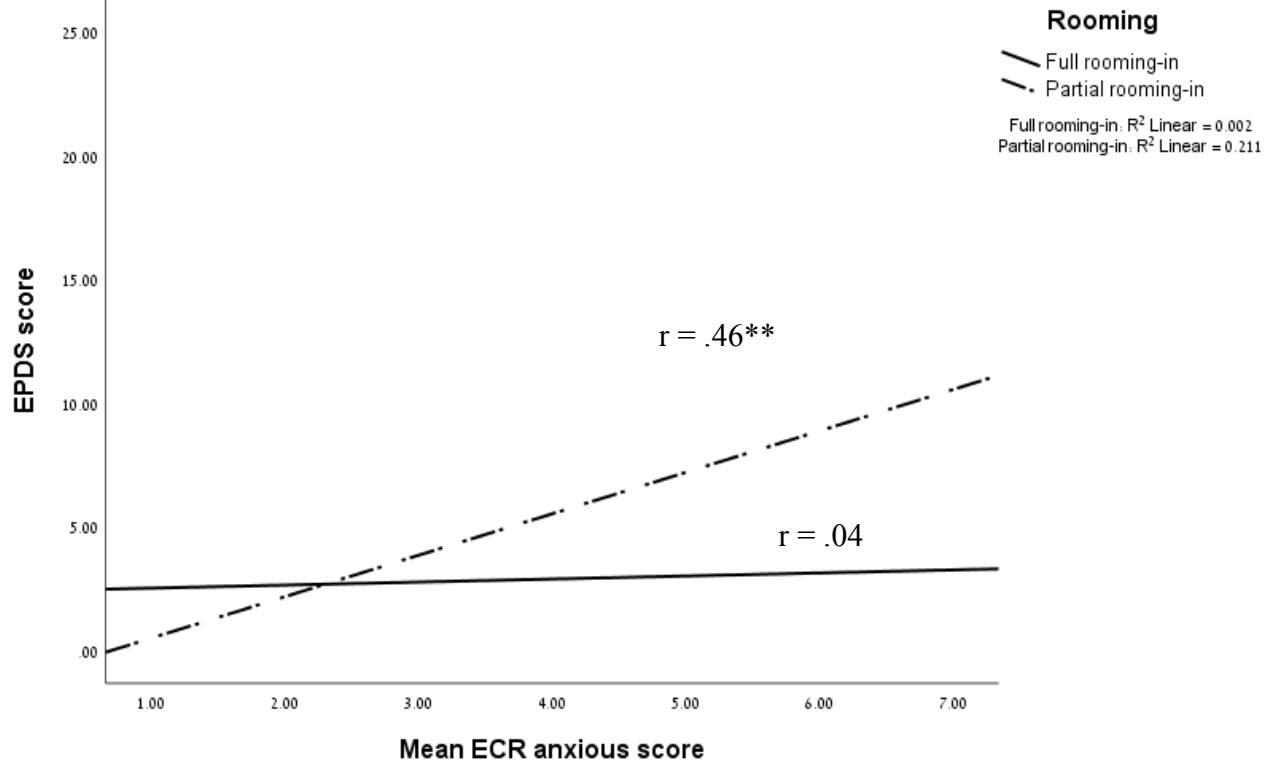
Studies have shown that the closeness between the infant and mother in full rooming-in had positive effects on mother-infant interactions and maternal adjustment to infant needs but to the best of our knowledge, no studies have examined the association of rooming-in and PPD. As PPD includes less sensitivity of the mothers and responsiveness to their infants and may contribute to poor child outcomes from infancy to adolescence it is of the essence to study precipitating factors associated with it.

Figure 1. Recruitment and data collection



A

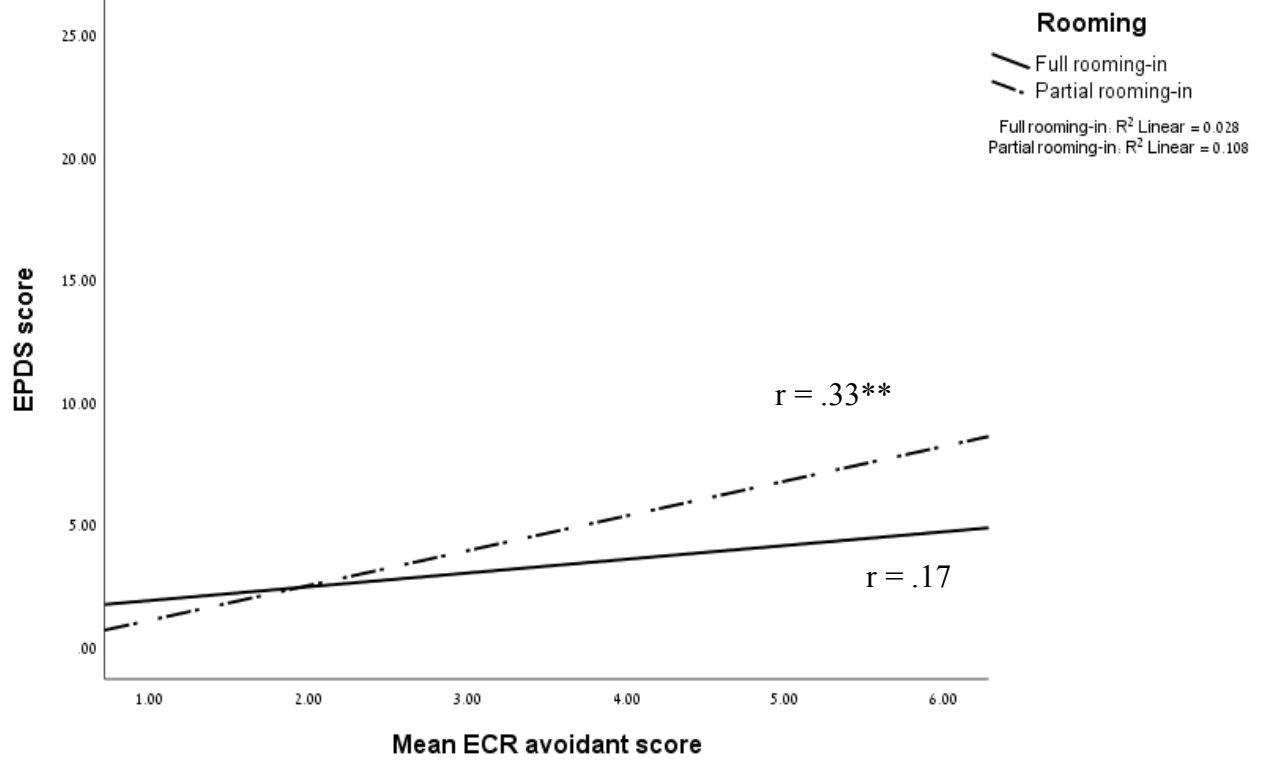
**Figure 2.** Multiple regression examining the interaction between anxious attachment, rooming-in and PPD



\*\*  $p < .01$

Author

**Figure 3.** Multiple regression examining the interaction between avoidant attachment, rooming-in and PPD



\*\*  $p < .01$

Author