

## POSTPARTUM BONDING DIFFICULTIES AND ADULT ATTACHMENT STYLES: THE MEDIATING ROLE OF POSTPARTUM DEPRESSION AND CHILDBIRTH-RELATED PTSD

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**ABSTRACT:** Despite decades of research demonstrating the role of adult attachment styles and early mother–infant bonding in parenting behaviors and maternal mental health, these constructs have seldom been studied together. The present study aimed to investigate the relationship between attachment styles and specific bonding difficulties of mothers. In addition, as postpartum depression and childbirth-related posttraumatic stress symptoms have been associated with both constructs, we explored their possible mediation effect. One hundred fourteen mothers, 4 to 12 weeks' postpartum, completed a demographic questionnaire, the Adult Attachment Style Questionnaire (M. Mikulincer, V. Florian, & A. Tolmacz, 1990), the Postpartum Bonding Questionnaire (L.F. Brockington, C. Fraser, & D. Wilson, 2006), the Modified Perinatal Posttraumatic Stress Disorder Questionnaire (J.L. Callahan, S.E. Borja, & M.T. Hynan, 2006), and the Edinburgh Postnatal Depression Scale (J.L. Cox, G. Chapman, D. Murray, & P. Jones, 1996), using an online survey system. As predicted, insecure attachment styles were associated with bonding difficulties wherein anxious/ambivalent attachment was associated with greater infant-focused anxiety, mediated by postpartum depression but not childbirth-related PTSD symptoms. In contrast, greater avoidant attachment style was associated with greater rejection and anger, mediated by childbirth-related posttraumatic stress disorder (PTSD), but not depression symptoms. The current study confirmed the association of different attachment styles with bonding as well as the mediating roles of childbirth-related PTSD and postpartum depression symptoms. Future psychological interventions may utilize such evidence to target interventions for bonding disorders in accordance with individual differences.

**Keywords:** attachment, bonding, postpartum depression, childbirth-related PTSD

**RESUMEN:** A pesar de las décadas de investigación demostrando el papel de los estilos de afectividad adulta y la temprana unión afectiva madre-infante en los comportamientos de crianza y la salud mental materna, estos conceptos han sido poco estudiados en conjunto. El presente estudio se propuso investigar la relación entre los estilos de afectividad y las específicas dificultades de unión afectiva de las madres. Adicionalmente, ya que la depresión posterior al parto y los síntomas de estrés postraumático relacionados con dar a luz han sido asociados con ambos conceptos, exploramos su posible efecto de mediación. 113 madres completaron, entre 4 y 12 semanas después del parto, un cuestionario demográfico, el Cuestionario del Estilo de Afectividad Adulta (AAQ), el Cuestionario de Unión Posterior al Parto (PBQ), el Cuestionario Modificado del Trastorno de Estrés Postraumático Perinatal (mPPQ), y la Escala de Edimburgo de Depresión Postnatal, usando un sistema de encuesta electrónico. Tal como se predijo, los estilos de afectividad inseguros fueron asociados con las dificultades de unión afectiva, donde la afectividad ansiosa/ambivalente se asoció con una mayor ansiedad enfocada en el infante, mediada por la depresión posterior al parto pero no así por los síntomas PTSD relacionados con dar a luz. En contraste, un mayor estilo de ocultar o evitar la afectividad se asoció con mayor rechazo e ira, mediado por PTSD relacionado con dar a luz pero no así por los síntomas de depresión. El presente estudio confirmó la asociación de diferentes estilos de afectividad con la unión afectiva así como también los papeles

Ilana Hairston and Jonathan Handelzalts contributed equally in the writing of this article. We thank Dana Deviri, Tal Solnik-Menilo, Tamar Lehman-Inbar, and Nirit Cohen-Zwang for help with data collection; we also thank Orr-Stav Communications (<http://orr-stav.com/index.html>) for help with back-translation of instruments. Funding for this project was provided by the Internal Research Fund of the Academic College of Tel Aviv–Yafo.

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de mediación de síntomas PTSD relacionados con dar a luz y los de depresión posterior al parto. Futuras intervenciones psicológicas pudieran utilizar tal evidencia para dirigir intervenciones para trastornos de unión afectiva de acuerdo con diferencias individuales.

**Palabras claves:** afectividad, unión afectiva, depresión posterior al parto, PTSD relacionado con dar a luz

**RÉSUMÉ:** En dépit de dizaines d'années de recherches démontrant le rôle des styles de l'attachement adulte et du lien précoce mère-bébé dans les comportements de parentage et la santé mentale maternelle, ceux-ci ont rarement été étudiés ensemble. Cette étude s'est donné pour but d'étudier la relation entre les styles d'attachement et les difficultés spécifiques à se lier des mères. De plus puisque la dépression postpartum et les symptômes de stress post-traumatique liés à l'accouchement ont été aussi liés à ces éléments, nous avons exploré leur effet de médiation possible. 113 mères à 4–12 semaines postpartum ont rempli un questionnaire démographique, le Questionnaire de Style de l'Attachement Adulte, le Questionnaire de Lien Postpartum, le Questionnaire Modifié de Trouble de Stress Périnatal Post-traumatique, et l'Echelle de Dépression Postnatale d'Edinbourg, en utilisant un système d'enquête en ligne. Comme on l'avait prédit, les styles d'attachement insécures étaient liés à des difficultés à se lier, alors que l'attachement anxieux/ambivalent était lié à une anxiété plus importante, centrée sur le bébé, médiées par la dépression postpartum mais pas par les symptômes liés au TSPT de l'accouchement. En revanche les styles d'attachement le plus évitant étaient liés à un plus grand rejet et à une colère plus importante, médiés par le TSPT lié à l'accouchement mais pas aux symptômes de dépression. Cette étude a confirmé le lien entre différents styles d'attachement et le lien affectif ainsi que les rôles de médiation du TSPT lié à l'accouchement et des symptômes de dépression postpartum. Les interventions psychologiques à venir pourraient utiliser ces résultats afin de cibler des interventions pour les troubles du lien affectif en fonction des différences individuelles.

**Mots clés:** attachement, lien affectif, dépression postpartum, TSPT lié à l'accouchement

**ZUSAMMENFASSUNG:** Auch wenn in jahrzehntelanger Forschungsarbeit die Zusammenhänge von erwachsenen Bindungsstilen und frühem Mutter-Kind-Bonding mit dem Elternverhalten und der psychischen Gesundheit von Müttern demonstriert werden konnten, wurden diese Konstrukte selten gemeinsam untersucht. Ziel der vorliegenden Studie war es, den Zusammenhang zwischen Bindungsstilen und spezifischen Bindungsschwierigkeiten von Müttern zu untersuchen. Darüber hinaus wurden postpartale Depression und geburtsbedingte posttraumatische Stresssymptome bereits mit beiden Konstrukten in Verbindung gebracht, so dass wir zusätzlich diese potentiellen Mediationseffekte erforschten. 113 Mütter füllten 4–12 Wochen nach der Geburt mithilfe eines Online-Umfragesystems einen demografischen Fragebogen, den „Adult Attachment Style Questionnaire“ (AAQ), den „Postpartum Bonding Questionnaire“ (PBQ), den „Modified Perinatal Posttraumatic Stress Disorder Questionnaire“ (mPPQ) und die „Edinburgh Postnatal Depression Scale“ (EPDS) aus. Wie vorhergesagt, wurden unsichere Bindungsstile mit Bindungsschwierigkeiten in Verbindung gebracht, wobei die ängstliche/ambivalente Bindung mit einer größeren, auf den Säugling bezogenen Angst assoziiert wurde, die durch postpartale Depression, aber nicht durch geburtsbedingte PTBS-Symptome mediiert wurde. Im Gegensatz dazu wurde ein stärker vermeidender Bindungsstil mit größerer Ablehnung und Wut assoziiert und durch geburtsbedingte PTBS, aber nicht durch Depressionssymptome mediiert. Die aktuelle Studie bestätigte die Assoziation verschiedener Bindungsstile mit Bonding sowie die medierenden Rollen von geburtsbedingter PTBS und postpartalen Depressionssymptomen. Zukünftige psychologische Interventionen können diese Evidenz nutzen, um gezielt Interventionen für Bindungsstörungen in Übereinstimmung mit individuellen Besonderheiten durchzuführen.

**Stichwörter:** Bindung, Bonding, postpartale Depression, geburtsbedingte PTBS

抄録: 養育行動と母親の精神保健における成人愛着スタイルと早期の母親-乳幼児のボンディング(絆)の役割を示す何十年もの研究にかかわらず、これらの構成概念が共に研究されることは、ほとんど無かった。この研究は、愛着スタイルと母親の特定のボンディングの困難さとの間の関係性を調査することを目的とした。それに加え、産後抑うつと出産関連の外傷後ストレス症状が、両者の構成概念に関連しているため、私たちはそれらの媒介効果の可能性も探索した。産後4-12週の113人の母親が、人口統計学的質問紙、成人愛着スタイル質問紙 he Adult Attachment Style Questionnaire (AAQ)、産後ボンディング質問紙 Postpartum Bonding Questionnaire (PBQ)、改訂周産期外傷後ストレス障害質問紙 Modified Perinatal Posttraumatic Stress Disorder Questionnaire (mPPQ)、およびエジンバラ産後うつ病尺度 Edinburgh Postnatal Depression Scale (EPDS) に、オンライン調査システムを用いて回答した。予測されたように、不安定な愛着はボンディングの困難さと関連していた。その中で不安/両価的愛着は、乳児に焦点づけたより大きな不安と関連し、産後抑うつにより媒介されたが、出産関連 PTSD 症状には媒介されなかった。対照的により大きな回避性愛着スタイルはより強い拒否と怒りに関連し、出産関連 PTSD により媒介されたが、抑うつ症状には媒介されなかった。この研究では、異なる愛着スタイルの違いとボンディングの関連、および出産関連 PTSD と産後抑うつ症状の媒介的役割を確認した。今後の心理的介入は、個人差に従ったボンディング障害への介入を目標とするために、このような根拠を利用するだろう。

**キーワード:** 愛着, ボンディング(絆), 産後抑うつ, 出産関連 PTSD

摘要: 儘管已有數十年的研究證明成人依附類型和早期母嬰關係, 在育兒行為和母親心理健康方面的作用, 但這些構念很少被一起研究。本研究旨在調查依附類型與母親的連結困難的關係。此外, 由於產後抑鬱症和與分娩有關的創傷後壓力症狀與這兩種構念有關, 我們探討它們可能引起的中介作用。113名母親在產後4–12週內, 在網上完成人口調查問卷、成人依附類型問卷 (AAQ)、產後連結問卷 (PBQ)、改良圍產期創傷後壓力疾患問卷 (mPPQ) 和愛丁堡產後抑鬱量表 (EPDS)。正如預測的那樣, 不安全的依附類型與連結困難有關, 其中焦慮/矛盾依附與較高的嬰兒焦慮有關, 由產後抑鬱症介導, 但與分娩相關的 PTSD 症狀無關。相比之下, 較嚴重的逃避依附類型與較高的排斥和憤怒

相關，由分娩相關的 PTSD 介導，但與抑鬱症狀無關。本研究證實不同依戀類型與聯結的關聯，以及分娩相關 PTSD 和產後抑鬱症狀的中介作用。未來的心理干預可能會使用這些證據，根據個別差異來治療聯結障礙。

**關鍵詞：** 依附，聯結，產後抑鬱症，與分娩有關的 PTSD

**ملخص:** علي الرغم من عقود من البحوث التي تبين دور أنماط التعلق عند البالغين وتكوين الارتباط المبكر بين الام والرضيع في سلوكيات الابوه والامومه والصحة النفسية الامومية، إلا أن هذه المفاهيم نادرا ما تم دراستها مجتمعة. تهدف هذه الدراسة إلى التحقيق في العلاقة بين أنماط التعلق والصعوبات المحددة التي تواجهها الأمهات في تكوين الارتباط المبكر. بالإضافة إلى ذلك، بما ان الاكتئاب بعد الولادة والاعراض المتصلة بالإجهاد اللاحق للصدمة النفسية قد ارتبطا بهذه الأنماط، فقد قامت الدراسة الحالية ببحث الآثار الوسيطة المحتملة لهذه المتغيرات. استكمل 113 من الأمهات (4-12 أسبوع بعد الوضع) استبياناً ديموغرافياً، واستبيان أنماط التعلق عند البالغين (AAQ)، واستبيان تكوين الارتباط بعد الولادة (PBQ)، والاستبيان المعدل لاضطراب الإجهاد العصبي للصدمة اللاحقة للولادة (mPPQ)، ومقياس أدنبرة لاكتئاب ما بعد الولادة (EPDS)، باستخدام استبيان علي الإنترنت. وجاءت النتائج في إطار التوقعات حيث ارتبطت أنماط التعلق الغير الآمن بصعوبات تكوين الارتباط، بينما ارتبط التعلق القلق-المزدوج بنسبة أكبر من التوتر المركز علي الطفل وتوسط هذه العلاقة الاكتئاب بعد الولادة ولكن ليس الاعراض المرتبطة بالصددمات (PTSD). وعلي النقيض من ذلك، ارتبط أسلوب التعلق التجنبي بالمزيد من الرفض والغضب، وتوسط هذه العلاقة الأعراض المرتبطة بالصددمات ولكن ليس أعراض الاكتئاب. وأكدت الدراسة الحالية على ارتباط أنماط التعلق المختلفة بتكوين الارتباط وكذلك الأدوار الوسيطة للاضطرابات اللاحقة للصددمات واعراض الاكتئاب بعد الولادة. وقد تستخدم التدخلات النفسانية في المستقبل هذه الأدلة لاستهداف التدخلات الخاصة باضطرابات تكوين الارتباط وفقاً للاختلافات الفردية.

**الكلمات الرئيسية:** التعلق-تكوين الارتباط-الاكتئاب بعد الولادة- اضطرابات الإجهاد اللاحقة للصددمات

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Parent–infant bonding is considered central to infant well-being and to cognitive and emotional development of the child (Cirulli, Berry, & Alleva, 2003; Landry, Smith, Miller-Loncar, & Swank, 1997; Tamis-LeMonda, Bornstein, & Baumwell, 2001). Maternal bonding is construed as a dynamic emotional state that emerges during pregnancy or immediately after birth (Bicking Kinsey & Hupcey, 2013) and continues to develop over the first months of the infant’s life (Koniak-Griffin, Logsdon, Hines-Martin, & Turner, 2006; Muzik et al., 2013). Thus, mother–infant bonding is defined as “an affective state of the mother” that can be assessed using maternal self-report instruments (Bicking Kinsey & Hupcey, 2013, pp. 1319; Billings, 1995).

Problems with bonding occur when the parent feels indifferent, irritated, or even hostile toward the baby and does not have positive feelings toward her or him for a significant period of time. Bonding difficulties are often associated with psychiatric morbidity (Brockington, 2004), and their prevalence in the general population is difficult to evaluate (Bienfait et al., 2011) due to the lack of diagnostic criteria (Brockington, Fraser and Wilson, 2006). Yet, even in the absence of psychiatric disorders, the presence of an infant may activate psychopathology in a parent predisposed to psychiatric problems, which in turn will interfere with bonding (Brockington, Butterworth, & Glangeaud-Freudenthal, 2016). Research on factors that influence parental, specifically maternal, emotions toward her infant has flourished in recent decades, with greater focus on psychiatric symptoms that negatively impact bonding. As the incidence of postpartum depression (PPD) ranges between 10 to 20% (Brockington, 2004; Brummelte & Galea, 2016), the influence of PPD on maternal behaviors in general (e.g., O’Hara & McCabe, 2013) and bonding in particular is one of the most researched topics (Brockington, Fraser, & Wilson, 2006; Loh & Vostanis, 2004; Nonnenmacher, Noe, Ehrental, & Reck, 2016), demonstrating that depressed mothers express greater hostility and less responsiveness toward their infant, and are more likely to neglect or abuse their infant (reviewed in O’Hara & McCabe, 2013).

Childbirth-related posttraumatic stress disorder (CR-PTSD) occurs in 1 to 6% of births (Alcorn, O’Donovan, Patrick, Creedy, & Devilly, 2010). Unlike other instances of PTSD in which patients may avoid trauma-associated cues, thereby limiting their anxiety, the baby is a constant and unavoidable reminder of the traumatic birth. Thus, some women have reported guilt for blaming their child for their traumatic childbirth experience (Alder, Stadlmayr, Tschudin, & Bitzer, 2006). Although the effect of CR-PTSD on bonding, per se, has not been previously assessed, CR-PTSD has been found to negatively impact maternal emotions toward her infant (Parfitt & Ayers, 2009) and mildly increase parenting stress (McDonald, Slade, Spiby, & Iles, 2011).

Conversely, only a minority of studies has focused on the role of precipitating personality traits on bonding problems (e.g., Oddo-Sommerfeld, Hain, Louwen, & Schermelleh-Engel, 2016; Ohashi et al., 2014). A key personality trait, with relevance to the construct of bonding, is adult attachment styles. According to John Bowlby and Mary Ainsworth, children internalize attachment relationships with their primary caregivers, creating a prototype for later relationships outside the family circle (Bretherton, 1992). This inner “working model” and its related behavioral patterns become central and stable components of personality, influencing future relationships (Bartholomew & Horowitz, 1991; Bretherton, 1992). Attachment style has a recognized role in parenting behavior and maternal mental health (Jones, Cassidy, & Shaver, 2015). It is postulated that pregnancy and childbirth activate a mother’s attachment system (Alhusen, Hayat, & Gross, 2013; Chrzan-Dętkoś & Lockiewicz, 2015), and her interactions with her child reflect her internal working models (Wilkinson & Mulcahy, 2010). Secure attachment underlies effective emotion regulation that relieves stress, thereby contributing to adaptation and coping with emotionally stimulating situations (Shaver & Mikulincer, 2007). Thus, secure attachment may be protective against various stressors, including the transition to parenthood (Rholes, Simpson, Campbell, & Grich, 2001), a notion supported by findings that insecurely attached mothers have

more PPD and CR-PTSD symptoms as compared to those with a secure attachment style (Bifulco et al., 2004; Iles, Slade, & Spiby, 2011; Sabuncuoglu & Berkem, 2006).

Nonetheless, to our knowledge, only three studies have specifically focused on the link between attachment styles and bonding difficulties, with varying outcomes. Nonnenmacher et al. (2016) reported that women with dual/disorganized attachment had more bonding difficulties as compared to women with either secure or insecure attachment styles, mediated by depression. Similarly, Van Bussel, Spitz, and Demyttenaere (2010) found weak correlations between secure and fearful attachment styles with impaired bonding measures. By contrast, Chrzan-Dętkoś and Lockiewicz (2015) found that attachment style was linked to antenatal, but not postnatal, bonding experience. The present study aimed to further investigate the relationship between adult attachment style and bonding experience of mothers, testing the hypothesis that women with insecure attachment styles will experience more bonding difficulties as compared to women with secure attachment styles. The Postpartum Bonding Questionnaire (PBQ; Brockington, Fraser, & Wilson, 2006) consists of four factors: (a) General Emotional Factor, (b) Anger Toward and Rejection of Baby, (c) Infant-Focused Anxiety, and (d) Risk of Abuse (also see Wittkowski, Wieck, & Mann, 2007), reflecting different dimensions of bonding pathology. Thus, we further predicted that the different attachment styles will be associated with different patterns of bonding problems. Finally, as insecure attachment is linked with PTSD and depression (Besser & Neria, 2010; Bifulco et al., 2004; Bifulco, Moran, Ball, & Bernazzani, 2002; Mikulincer, Florian, & Weller, 1993), and both have been linked to bonding difficulties (e.g., Ayers, Jessop, Pike, Parfitt, & Ford, 2014; Brockington, Fraser, & Wilson, 2006), we predicted that the severity of symptoms of these disorders will mediate the relationship between adult attachment style and bonding.

## METHOD

### Participants

The original sample constituted of 127 mothers of infants 4 to 12 weeks of age. Exclusion criteria were birth before or at 32 weeks of pregnancy or infants with a chronic illness. Thirteen of the 127 participants were excluded from the research due to unreasonable responses (e.g., large gaps in responses or repetitive responses across all items) or having an infant outside the age range. Thus, 114 participants were included in the sample (Table 1).

### Procedure

The study is part of a larger study aimed at understanding the underpinnings of parent–infant bonding in the first year of life. The protocol was approved by the Institutional Review Board of the academic institution and the Helsinki committee of the hospital of the authors. Women were recruited soon after birth at the delivery ward of the Edith Wolfson Medical Center, Holon, Israel, a tertiary healthcare institute, and via Internet advertisements published

**TABLE 1.** Demographic Characteristics of the Sample

	Variable	Statistic
Age ( <i>M</i> , range)	Mother (years)	31.73 (22–41)
	Infant (weeks)	7.6 (4–12)
Infant Gender	%Female	54%
Employment (%sample)	Full-Time	78%
	Working Student	9%
	Student	4%
	Neither Work/Study	9%
Ethnicity/Religion	Jewish	100%
	Other	–
Education	8–12 Years	8.8%
	Higher Education	91%
	Marital Status	
	Married/Living With Partner	64%
Income Relative to National <i>Mdn</i>	Below	22%
	At/Around <i>Mdn</i>	42%
	Above	36%
Birth	Primipara	50%
Birth Type	Vaginal	81%
	Assisted/Cesarean	19%
Breast-Feeding	Exclusive	54%
	Partial	13%
	Not Breast-Feeding	33%

on parenting forums, relevant Facebook groups, and the snowball method. Informed consent was obtained, and all questionnaires were filled online. In return for completing the questionnaires, participants were provided a coupon of \$10. All identifying details were omitted from the database used for analyses. Questionnaires and data output were generated using Qualtrics 2015 (Qualtrics, Provo, UT; <http://www.qualtrics.com>).

### Instruments

Demographic information regarding the baby's age and gender, maternal socioeconomic status, breast-feeding, and type of child-birth was collected using a brief demographic questionnaire.

Mother–infant bonding was measured using the Hebrew translation (Hairston, Solnik-Menilo, Deviri, & Handelzalts, 2016) of the PBQ (Brockington, Fraser, & Wilson, 2006). The original questionnaire consists of a 25-item scale assessing the mother's feelings or attitudes toward her baby (e.g., "I feel close to my baby"). Participants rate agreement with statements on a Likert scale ranging from 0 (*always*) to 5 (*never*), with reverse coding of positive items; higher scores denote worse perceived bonding. The internal consistency coefficient of the total scale in this study was  $\alpha = .91$ . The PBQ has four subscales, including "Impaired Bonding" ( $\alpha = .84$ ), "Anger/Rejection" ( $\alpha = .76$ ), and "Infant-Focused Anxiety" ( $\alpha = .63$ ). Two items relating to risk of abuse were not included for ethical reasons. A score of 25 or higher for the total PBQ score is considered to conform with consensus diagnoses of various forms of an abnormal mother–infant relationship. A score higher than

TABLE 2. Descriptive Statistics of Variables of Interest

	Parental Bonding Questionnaire (PBQ)				Adult Attachment Style Questionnaire (AAQ)				
	Total Scale	Impaired Bonding	Anger/Rejection	Infant-Focused Anxiety	Secure	Avoidant	Anxious/Ambivalent	mPPQ	EPDS
<i>M</i>	11.53	6.55	6.26	3.00	4.74	2.91	2.45	7.75	4.84
<i>SD</i>	11.34	6.26	2.53	2.71	1.194	1.15	0.96	6.49	4.18
Minimum	.00	.00	.00	.00	2.20	1.00	1.00	0.00	.00
Maximum	67.00	37.00	20.00	16.00	7.00	6.40	5.80	29.00	18.00
% above cutoff	6.2	14.4	1.0	2.7				6.2	13.2
<i>n</i>	109	109	114	114	114	114	114	114	114

Note. Cutoff for high specificity for clinically significant symptoms of the Modified Postpartum PTSD Questionnaire (mPPQ) = 19, of the Edinburgh Postpartum Depression Scale (EPDS) = 10. Cutoffs for the PBQ based on Brockington, Fraser, & Wilson (2006); cutoff for the mPPQ is based on Callahan, Borja, & Hynan (2006), and for the EPDS on Cox, Chapman, Murray, & Jones (1996).

10 on the general factor reflects “some kind of bonding disorder,” a score above 16 on the Anger/Rejection scale reflects a “severe bonding disorder,” and a score above 11 on the Infant-Focused Anxiety scale indicates high levels of anxiety (Brockington, Fraser, & Wilson, 2006; Brockington et al., 2001).

Adult attachment style was measured using the original Hebrew version of the Adult Attachment Style Questionnaire (AAQ; Mikulincer, Florian, & Tolmacz, 1990). The questionnaire consists of 15 items, with five items per attachment style (*secure*, *anxious/ambivalent*, and *avoidant*). Participants use a Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) to respond to the items. Cronbach  $\alpha$ s for each factor were found to be reasonably high, secure:  $\alpha = .68$ , anxious/ambivalent:  $\alpha = .78$ , and avoidant:  $\alpha = .71$ .

Childbirth-related PTSD was measured using the Hebrew translation (Zerach, Elsayag, Shefer, & Gabis, 2015) of the Modified Perinatal PTSD Questionnaire (mPPQ; Callahan, Borja, & Hynan, 2006). The questionnaire consists of 14 items assessing the presence of traumatic memories of the delivery. Items relate to reexperiencing (“Did you have any sudden feelings as though your baby’s birth was happening again?”), avoidance (“Did you try to avoid thinking about childbirth or your baby’s hospital stay?”), and hyperarousal (“Did you feel more ‘jumpy’ [sensitive to noise]?”). Participants rated their agreement with the statements on a Likert scale ranging from 0 (*very often*) to 4 (*never*), with higher scores denoting more symptoms. A score of 19 or higher was found to have good clinical sensitivity (0.82). The internal consistency of the scale in the current study was  $\alpha = 0.79$ .

Postpartum depression was measured using the Hebrew translation (Glasser & Barell, 1999) of the Edinburgh Postnatal Depression Scale (EPDS; Cox, Chapman, Murray, & Jones, 1996). The EPDS is an internationally accepted, 10-item self-report screening instrument for postnatal depression. Items correspond to various clinical depression symptoms (e.g., feelings of guilt, sleep disturbance, low energy, anhedonia, and suicidal ideation). Each item is scored on a four-point scale (0–3), with the total score ranging between 0 to 30; higher scores indicate more depressive symptoms. Cox, Holden, and Sagovsky (1987) suggested a threshold of 9/10

for screening for clinically significant depression, later amended to a threshold of 12/13 that had greater diagnostics specificity (Cox et al., 1996). The internal consistency coefficient of the scale in the current study was high ( $\alpha = .85$ ).

### Statistical Analysis

Descriptive statistics, correlations, and mediational hypothesis testing were done in STATA Version 13.0. Mediation analyses were done using structural equation modeling (SEM). For SEM, overall goodness-of-fit statistics were assessed using the chi-squared test for the likelihood ratio of the observed to saturated model, the root mean square error of approximation (RMSEA), and baseline comparison indices (comparative fit index, CFI) and residual size (standardized mean square residual, SMSR). A fit was considered adequate if the chi-squared test was not significant, the RMSEA was under .08, the CFI coefficients were above .90, and the SRMR was no higher than .08. Equation-level goodness-of-fit and effect sizes were calculated using  $R^2$  coefficients for each equation and for the global model, multiple correlation (mc) and the Bentler–Raykov multiple correlation (mc<sup>2</sup>).

## RESULTS

Means and *SD*s of the variables of interest can be seen in Table 2. As can be seen, 6.2% of women had clinically significant symptoms of PTSD; that is, they scored equal or above 19 on the mPPQ (Callahan et al., 2006). In addition, 14.2% scored equal or above 10 on the EPDS, indicating a risk for depression (Cox et al., 1996). Of mothers scoring above the EPDS cutoff, 33.3% ( $n = 5$ ) were above cutoff for bonding disorder, as compared with 9% of women below the cutoff,  $\chi^2 = 22.67, p < .001$ . Similarly, of women scoring above the mPPQ cutoff, 28.5% were above cutoff for bonding disorders, as compared to 5% among women with lower scores on the mPPQ,  $\chi^2 = 6.27, p = .014$  (data not shown).

To determine the relationship between variables of interest and demographic characteristics, zero-order correlation analyses were run (Table 3). The Benjamini–Hochberg false discovery rate

**TABLE 3.** Zero-Order Correlations Among Variables of Interest

	.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
1. Mother Age	–									
2. Income	.380**	–								
3. Birth Type	–.065	–.046	–							
4. PBQ General	.039	.236**	–.034	–						
5. PBQ Anger	.085	.134	–.056	.799**	–					
6. PBQ Anxiety	–.007	.118	.100	.696**	.613**	–				
7. mPPQ	.028	.109	.154	.415**	.426**	.372**	–			
8. EPDS	.022	.163	.126	.453**	.426**	.494**	.646**	–		
9. Secure	–.102	.068	–.005	–.188**	–.230**	–.267**	–.118	–.206	–	
10. Avoidant	.209**	.072	–.009	.238**	.303**	.306**	.225**	.227**	–.489	–
11. Anxious	.229**	.051	.080	.257**	.230**	.421**	.243**	.269**	–.395	.434**

Note. Zero-order Pearson correlations on variables of interest. PBQ = Postpartum Bonding Questionnaire; mPPQ = Modified Postpartum PTSD Questionnaire; EPDS = Edinburgh Postpartum Depression Scale.  $p < .050$ . \*\* $p < .029$ , FDR corrected.

formula (Benjamini & Hochberg, 1995) was used to threshold significant correlations,  $p \leq .0269$ . Mother’s age correlated with the insecure AAQ scales, Avoidant:  $p = .027$ , Anxious/Ambivalent:  $p = .015$ , such that older women had higher scores on these scales. Income positively correlated with higher scores on the General Impaired Bonding scale,  $p = .013$ . All three attachment style scales correlated with the three bonding scales, but only the insecure attachment scales correlated with the EPDS and the mPPQ.

The first hypothesis, that specific attachment styles would be associated with specific bonding problems, was supported. To test the hypothesis, a multivariate multiple regression analysis (Afifi, May, & Clark, 2003) was run, which allows for several dependent variables (i.e., general factor, rejection and anger, and infant-focused anxiety) to be jointly regressed against the same independent variables (i.e., secure, avoidant, and anxious/ambivalent attachment styles). As a control, mother’s age also was included in the model. The residuals of the three dependent variables covaried significantly, general factor with rejection and anger  $R^2 = 0.782$ ; general factor with infant-focused anxiety  $R^2 = 0.665$ ; rejection and anger with infant-focused anxiety  $R^2 = 0.576$ ; Breusch–Pagan  $\chi^2 = 156.614$ ,  $p < .001$ . The combined model was significant,  $F(9, 108) = 3.93$ ,  $p < .001$ , with the equation for each of the attachment styles significant (Table 4). None of the attachment styles predicted the general factor whereas rejection and anger was predicted by avoidant style,  $t(9, 108) = 3.01$ ,  $p = .047$ , and infant-focused anxiety was predicted by anxious/ambivalent style,  $t(9, 108) = 3.73$ ,  $p < .001$ .

The mediation hypothesis was also supported. Based on the regression analysis, SEM analyses were used to test the mediating role of mood and childbirth-related trauma symptoms in the relationship between avoidant and anxious/ambivalent attachment styles with the Rejection/Anger and Infant-Focused Anxiety subscales of the PBQ, respectively (Fig. 1). Results of the SEM mediation model for the AAQ avoidant attachment style with the PBQ Rejection are summarized in Table 5. The model yielded an

**TABLE 4.** Multivariate Regression—Relative Contribution of Attachment Styles to Types of Bonding Difficulties

Equation	RMSE	R <sup>2</sup>	F	p
General Factor	.504	0.092	2.743	.032
Anger/Rejection	.353	0.112	3.402	.012
Infant-Focused Anxiety	.630	0.220	7.601	<.001

	Coefficient	SE	95% CI	
PBQ General Factor				
Secure	–.023	.047	–.116	.116
Avoidant	.064	.051	–.036	.165
Anxious	.102	.057	–.012	.216
Mother age	–.004	.013	–.029	.022
Constant	.330	.501	–.663	1.322
PBQ Anger/Rejection				
Secure	–.025	.033	–.091	.040
Avoidant	.071 <sup>a</sup>	.036	.001	.142
Anxious	.040	.040	–.040	.119
Mother Age	.001	.009	–.017	.019
Constant	.677	.351	–.018	1.373
PBQ Infant-Focused Anxiety				
Secure	–.038	.059	–.155	.078
Avoidant	.092	.063	–.034	.217
Anxious	.267 <sup>a</sup>	.072	.125	.409
Mother Age	–.023	.016	–.055	.010
Constant	.725	.626	–.515	1.966

Note.  $N = 114$ . RMSE = root mean square error; PBQ = Postpartum Bonding Questionnaire. Secure, Avoidant, and Anxious subscales of the Adult Attachment Style Questionnaire. <sup>a</sup> $p < .05$ .

acceptable fit,  $\chi^2 = 1.11$ ,  $p = .774$ , CFI = 1.0, SRMR = .021, RMSEA = 0.0. The overall predictive capacity was 0.102, largely accounted for by the direct effect,  $R^2 = 0.248$ , whereas  $R^2$  for the EPDS and the mPPQ were 0.037 and 0.040, respectively. The direct effect of the EPDS on the PBQ Rejection/Anger subscale was close to significance,  $p = .055$ . Results of the SEM mediation model for anxious/ambivalent with PBQ Infant-Focused Anxiety

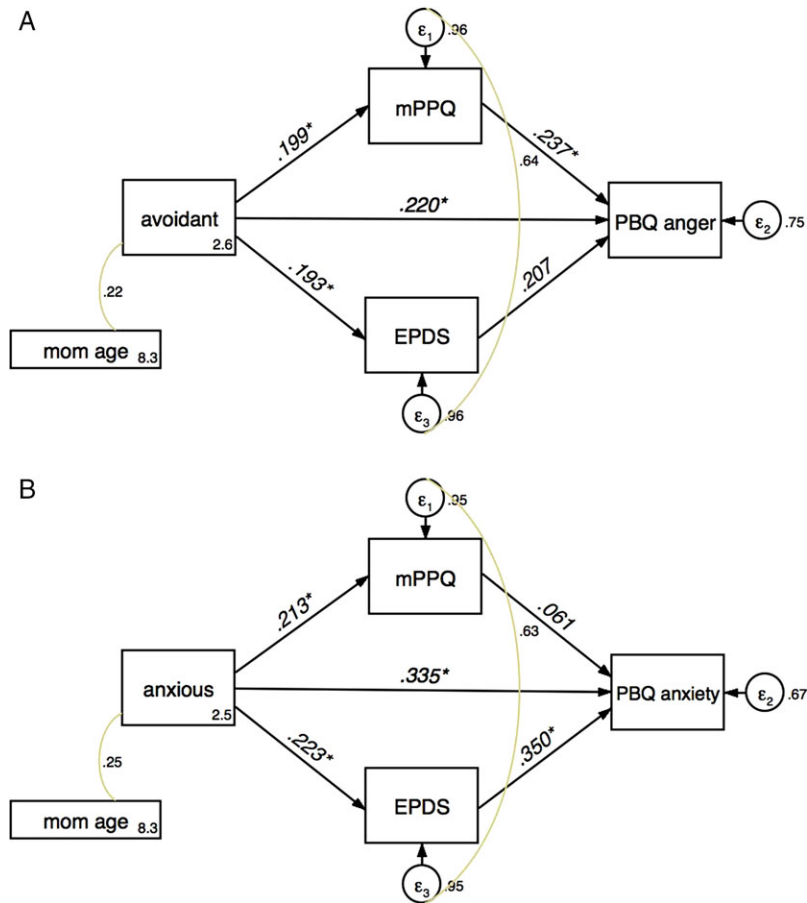


FIGURE 1. SEM models for the mediational role of the Edinburgh postpartum depression scale (EPDS) and the modified postpartum PTSD questionnaire (mPPQ). (a) The mediational role of the EPDS and the Postpartum Bonding Questionnaire (PBQ) on the relationship between avoidant attachment style (avoidant) and feelings of anger toward infant (PBQ anger or rejection); and (b) the mediational role of the EPDS and the PPQ on the relationship between anxious/ambivalent attachment style (anxious) and infant-focused anxiety (PBQ anxious); mothers' age was included as a covariate in Models A and B, as it covaried with the primary predictor. The mPPQ and the EPDS considerably covaried, and thus were linked with a covariance connector. Numbers above dark lines are standardized coefficients ( $\beta$ ), stars denote statistically significant coefficients. Curved light lines denote covariance.  $*p < .05$ .

subscale are summarized in Table 6. The model yielded an acceptable fit,  $\chi^2 = 1.710, p = .635, CFI = 1.0, SRMR = .032, RMSEA = 0.0$ . The overall predictive capacity was 0.186, largely accounted for by the direct effect,  $R^2 = 0.327$ , whereas  $R^2$  for the EPDS and PTSD were 0.050 and 0.046, respectively. In this model, the direct effect of PTSD was not significant,  $p = .547$ .

### DISCUSSION

The present study aimed to explore the understudied link between adult attachment style and mother–infant bonding, in a sample of healthy mothers of infants aged 4 to 12 weeks. As PPD and CR-PTSD have been associated with both constructs, we explored their possible mediating role. As predicted, insecure attachment styles were associated with bonding difficulties, wherein anxious/ambivalent attachment was associated with greater infant-focused anxiety, mediated by PPD but not CR-PTSD symptoms. In contrast, greater avoidant attachment style was associated with

greater rejection and anger, mediated by CR-PTSD but not depression symptoms.

In the present study, attachment styles were assessed using the AAQ (Mikulincer et al., 1990), which generates scores on three dimensions of attachment: anxious/ambivalent, avoidant, and secure. Anxious/ambivalent attachment is assumed to reflect hyperactivation of attachment behaviors and a negative sense of self. Elevated attachment anxiety is associated with fear of abandonment and preoccupation with the availability and responsiveness of others. Avoidant attachment style is associated with relative deactivation of attachment behaviors and a negative sense of others. Individuals with elevated avoidant style are characterized by devaluation of close relationships, self-reliance, and avoiding intimacy and codependency. Secure attachment style is conceptualized as the relative absence of either anxiety or avoidance styles (Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010).

Thus, attachment styles provide a heuristic framework for the regulation and appraisal of emotional states and relationships

**TABLE 5.** Parameter Estimates for the Mediation of the EPDS and the mPPQ on the Link Between Avoidant Attachment Style and PBQ Anger/Rejection

	B	SE	95% CI			
<b>Direct</b>						
mPPQ → Anger/ Rejection	.188*	.085	.021	.354		
EPDS → Anger/ Rejection	.177	.092	−.003	.358		
Avoid → Anger/ Rejection	.071*	.026	.018	.124		
Avoid → mPPQ	.081*	.038	.008	.1554		
Avoid → EPDS	.072*	.035	.004	.141		
<b>Indirect</b>						
Avoid → anger/ Rejection	.028*	.013	.002	.054		
<b>Total</b>						
mPPQ → Anger/ Rejection	.188*	.085	.021	.354		
EPDS → Anger/ Rejection	.177	.092	−.003	.358		
Avoid → Anger/ Rejection	.100*	.029	.043	.156		
Avoid → mPPQ	.082*	.037	.009	.354		
Avoid → EPDS	.072*	.035	.004	.141		
<b>Equation-Level Goodness of Fit</b>						
	Fitted	Predicted	Residual	R <sup>2</sup>	mc	mc <sup>2</sup>
Anger/Rejection	.135	.034	.102	.250	.500	.250
mPPQ	.217	.009	.208	.040	.200	.040
EPDS	.184	.007	.177	.037	.193	.037
Overall				.102		

Note. N = 114; mc = correlation between dependent variable and its prediction; mc<sup>2</sup> = Bentler–Raykov squared multiple correlation coefficient; EPDS = Edinburgh Postpartum Depression Scale; mPPQ = Modified Postpartum PTSD Questionnaire; PBQ = Postpartum Bonding Questionnaire.  
\*p < .05.

**TABLE 6.** Parameter Estimates for the Mediation of EPDS and mPPQ on the Link Between Anxious/Ambivalent Attachment Style and PBQ Infant-Focused Anxiety

	B	SE	95% CI			
<b>Direct</b>						
mPPQ → Infant-Focused Anxiety	.092	.153	−.208	.392		
EPDS → Infant-Focused Anxiety	.571*	.167	.244	.898		
Anxious → Infant-Focused Anxiety	.245*	.058	.131	.358		
Anxious → mPPQ	.103*	.045	.014	.186		
Anxious → EPDS	.100*	.041	.019	.180		
<b>Indirect</b>						
Anxious → Infant-Focused Anxiety	.066*	.030	.008	.124		
<b>Total</b>						
PPQ → Infant-Focused Anxiety	.092	.153	−.208	.392		
EPDS → Infant-Focused Anxiety	.571*	.167	.244	.898		
Anxious → Infant-Focused Anxiety	.311*	.062	.189	.432		
Anxious → mPPQ	.103*	.045	.016	.191		
Anxious → EPDS	.100*	.041	.019	.180		
<b>Equation-Level Goodness of Fit</b>						
	Fitted	Predicted	Residual	R <sup>2</sup>	mc	mc <sup>2</sup>
Infant-Focused Anxiety	.489	.160	.330	.327	.572	.327
mPPQ	.212	.012	.200	.056	.237	.056
EPDS	.184	.009	.174	.050	.223	.05
Overall				.200		

Note. N = 114; mc = correlation between dependent variable and its prediction; mc<sup>2</sup> = Bentler–Raykov squared multiple correlation coefficient; mPPQ = Modified Postpartum PTSD Questionnaire; EPDS = Edinburgh Postpartum Depression Scale.  
\*p < .05.

(Hazan & Shaver, 1987; Kobak & Sceery, 1988; Mills-Koonce et al., 2011) and also may provide a foundation for bonding, namely the affective dimension of mother–infant relationship, a mother’s representations of her child, and her cognitions regarding herself as a mother (Bicking Kinsey & Hupcey, 2013; Crouch & Manderson, 1995). Our findings are consistent with the conceptualization of anxious/ambivalent style, associated with a tendency to direct attention to distress cues (Mikulincer et al., 1990), which may manifest as enhanced concerns regarding the ability to care for and engage with the infant, and expressed as higher scores on the Infant-Focused Anxiety subscale of the PBQ. Similarly, avoidant attachment style, governed by an effort to abate attempts to seek comfort (Kobak & Sceery, 1988), in the context of bonding may manifest as feelings of rejection and distance from the infant, and discomfort (“anger”) when the infant signals distress, resulting in higher scores on the Rejection/Anger subscale.

The mediating role of depression symptoms in the association between anxious attachment style and infant-focused anxiety bonding conforms with reliable observations that anxious attachment is more frequently associated with PPD symptoms than is the avoidant attachment style (Warfa, Harper, Nicolais, & Bhui, 2014). These findings also are in line with Nonnenmacher et al.’s (2016)

report, but differ from Chrzan-Dełkoś and Łockiewicz (2015), who found an association between insecure attachment and EPDS, but not bonding. Further, consistent with a reported association between CR-PTSD symptoms and avoidant attachment style (Ayers et al., 2014), our findings add a unique role for CR-PTSD symptoms in the association between avoidant attachment style with cognitions of anger and rejection toward the infant. Given the paucity of research regarding CR-PTSD and bonding (Ayers et al., 2014), this relationship should be further explored.

Overall, the picture that emerges from the current study is largely consonant with research demonstrating that parental attachment insecurity can be associated with less sensitive and responsive parenting behaviors (Edelstein et al., 2004; Luz, George, Vieux, & Spitz, 2017; Mills-Koonce et al., 2011; Rholes, Simpson, & Blakely, 1995; Selcuk et al., 2010), and bated feelings of closeness to the child as compared to the securely attached parent (Rholes et al., 1995; Wilson, Rholes, Simpson, & Tran, 2007). They also are in line with findings that insecure attachment style is a risk for depression and anxiety disorders (Ayers et al., 2014; Mikulincer & Shaver, 2012; Warfa et al., 2014). This is despite inconsistencies among studies, which are likely attributable to the utilization of different instruments to assess adult attachment and different implementations of the PBQ.



Combined, the present study proposes a comprehensive model for the associations among the different attachment styles, different aspects of bonding problems, and various postpartum symptomatology, raising the possibility that interventions targeting postpartum psychopathology and bonding difficulties should take into account the mother's attachment style and its effect on her parental experience. For example, women with a more anxious/ambivalent attachment style may experience greater anxiety regarding their own parental competence; thus, the intervention may focus on a more positive sense of self while alleviating fears regarding abandonment and responsiveness of others. Conversely, women with a more avoidant attachment style may experience emotional detachment and feelings of guilt; thus, the focus of intervention could be on increasing their capacity to be present within the intimacy of the mother–infant dyad.

Several limitations regarding this study should be underscored. First, the cross-sectional correlational design does not permit directional or causal conclusions to be drawn. Moreover, the correlation sizes were small to moderate, as were the explained variances in the different models, suggesting that other factors may contribute to the development of bonding. Another concern relates to the psychometric properties of the PBQ, specifically of the Infant-Focused Anxiety subscale. This subscale has displayed somewhat lower internal consistency and has demonstrated unsatisfactory performance in follow-up validation studies (Brockington, Fraser, & Wilson, 2006; Reck et al., 2006). Nevertheless, the divergent associations of the PBQ subscales found in the present study imply that there may be utility in further investigating their construct validity. In addition, all assessments were based on self-report measures, thereby potentially inflating shared variance among the variable. Although, it should be stressed that the concept of bonding is by definition the mother's feelings toward her infant, impacted by her own experiences and characteristics, and the PBQ has been found to be closely associated with objective measures of maternal care (Hornstein et al., 2006). Finally, although the incidence of PPD was on par with previous studies on larger, and more representative, local samples (e.g., Bloch, Rotenberg, Koren, & Klein, 2005; Fisch, Tadmor, Dankner, & Diamant, 1997; Glasser et al., 1998), and the percentages of women who scored above cutoff on the PBQ and the mPPQ (Brockington, Fraser and Wilson, 2006; Callahan et al., 2006, respectively) were similar to those reported in validation studies, other aspects of the sample characteristics (e.g., level of education) differed from the general population, a fact which may limit the generalizability of the results.

In sum, despite decades of research demonstrating the role of attachment styles (Jones et al., 2015) and bonding (Bicking Kinsey & Hupcey, 2013) in parenting behaviors and maternal mental health, these constructs have seldom been studied together. To our knowledge, only three studies have directly tested the link between these constructs, two of which found an association between insecure attachment styles and impaired bonding (Nonnenmacher et al., 2016; Van Bussel et al., 2010) and one which did not (Chrzan-Dętkoś & Lockiewicz, 2015). As the designs of these studies varied

in the timing of assessment, attachment style assessment instruments, and implementation of the PBQ, further investigation of the role of insecure attachment styles in the cascade of risk for postpartum psychopathology and bonding pathology is merited. Our findings further raise the possibility that future psychological interventions could utilize these findings to tailor individualized interventions.

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