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Research article

The role of maternal attachment in mental health and dyadic relationships in war trauma

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ABSTRACT

Background: Infant care is a demanding task in dangerous war conditions, but research on the wellbeing of mother-infant dyads is mainly available in peaceful conditions. Knowledge on protective versus risking processes is especially vital for tailoring effective help, and the present study proposes the maternal attachment style to play an important role in dangerous war conditions.

Objective: The study analyses, first, how various traumatic war events, such as losses, horrors and life-threat, are associated with maternal mental health and dyadic mother-infant interaction quality, indicated by maternal emotional availability (EA). Second, it tests a hypothesis that maternal insecure attachment risks and secure attachment protects good mental health and optimal EA from negative impacts of traumatic war events.

Method: The prospective three-wave study involved 502 Palestinian mothers, who were pregnant during the 2014 War on Gaza, and participated at delivery (T1), and when the infant was seven (T2; $N = 392$) and eighteen (T3; $N = 386$) months. Mothers reported about war events at T1 and T2 (death and losses, witnessing horrors and life-threat), and posttraumatic stress disorder (PTSD) and depression symptoms at T2 and T3. Dyadic interaction quality was assessed by mother-perceived emotional availability (EA) scale at T2 and T3, and attachment styles by mothers' self-reports at T3.

Results: Death and losses, witnessing horrors, and life-threat were all associated with a high level of maternal PTSD, but only at T2, whereas death and losses were associated with her depressive symptoms both at T2 and T3. Witnessing horrors was associated with a low close and positive and a high distant and negative emotional availability at T2 and T3. As hypothesized, maternal avoidant attachment was associated with a low level of close and positive EA in general, and especially when the dyads were exposed to a high level of traumatic war events, thus indicating a risking function. Against the hypothesis, secure attachment did not show any protective function on emotional availability, while, unexpectedly, maternal preoccupied attachment was associated with close and positive emotional availability, when dyads were exposed to a high level of traumatic war events.

Conclusion: Mothering in conditions of war and military violence is an overwhelmingly demanding task, and mother-infant dyads need legal, social, and psychological assistance. Knowledge and reflection of unique responses and meanings of different attachment styles would be fruitful in tailoring effective help.

1. Introduction

Unresolved military conflicts and wars force families to face losses, horrors and destruction. The number of children growing up in war zones continue to increase, and more than 65 million people are fleeing and seeking of safety outside their homes (UN High Commission for Refugees, 2016). Pregnant women, mothers and their infants are particularly vulnerable in life-endangering conditions of war, and are therefore in need for effective and tailored help. According to attachment theory, pregnancy activates parental attachment and caregiving systems (Bowlby, 1980; George and Solomon, 2008). In facing a life danger both these evolutionally salient core systems are activated, serving distinct purposes: the parental attachment system is guaranteeing the parent's own sense of security, and the caregiving system is providing protection for the infant from distress and satisfying his/her needs. Qualitative studies among pregnant and caring mothers in war conditions reveal that

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simultaneous and constant activation of both these core attachment systems is highly burdening for mothers (Kaitz et al., 2009; Almqvist and Broberg, 2003). Subsequently, traumatic war experiences can shatter mothers' sense of themselves as competent caregivers and cause an excessive fear of losing the child.

Yet, mothers' own specific early-learned working models about safety and danger guide the strategies that they use in re-establishing a sense of security and attuning their infants' distress (Bowlby, 1988). Maternal attachment style, whether secure-balanced, insecure-dismising/avoidant, or insecure-preoccupied/anxious can thus be decisive to the ways how war trauma influences both mothers' own and their infants' wellbeing, and their dyadic interaction. Accordingly, this study examines impact of traumatic war events, such as losses, atrocities and life threat, on maternal mental health and dyadic interaction quality during the first eighteen months of child's life. It further tests whether maternal secure attachment style can protect her own mental health and dyadic interactio from negative trauma impacts in the aftermath of a major war in the context of Israel-Palestinians military conflict.

2. War trauma and pre- and postnatal maternal mental health

Ample evidence shows that war and military violence negatively influence both adults' and children's mental health, increasing especially posttraumatic stress disorder (PTSD), depression, anxiety and dissociative symptoms (reviews, Dimitry, 2012; Slone and Mann, 2016; Morina et al., 2018). Concerning pre- and postnatal mental health, some research is available among survivors of terrorist attacks, families seeking safety as refugees, and civilians living in war conditions. A systematic review of the 9/11 terrorist attack in USA showed a high increase of PTSD symptoms among pregnant mothers living in vicinity of the disaster place (Harville et al., 2010) and mothers continued to report high distress and depressive symptoms also in postpartum (Chemtob et al., 2010). A study showed that women were twice as vulnerable as men to develop PTSD after being exposed to the terrorist attack, and that earlier traumatic experiences, lack of social support, and worry for children's safety contributed to the high maternal mental health problems (Pulcino et al., 2003).

Concerning refugees and immigrants, a meta-analysis of 40 studies ($n = 10\,123$) found that a third of refugee women from low- and middle income countries suffered from clinically significant depression in pre- and postnatal period (Fellmeth et al., 2017). Epidemiological studies have confirmed immigrant women to be at 2–3 times higher risk for postpartum depression than natives (Stewart et al., 2008; Davey et al., 2011). Traumatic war experiences, such as rape and life threat, together with post-migration stress, such as alienation and discrimination, further deteriorated immigrant women's perinatal mental health. Gagnon and group (2013) confirmed that refugees and asylum seeking women fleeing from war-zones showed more symptoms of depression, somatization, and anxiety (37% and 42% respected) compared to immigrants (21%) without severe war trauma. None of these studies have assessed whether mental health problems differ according to personal trauma exposure or according to nature of trauma, e.g., whether loosing family members or witnessing horrors resulted in specific mental health problems.

Research on pre- and postnatal mental health among mothers living in actual war conditions is more scarce. A prospective follow-up among Palestinian mothers (Gaza Infant Study) showed that an accumulation of traumatic war events, such as human and material losses, deteriorated maternal mental health, indicated by high levels of PTSD, anxiety and depression symptoms in pregnancy and postpartum (Punamäki et al., 2017). Yet, the nature of trauma turned out to be important also in conditions of war, as mothers' exposure to early interpersonal trauma (parental emotional and physical abuse) increased especially depressive symptoms, while traumatic war events increased PTSD symptoms from prenatal to postnatal period (Isosävi et al., 2017).

3. Trauma and dyadic interaction

During the first year, the mother and infant create a unique dyadic relationship that incorporates the infant seeking safety, the mother showing sensitivity to the infant's needs, structuring their dyadic behavior, and both expressing and sharing emotions (Biringen, 2000). Qualitative studies suggest that pregnant and caring women are highly vulnerable in war conditions, which is reflected in their own and infants' wellbeing and dyadic interaction (Kaitz et al., 2009). An Israeli interview study revealed that mothers exposed to a terrorist attack in pregnancy perceived themselves as damaged and inadequate to provide safety to the infant, and were overwhelmed by feelings of guilt (Levy, 2006). The birth evoked intrusive and horrific memories of the traumatic and violent scene, and made mothers feel helplessness and lost. Van Ee and her group (2012) showed that refugee mothers who suffered from PTSD symptoms were more insensitive, non-structuring, and hostile towards their infants, who in turn were less responsive and involved in the in the dyadic interaction. Findings of the Gaza Infant Study showed, however, that mother's severe traumatic war experiences were not directly associated with poor quality of mother-infant -interaction, but the impact was mediated trough maternal-fetus attachment, social support and maternal pre- and post-natal mental health (Punamäki et al., 2017).

Ample evidence shows that interpersonal trauma, such as family violence or parents own early emotional and physical abuse, has negative impacts on dyadic mother-infant interaction. Trauma-exposed mothers tend to be either intrusive or withdrawn with their children, and oscillate between extreme states of mind (Lyons-Ruth et al., 2006). The neediness and helpless of the infant can active the mothers' overly painful memories, causing them to shut-out communication with the infant (Schechter and Willheim, 2009: Scheeringa and Zeanah, 2001). A prospective study found that mothers who had experienced early sexual and emotional abuse showed maladaptive interactions during the feeding of their six month old infants, involving hostile and intrusive parental affectivity and infant's food refusal, although maternal empathy in the interaction was intact (Tambelli et al., 2015).

4. War trauma and attachment style

In war conditions, mothers face an inhuman conflict between signals of infant's security needs and external dangers, which they attempt to resolve in different adaption-serving ways. Attachment theory explains how and why mothers with secure, insecure-dismissing/avoidant, and insecure-preoccupied/anxious attachment styles show profound differences and unique meanings in their responses (Bowlby, 1980; Crittenden, 2006; Mikulincer &Shaver, 2007). Yet, we could detect only few studies on the function of attachment representations in transition to parenthood in conditions of war and military violence.

Research by Van Ee and her group on parental representations and attachment style in refugee families provides an important contribution. They found that parental PTSD was associated with insensitive parent-toddler interaction and toddler's disorganized attachment behaviour (Van Ee, Kleber, Jongmans, Mooren and Out, 2016b). Furthermore, insecure parental attachment representations increased the risk of insensitive interaction if parents suffered from PTSD, thus emphasizing the putative mechanism of activation of maternal attachment systems among dyads with refugee past (Van Ee, Jongmans, Van deer Aa and Kleber, 2016a). The Gaza Infant Study included interviews of Palestinian mothers' representations of caring their infants in the aftermath of the 2008/09 war on Gaza. Results identified three risk features incorporating dysregulation, unavailability, and fearfulness in mothers' caregiver and infant representations. War trauma was not, however, associated directly with these maternal representations, but prenatal depressive symptoms predicted high levels of dysregulating and fearful representations, and postnatal PTSD symptoms were associated with fearful representations (Isosävi et al., 2019).

Israeli and Palestinian studies on civilians, soldiers, and political

prisoners may be helpful, as they illustrate how trauma survivors differ in their ways of seeking and selecting threatening information (cognitive information processing), recognizing, expressing, and regulating emotions, and balancing their psychophysiological reactions (Ein-Dor et al., 2010; Mikulincer et al., 2009; Punamaki, 2019). In threatening situation, preoccupied persons were quick to recognize the danger, and tended to cling to others for help and safety, whereas avoidant persons acted independently and were ready for rapid fight-flight reactions to survive. Secure persons in turn helped others and readily asked help for themselves (Ein-Dor et al., 2011; Ein-Dor and Perry, 2014). Preoccupied trauma survivors tended to use emotional coping strategies, and avoidant survivors cognitive strategies, whereas secure survivors typically coped by seeking social support and using constructive problem-focused strategies (Mikulincer et al., 1993).

Palestinian research confirmed that political prisoners with secure attachment had a balanced access to both cognitive and emotional features of their trauma-related memories, while avoidant prisoners were biased towards deactivated, predominantly cognitive, and preoccupied prisoners towards hyperactivated memories incorporating predominantly emotional and behavioural features (Kanninen et al., 2003). Post-traumatic growth, involving new insights, strengthened social affiliation and spirituality, emerged only among secure prisoners (Salo et al., 2005). Another study identified four different Palestinian family types according to parental attachment and siblingship quality: security and positive, insecurity and negative, moderate security and neutral family relationships. Children in the insecurity and negative relationships families showed higher levels dysfunctional posttraumatic cognitions and internalizing and externalizing symptoms (Punamäki et al., 2018).

To our best knowledge, there are no studies on putative moderating role of attachment style among mothers caring their infants in condition of war and military violence. Yet, based on the theoretical and empirical premises (Bowlby, 1988; Crittenden, 2006; Mikulincer and Shaver, 2007), we may suggest that insecure-avoidant mothers tend to deactivate their attention and emotion expression by not recognizing or denying dangers, supressing their own and children's negative feelings, and trusting their own resources to recover from trauma. On the contrary, insecure-preoccupied mothers hyperactive their attachment strategies by exaggerating perceived threats, expressing overwhelming negative emotions, and clinging to others for help. Secure mothers in turn can balance between the hypo- and hyperactivating their cognitions and emotions, and have access both to their own apt resources and to others' help and availability as safe heaven when facing threats and dangers.

These attachment-specific representations serve as templates for social, intimate and parenting interactions and mental health. As individuals with secure attachment have access to apt and multiple psychosocial resources, secure attachment is considered protective in multiple psychosocial domains, importantly also mental health. According to meta-analyses preoccupied individuals are particularly vulnerable to severe mental health problems including depression, anxiety, PTSD, and even psychotic disorders (Korver-Nieberg et al., 2014; Woodhouse et al., 2015). Research in conditions of war and military violence suggests, however, that both insecure avoidant and preoccupied survivors show higher levels of PTSD than secure (Kanninen et al., 2003; Solomon et al., 2008). Parents exposed to traumatic events often face difficulties in sensitively responding to their infants' needs or communicating with them here and now (Schechter and Willheim, 2009). Their involuntarily intruding traumatic memories are thus interfering with their dyadic interactions. Yet, we could not detect any research analysing the potential protective role of secure maternal attachment or the risking role of the insecure attachment during pre- and post-natal period in conditions of war and military violence. Instead, there is augmenting evidence of insecure attachment contributing to the non-optimal parenting quality among mothers exposed to current interpersonal violence or abuse in their own childhood (Lo et al., 2017; Sutton, 2019).

5. Research aims

Life-danger activates attachment behaviour, which makes maternal attachment style decisive to both her own mental health and dyadic interaction quality in war conditions. Mothers of the present study were pregnant during the 2014 War on Gaza (The Operation of Resolute Cliff in the Israeli military terms) that lasted 54 days and was characterized by almost a complete curfew, daily shelling and bombing from air, sea, and land, resulting in about 2000 deaths, 11 000 wounded and 100 000 displaced civilians (OCHA, 2016; UN-Human Rights Council, 2014). This prospective study involved assessments at delivery (T1), and when the infant was seven (T2) and eighteen (T3) months of age. Our research questions and hypotheses were as follows.

1. How do different traumatic war events (death and losses, witnessing horrifying scenes, and life-threats) associate with maternal postpartum mental health problems, indicated by self-reported PTSD and depressive symptoms at T2 and T3. As there is not earlier research on the nature of war trauma impacting mental health, we do not propose hypotheses concerning the potentially specific impacts of death and losses, witnessing horrifying scenes, and life-threats.
2. How do different traumatic war events associate with mother-infant interaction, indicated by emotional dyadic availability at T2 and T3? We hypothesize that a high level of losses, horrors, and life-threats are associated with non-optimal emotional availability, indicated by a low level of mother-perceived closeness and positive and a high level of distant and negative dyadic relationship.
3. In a cross-sectional setting at T3 we test the protecting vs. risking role of maternal attachment style in conditions of war and military violence. We hypothesize that maternal secure attachment has a protective role in that traumatic war events are not associated with high levels of maternal PTSD and depressive symptoms or with non-optimal dyadic emotional availability, if mothers show secure attachment. Instead, traumatic war events are associated with poor mental health and non-optimal dyadic emotional availability, when mothers show insecure-avoidant and preoccupied-attachment styles.
4. We further analyse the associations between maternal attachment style and her mental health and dyadic emotional availability. We hypothesize that secure attachment is associated with low levels, and insecure attachment styles with high levels of maternal PTSD and depressive symptoms. Further, secure attachment is associated with a high level of close and positive, and with a low level of distant and negative dyadic relationship, while both insecure attachment styles are associated with non-optimal emotional availability.

6. Method

6.1. Participants and procedure

The participants were 502 Palestinian women recruited at their delivery in maternity units in three governmental and one private hospitals in the Gaza Strip (T1). Of them 392 of them were visited in their homes when their infants were 6–7 months old (T2) and 386 continued the participation when the infants were 17–18 months old (T3). The delivering women were representative of the four main regions of the Gaza Strip: North ($n = 100$), Middle ($n = 100$), and South ($n = 100$), and the Gaza City ($n = 202$). The T1 assessment was conducted between January–March 2015. The inclusion criteria of the participating mothers were that they had been pregnant in their first trimester during the 2014 War on Gaza, and that they accepted voluntary participation. One midwife in each hospital registered all deliveries during her work shift and obtained the participants' written informed consent. The midwife filled-in the obstetric registry information used in the present study.

The T2 assessment was conducted in June–October 2015, when the infants were about 6–7 months old ($M = 6.18$; $SD = 0.41$), and August–November when 2016 when the infants were about 17–18

months of age ($M = 18.10$; $SD = 0.56$). Ten fieldworkers with BA degrees and with former research experiences collected the data, after attending a comprehensive training on the research tasks, ethics and procedures. The interviews took place in the homes, and their average duration was 90 min. The mothers received small presents for their participation in the study. Two Palestinian members of the research team supervised the fieldwork through supervisory meetings with the fieldworkers.

Mothers undersigned an informed consent that emphasized the participant rights, such as its voluntary nature and possibility to withdraw from the study without reason. The Ethical Board of the Palestinian Health Research Council and the Helsinki Committee for Ethical Approval reviewed the study setting, research tools and procedures, and provided positive statement.

The number of drop-out between T1 and T2 was 110 participants (22%). The main reasons for dropping out from the study were changed home address due to displacements and shelled homes (n = 90), death of the baby (n = 13), and withdrawal for family reasons (n = 7). The displaced women were mainly from Gaza City, where one large neighborhood was completely destroyed and all families were consequently living in UN-provided tents or by relatives. Due to the military siege and international economic boycott, the reconstruction was not possible due to lack of cement or metals (Manduca et al., 2017; UN-Human Rights Council, 2014).

The drop-out was independent on child's gender and birthweight, and the age and education of the mother and the father. Instead, T2 participation was related to a longer gestation ($t = 2.50$, $p = .01$) and better newborn health ($t = 57.65$, $p = .01$). The drop-out rate between T2 and T3 was only five mothers, one due to the death of the child.

6.2. Measures

6.2.1. Family demographic and obstetric information (T1)

Standard European and US birth register information was gathered at birth, including child's birthweight, length of gestation, mode of delivery, and newborn health, and need of intensive care unit (NICU). Mothers also reported their own and spouse's working status (works at home or professional; unemployed or employed or entrepreneur), family size and parental age.

6.2.2. Traumatic war events (T1 and T2)

Women responded at T1 to five questions about their exposure to the 2014 War on Gaza: whether their own house was bombed, their next door house was bombed, whether they were inside their home at the time of the shelling/attack, whether they were displaced afterwards, and whether they found spent ammunitions inside their dwelling (*yes* = 1; *no* = 0).

At T2 women responded on a 22-item scale of traumatic war events, covering earlier wars and military offensives on the Gaza Strip, and developed by the research group (Punamäki et al., 2017). Seven events probed about death and losses (e.g., death and injury of family members, seeing friend killed), nine about witnessing horrifying scenes (e.g., seeing deaths, explosions, and bombing, experiencing threats and massacres, and hearing injured screaming), six about life threat (e.g., fleeing for life due shelling/bombing, near miss of death, separation from family). The women reported whether they had been exposed to these events during the 2014 War on Gaza (*yes* = 1; *no* = 0). A factor analysis with varimax rotation was conducted to check the dimensionality and get orthogonal regression factor scores (Death and losses, Witnessing horrors, and Life-threat) to study the impact of the nature of traumatic war events on maternal mental health and mother-perceived emotional availability. The factor analysis explained 46.38% of the variation of traumatic war events reported at T2. Further, a total sum variable of traumatic war events was constructed by combining the T1 and T2 scales (by summing up all yes-answers) for the analysis of the role of maternal attachment.

6.2.3. PTSD symptoms (T2 and T3)

The 16-item scale of symptoms of posttraumatic stress disorder (PTSD) from the Harvard Trauma Questionnaire (HTQ; Mollica et al., 1992) was applied at T2. The self-reported HTQ covers intrusive, avoidance and hypervigilance symptoms. Mothers evaluated on a 4-point scale ranging from 0 (Not at all) to 3 (Severely) how severely they suffered from the described symptoms during the previous month. A sum variable was constructed and the Cronbach's α was .91.

At T3 PTSD symptoms were measured by a 9-item National Stressful Events Survey PTSD Short Scale (NSESSS-PTSD, LeBeau et al., 2014). The self-report is based on the DSM-5 diagnostic criteria and covers the dimensions of intrusion, avoidance and hypervigilance, as well as negative cognitive-affective responses. Women estimated on a 5-point scale to what extent they had suffered the symptoms and affective states during the previous month 0 (Not at all) to 4 (Extremely). A sum score was constructed with Cronbach's $\alpha = .94$. The reason for changing the PTSD symptom scale was the criticism of the HTQ not being updated for DSM-5.

6.2.4. Depressive symptoms (T2 and T3)

The Edinburgh Postnatal Depression Scale (EPDS, Cox et al., 1987) was applied to measure self-reported depressive symptoms at T2 and T3. The EPDS consists of 10 items assessing negative thoughts, feelings, and behaviors. Mothers responded on a 4-point Lickert-scale ranging from 1 (Not at all) to 4 (Every day) on how often they suffered described symptoms in the last two weeks. A sum variable was constructed and the Cronbach's α was .82 at both assessment times.

6.2.5. Mother-perceived emotional availability (T2 and T3)

A short version of the Emotional Availability-Self-Report (EA-SR Brief; Biringen, Vliegen, Bijttebier and Cluckers, 2002) was used to evaluate mother-perceived emotional availability at seven and 18 months. The 28-item questionnaire depicts, first, close and positive dyadic relationships (e.g., "My baby likes to be with me the most of the time": "My baby seems to light up when she/he sees me"; "I am usually in a good mood when with my baby"); second, distant and hard to soothe dyadic relationships (e.g., "My baby is "cranky" most of the time"; "My baby doesn't seem to notice when I come back into the room"; "It is hard to soothe my baby and he (or she) seems to be distressed a lot"), and, third emotional scaffolding (e.g., "I try to see things from my baby's perspective"). Women estimated to what extent the descriptions fit her and her baby by a 5 point Likert scale (1 = *not at all*; 5 = *completely*). The EA-SR-Brief Self-assessment form is based on the observational Emotional Availability Scales, and has found to correlate with them (Vliegen et al., 2009). The EA-SR-Brief has not been validated in Middle Eastern samples, and therefore the present study run a confirmatory factor analysis (CFA) to confirm that three-dimensionality, but accordingly reliability analyses only Close and positive ($\alpha = .71$–78) and, to some extent, Distant and negative ($\alpha = .63$–65) emerged and were used in the analyses.

6.2.6. Attachment style (T3)

Mothers self-reported attachment style was measured using 18-item shortened questionnaire from the 40-items Attachment Style Questionnaire (ASQ) by Feeney et al. (1994). The shortening was performed using factor analysis (Varimax) on a data of another study conducted with Palestinian mothers living in Gaza (n = 337), extracting a three factor solution. The shortened version include six items on each factor that showed the highest loadings in that dimension only: secure attachment style (6- items, e.g., "I find it relatively easy to get close to other people''; "I am confident that other people will like and respect me.''), avoidant attachment style (6-items, e.g., "I prefer to keep to myself.''; "Achieving things is more important than building relationships,'' and preoccupied attachment style (6-items, e.g., "I find it hard to make a decision unless I know what other people think'', "Other people often disappoint me''). The participants estimated about how they typically feel in close

relationships under each of the 18 descriptions on a six-point Likert scale from (1) strongly agree, (6) strongly disagree. Sum scores were calculated for the three attachment styles, but only self-reported avoidant (α. = .71) and preoccupied (α. = .70) attachment styles showed sufficient internal consistency, while self-reported secure attachment (α. = .65) did not.

6.2.7. Translation

All measures were in Arabic. The HTQ and EPDS indicating mental health were translated and validated in earlier studies (Isosävi et al., 2017) as well as the Emotional Availability-Self-Report short scale (Punamäki et al., 2017) and Attachment Style Questionnaire (Salo et al., 2005). A bilingual researcher translated the NSESSS-PTSD scales from English to Arabic, and another conducted a back translation to check the accuracy.

6.3. Statistical analyses

The distribution of demographic and obstetric variables are reported by $\chi 2$ statistics, and correlations between study variables with Pearson' Product Moment two-way analyses. To answer the first research question about the impact of various traumatic war events on self-reported maternal mental health and mother-perceived emotional availability, we run multiple hierarchical regression analyses with main effects of background variables (maternal age, employment, number of children and the newborn health) in the first step, and three factor scores of traumatic war events (death and losses, witnessing horrifying scenes, and life-threats) in the second step. The independent variables were maternal self-reported PTSD and depressive symptoms at T2 and T3, and mother-perceived close and positive, and distant and negative emotional availability sum variables at T2 and T3.

The second task was to analyze the role of self-reported maternal attachment styles in protecting (secure), or risking (avoidant and preoccupied) self-reported maternal mental health and mother-perceived emotional availability when exposed to traumatic war events. Because the self-reported maternal attachment styles were assessed only at T3, we run cross-sectional multiple hierarchical regression analyses with main and interaction effects, using self-reported maternal PTSD and depressive symptoms and mother-perceived close and positive and distant and negative emotional availability as dependent variables. In the first step, demographic factors were entered as control variables, the second step included the main effect of traumatic war events (combined total sum variable of T1 and T2 scales), and in the third step, the main effects of self-reported secure, avoidant and preoccupied maternal attachment styles were entered. Finally, the forth step involved the three interaction terms between traumatic war events and maternal attachment styles. Traumatic war events and attachment variables were centred before forming the interaction terms in order to avoid low variance of regression coefficients and problems of multicollinearity (Aiken et al., 1991).

The requirement for normal distribution of dependent variables in regression analysis did not realize. According to Kolmogorov-Smirnov -test the variables of self-reported PTSD and depressive symptoms had significantly skewness values (towards high levels) and mother-perceived emotional availability (close and positive towards high, and distant and negative towards low levels). Accordingly, we used logarithmic transformations in the regression analyses, but reported the reliabilities of the original sum scores.

7. Results

7.1. Descriptive results

Table 1 reports the demographic and obstetric information at T1. The average age of mother was 26 years (SD = 6.0 years) and of father 31 years (SD = 6.0 years). Majority of the mothers worked at home (89%) and the rest were professionals, e.g., teachers and nurses (9.3%). About a half of fathers were manual workers (49%) and about a fifth was blue-collar staff, such as teachers, engineers or governmental officials (22.5%). A fifth of fathers were unemployed (22%). The infant sample consisted of equal number of boys and girls.

Table 1
Demographic background, obstetric and newborn characteristics at birth (%).

	Participants[a]	
	%	N
Mother's age (years)		
16–20	14.5	73
21–30	62.9	316
31–40	21.1	106
41-52	1.4	7
Father's age (years)		
18–20	2.8	14
21–30	53.6	269
31–40	37.3	187
41-50	6.4	32
51-70	2.8	14
Number of children		
Expecting first child	26.5	133
1–3	53.0	268
4–6	17.0	85
7–10	3.5	18
Mother employment		
Works at home	88.8	446
Worker or entrepreneur	0.2	1
Blue collar: teacher, nurse	9.3	46
High professional (doctor)	0.6	3
Student	1.2	6
Father employment		
Unemployed	22.1	111
Worker	49.2	247
Entrepreneur	0.8	4
Blue collar: teacher, officer	22.5	113
High professional (doctor, engineer)	2.4	12
Farmer	2.2	11
Student	0.8	4
Type of residence		
Urban area	48.9	244
Village	18.6	93
Refugee camp	32.5	162
Child's sex		
Girl	50.4	253
Boy	49.6	249
Gestational age (weeks)		
<37	4.2	20
37	11.3	54
38-42	84.5	404
Birth weight (gr)		
<2500	3.5	10
2500–3499	59.5	172
3500–4499	35.3	102
>4500	1.7	5
Newborn health		
Excellent	51.1	256
Good	45.5	228
Health problems[b]	2.6	13
Child death	0.8	4
Birth defect		
ICD 10 diagnosis	5.2	26
Not defect	94.8	476
Type of delivery		
Normal vaginal	86.8	435
Caesarean	13.2	66

[a] Participant numbers differed due to missing data.
[b] Combines reasonable and severe problems (severe n = 2).

Concerning obstetric data, the average length of gestation was 39.23 weeks (SD = 1.77 weeks) and birthweight 3348.38gr (SD = 526.96 gr). The prevalence of preterm delivery (<37 weeks) was 4%, low birth weight (<2.500 gr) 3.5%, and birth defects 5.2%. All babies were born alive, although one died in few minutes after birth and four during the first months.

Table 2 shows the mothers' exposure to traumatic war events during the 2014 War on Gaza, reported at T2: Death and losses, Witnessing

Table 2
Women's self-reported traumatic war events[a] (% and frequencies).

	Participants[b]	
	%[c]	n
Death and losses		
Witnessing killing of family member	3.6	14
Witnessing injury and wounding of family member	5.9	23
Death of family member	6.9	27
Injury of family member	12.1	47
Seen fried/s killed by bombs/shells	13.4	52
Seen friend/s injured by bombs/shells	15.2	59
Own injury in shelling	2.1	8
Witnessing horrors		
Seen other people killed	17.5	68
Seen death bodies in street/ruins	13.9	54
Due to curfew stayed with death bodies	2.1	8
Witnessing a massacre in neighborhood	50.6	197
Hearing injured screaming for help	47.4	185
Witnessing explosion of houses	61.0	238
Neighborhood shelled and bombed	76.9	300
Schools, mosques and administrative building destroyed	70.0	273
Heavy explosions, fire and burning in the neighborhood	63.6	248
Life threat		
Home severely damaged in bombing and shelling	22.6	88
Fleeing from home while under bombing and shelling	55.1	215
Not finding safe place to hide from shelling	50.8	198
Separation from family while fleeing bombardment	41.8	163
Soldiers attacking/threatening families	51.0	199
Near miss of death as being targeted and/or shelled	53.1	207

Notes: [a]War events refer to the 2014 War on Gaza, reported at T2; [b]Participants N = 388–390; [c]The percentages and frequencies refer to yes-answers in the dichotomy scale of traumatic war events.

horrors, and Life threat. Most common events were related to witnessing horrors, as 70–77% of women reported shelling and bombing in their neighborhoods. About a half (51–55%) had experienced life-threat, for instance, fleeing for safety and near-miss situations. Death and losses were less common, as 7–12% had death or injury in the family.

Correlations between the study variables are presented in Table 3. The dimensions of traumatic war events are based on factor scores with varimax rotation, and therefore they share zero correlations. Death and losses correlated positively with depressive symptoms at both T2 and T3, and with PTSD symptoms at T2, whereas witnessing horrors and life-threat correlated with PTSD symptoms only at T2. Instead, witnessing horrors correlated negatively with the mother-perceived close and positive and positively with distant and negative mother-infant interaction at T2, but negatively with both close and distant dyadic emotional availability at T3. Life-threat had a negative correlation with close and positive emotional availability at T3.

Traumatic war events were correlating with self-reported avoidant attachment, but the nature of war trauma was significant. Death and losses were correlating with a low level and witnessing horrors with a high level of avoidant attachment. Life-threat was correlating with low secure attachment. Self-reported maternal PTSD and depressive symptoms correlated negatively with mother-perceived close and positive, and positively with distant and negative emotional availability at T2, while only depressive symptoms replicated these correlations at T3 emotional availability. Avoidant security style correlated with low close and positive and with high distant and negative dyadic emotional availability at both T2 and T2, and secure attachment style with high close and positive emotional availability at T2.

7.2. Traumatic war events, maternal mental health and emotional availability

Table 4 shows the main effect regression models of different traumatic war events associating with maternal mental health and dyadic emotional availability at T2. Step II explained 17% of the variation of self-reported PTSD symptoms [Increase in $R^2 = .17$, $F(1,373) = 27.68$, $p = .0001$] and significant β−values indicate that high levels of death and losses, witnessing horrors and life-threats were all associated with high levels of self-reported PTSD symptoms. Instead, only death and losses were significantly associated with a high level of self-reported depressive symptoms ($\beta = .12$, $t\ (372) = 2.35$, $p = .02$), although step II was only marginally significant [increase in $R^2 = .02$; $F(3,372) = 2.29$, $p = .082$], indicating cautiousness of interpretation. Of background variables women's own working situation was significant for PTSD, and her husband's working situation to depressive symptoms. Women working at home reported more PTSD symptoms than professional women, and husband's unemployment was associated with a high level of maternal depressive symptoms.

Concerning T3, the main effect regression models were significant for self-reported depressive symptoms [$F(8,360) = 2.23$, $p < .025$, 5% explained variance, (adj. R = .03)], but non-significant for PTSD [$F(8,358) = 1.33$, $p <$ .ns.]. (Tables available from the corresponding

Table 3
Pearson's product moment correlations between traumatic war events, maternal mental health, attachment styles, and mother-perceived emotional availability.

	Traumatic war events[a,b]			Self-reported Maternal mental health				Mother-perceived emotional availability				Self-reported maternal attachment	
	1	2	3	4	5	6	7	8	9	10	11	12	13
Traumatic war events													
1. Death and losses	1												
2. Witnessing horrors	00	1											
3. Life-threat	00	00	1										
Maternal mental health													
4. PTSD T2	.23***	.33***	.20***	1									
5. Depressiveness T2	.13**	.03	.04	.49***	1								
6. PTSD T3	.06	.02	.02	.30***	.28***	1							
7. Depressiveness T3	.17**	.05	.02	.37***	.43***	.48***	1						
Mother-infant-interaction													
8. Close & positive T2	.01	-.11*	.03	-.05	-.16**	-.01	-.01	1					
9. Distant & negative T2	.07	.18***	.05	.15*	.32***	.03	.15*	-.41**	1				
10. Close & positive T3	-.07	-.13**	-.11*	-.01	-.05	-.04	-.07	.25***	-.13***	1			
11. Distant & negative T3	.03	-.13**	.01	.10	.11*	.16**	.18***	-.03	.16**	.01	1		
Maternal attachment													
12. Secure	-.08	-.01	-.10*	-.11*	-.07	-.15***	-.18***	.18**	-.07	.05	.03	1	
13. Avoidant	-.11*	.14**	.06	.05	.03	.18**	.06	-.16**	.18**	-.18***	.10*	.09	1
14. Preoccupied	.07	.02	.03	-.20**	-.25***	-.33***	-.45***	.01	-.15**	.09	-.34***	-.31***	.17**

Note: *p < .05, **p < .01; ***p < .001; [a]The traumatic war events are reported at T2 (N = 386), The scores are based on factor analyses (Varimax rotation with regression scores of the three dimensions); [b]The significances are based on one-tailed correlations between traumatic war events and other study variables, and on two-tailed correlations between all other.

Table 4
Main effects of types of traumatic war events on women's mental health (PTSD and depressive symptoms) and mother-infant -relationship (close and positive and distant and negative interaction).

	PTSD-symptoms at T2					Depressive symptoms at T2				
	R^2	F-valueΔ R^2	B	StdE	β^c	R^2	F-value Δ R^2	B	StdE	β^c
I Control variables	.06	4.52***				.04	3.54**			
Mother's age			0.01	.01	.03			0.01	.01	.03
Mother employment[a]			-0.04	.01	-.11*			-0.01	.02	-.03
Father employment[b]			-0.02	.04	-.09			-0.03	.01	-.17***
Number of children			0.01	.00	.06			.01	.01	.11
Newborn health			0–.01	.01	-.01			-0.01	.01	-.04
II Traumatic war experiences	.17	27.68****				.02	2.29+			
Death and losses			0.03	.01	.22****			0.02	.01	.12*
Witnessing horrors			0.04	.01	.31****			0.01	.01	.06
Life-threat			0.03	.01	.20****			0.01	.01	.06
Models	F (8,373) = 13.82, $p < .0001$; 23% explained variance; (adj. R^2 = .22); Effect size, Cohen's f^2 = 0.30					F (8,372) = 3.09, $p < .002$; 6% explained variance; (adj. R^2 = .04); Effect size, Cohen's f^2 = 0.08				
	Close and positive interaction at T2					Distant and negative interaction at T2				
	R^2	F-valueΔ R^2	B	StdE	β^c	R^2	F-value Δ R^2	B	StdE	β^c
I Control variables	.03	2.52*				.02	1.54			
Mother's age			-0.01	.01	-.02			-0.01	.01	-.01
Mother employment[a]			0.01	.01	.04			0.01	.02	.03
Father employment[b]			0.01	.01	.07			-0.01	.01	-.06
Number of children			-0.01	.01	-.15*			.01	.00	.09
Newborn health			0.01	.01	.06			-0.01	.01	-.05
II Traumatic war experiences	.02	2.38+				.04	4.62**			
Death and losses			-0.01	.01	-.02			0.01	.01	.07
Witnessing horrors			-0.01	.01	-.13**			0.02	.01	.17***
Life-threat			-0.01	.01	-.04			0.01	.04	.06
Models	F (8,379) = 2.48, $p < .012$; 5% explained variance; (adj. R^2 = .03); Effect size, Cohen's f^2 = 0.06					F (8,372) = 2.72, $p < .006$; 6% explained variance; (adj. R^2 = .04); Effect size, Cohen's f^2 = 0.08				

Note: *p < .05, **p < .01; ***p < .001, ****p < .0001 (+< .10) [a]Mother employment (dummy variable 0 = works at home; 1 = professional) [b]Father employment (dummy variable 0 = unemployed; 1 = professional); β-values are from the final forth step of the regression models.

author). Of the traumatic war events death and losses continued to increase depressive symptoms [β = .16, t(360) = 3.09, p = .002]. None of the background variables were significantly for variation of PTSD or depressive symptoms at T3.

Table 4 further presents the main effect regression models of mother-perceived dyadic emotional availability. Of the traumatic war events only witnessing horrors was significantly associated with non-optimal emotional availability, i.e., a low level of close and positive (β = -.13, t (372) = 2.50, p = .013), and a high level of distant and negative responses (β = .17, t (372) = 3.30, p = .001). Yet, step II was only marginally significant on close and positive emotional availability (R^2 = 0.02 F(3,372) = 2.38, p = .070), indicating cautiousness in the interpretation. Of background variables, smaller number of children was associated with close and positive emotional availability (β = -.15, t (372) = -1.98, p = .048).

At T3, the main effect regression models were significant on both close and positive [F(8,360) = 2.77, p = .006, 6% explained variance, (adj. R^2 = .04)] and distant and negative [F(8,360) = 2.98, p = .003, 6% explained variance, (adj. R^2 = .04)] dyadic emotional availability. Yet, step II was significant only for close and positive F(3,360) = 3.68, p = .012, but not for distant and negative F(3,360) = 1.72, p = .168) emotional availability at T3. (Tables available from corresponding author). Result showed that witnessing horrors predicted a lower level of close and positive (β = -.13, t(360) = -2.39, p = .017) and a higher level distant and negative (β = .12, t(360) = 2.22, p = .027) emotional availability. Concerning the background variables of the T3 models for emotional availability, younger mothers perceived a lower level of close and positive emotional availability than older (β = -.17, t(360) = -2.06, p = .040). Mothers working in professional life perceived a lower level of distant and negative emotional availability than those working at home (β = -.13, t(360) = 2.37, p = .018).

7.3. Role of maternal attachment style

Table 5 shows that the models comprising of main and interaction effects between traumatic war events and attachment styles were significant for PTSD and depressive symptoms at T3, explaining 16% and 23% of their variations. Yet, results did not substantiate our hypotheses about the protective role of secure or the risking role of avoidant and preoccupied attachment styles in maternal mental health problems. Steps IV of traumatic war events and attachment styles -interaction terms as well as all β-values were non-significant on both PTSD and depressive symptoms.

Significant main effects of attachment styles indicate, also against to the hypothesis, that mothers with preoccupied attachment styles showed lower levels of PTSD and depressive symptoms, while secure attachment was non-significant for these symptoms. Of the background variables, newborn health problems were associated with a higher level of PTSD and working at home with higher levels of depressive symptoms.

Table 5 further shows that these models involving main and interaction effects between traumatic war events and maternal attachment styles were significant on mother-perceived dyadic emotional availability, explaining 12% of the variation close and positive and 17% of distant and negative emotional availability. The interaction effects were significant on close and positive (Step IV, increase in R^2 = .04, F(3,360) = 5.71, p = .001), but not on distant and negative (no increase in R^2 = F(3,360) = 0.96, p = ns.) emotional availability. Results confirmed only the hypothesis on the risking function of avoidant attachment style concerning close and positive emotional availability (β = .17, t(360) = 3.19., p = .002). Fig. 1 illustrates that, as hypothesized, traumatic war events were associated with a low level of close and positive emotional availability, when mothers showed insecure-avoidant attachment style.

Instead, against to our hypothesis, traumatic war events were not

Table 5
Main and interaction effects of traumatic war events and maternal attachment style on women's mental health (PTSD and depressive symptoms) and mother-infant dyadic interactions at T3.

	PTSD-symptoms at T3					Depressive symptoms at T3				
	R^2	F-valueΔ R^2	B	StdE	β^c	R^2	F-value Δ R^2	B	StdE	β^c
I Control variables	.03	1.83				.02	1.28			
Mother's age			0.01	.01	.04			0.01	.01	.07
Mother employment[a]			-0.02	.05	-.02			-0.01	.02	-.03
Father employment[b]			-0.02	.02	-.05			-0.01	.01	-.02
Number of children			-0.01	.01	-.04			.00	.01	.01
Newborn health			-0.08	.03	-.14**			0.01	.01	.02
II Traumatic war events	.00	0.65	0.01	.01	.01	.01	2.26	0.01	.01	.07
III Attachment styles	.13	17.38****				.19	30.26****			
Secure			-0.03	.02	-.08			-0.01	.01	-.05
Avoidant			0.05	.02	.13*			0.01	.01	.02
Preoccupied			-0.10	.02	-.31****			-0.07	.01	-45****
IV Interaction effects	.01	0.69				.01	1.28			
Trauma * Secure attachment			-0.01	.01	.02			-0.01	.01	-.01
Trauma * Avoidant attachment			0.02	.01	.04			-0.01	.01	-.08
Trauma * Preoccupied attachment			0.01	.01	.08			0.01	.01	.04
Models	F (12,372) = 5.44, $p < .0001$; 16% explained variance; (adj. $R^2 = .13$); Effect size, Cohen's $f^2 = 0.19$					F (12, 372) = 8.80, $p < .0001$; 23% explained variance; (adj. $R^2 = .20$); Effect size, Cohen's $f^2 = 0.30$				
	Close and positive interaction at T3					Distant and negative interaction at T3				
	R^2	F-value Δ R^2	B	StdE	β^c	R^2	F-value Δ R^2	B	StdE	β^c
I Control variables	.03	2.24*				.05	4.17***			
Mother's age			-0.01	.01	-.17*			.00	.01	.01
Mother employment[a]			0.10	.06	.10			-0.03	.01	-.10
Father employment[b]			-0.04	.03	-.08			-0.01	.01	-.07
Number of children			0.01	.01	.07	.		-0.01	.00	-.13
Newborn health			0.01	.04	.01			-0.01	.01	-.08
II Traumatic war events	00	0.13	.00	.00	.03	.01	1.57	0.01	.01	.05
III Attachment	.05	5.82***				.11	15.16****			
Security			0.01	.00	.03			-0.01	.01	-.10
Avoidant			-0.01	.00	-.24****			0.01	.03	.02
Preoccupied			0.01	.00	.16**			-0.04	.01	-.34****
IV Interaction effects	.04	5.71***				.00	0.96			
Trauma * Secure attachment			-0.01	.00	-.17**			0.01	.01	.07
Trauma * Avoidant attachment			0.02	.01	.17**			-0.01	.01	-.06
Trauma * Preoccupied attachment			-0.01	.00	-.14*			0.00	.01	.02
Models	F (12,372) = 4.00, $p < .0001$; 12% explained variance; (adj. $R^2 = .09$); Effect size, Cohen's $f^2 = 0.14$					F (12,372) = 5.98, $p < .0001$; 17% explained varianace; (adj. $R^2 = .14$); Effect size, Cohen's $f^2 = 0.20$				

Note: *p < .05, **p < .01; ***p < .001, ****p < .0001; [a]Mother employment (dummy variable 0 = works at home; 1 = professional) [b]Father employment (dummy variable 0 = unemployed; 1 = professional); [c]β-values are from the final forth step of the regression models.

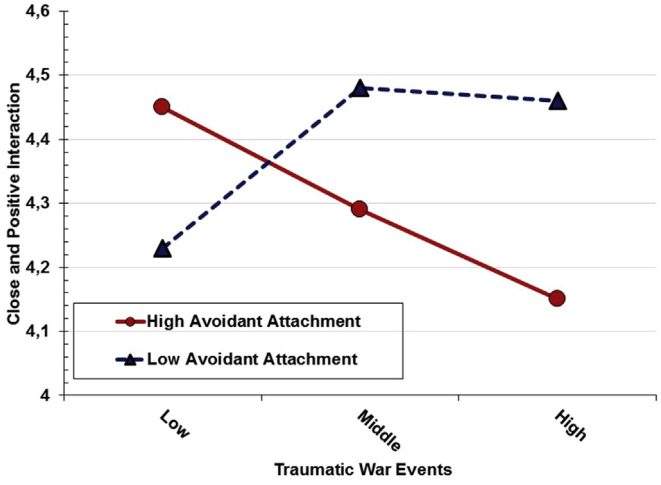

Fig. 1. Interaction effect between traumatic war events and maternal avoidant attachment style on close and positive dyadic interaction. Slopes drawn from two SD above mean (High avoidant attachment) and two SD below mean (Low avoidant attachment).

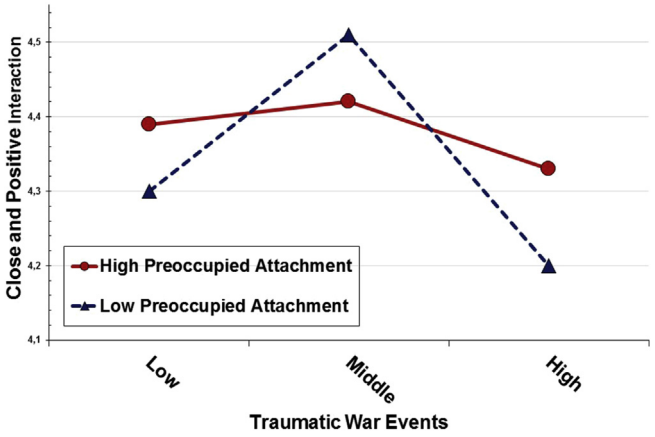

Fig. 2. Interaction effect between traumatic war events and maternal preoccupied attachment style on close and positive dyadic interaction. Slopes drawn from two SD above mean (High preoccupied attachment) and two SD below mean (Low preoccupied attachment).

associated with a low level of close and positive emotional availability in dyads with preoccupied mothers (β = -.14, $t(360) = -2.41$, $p = .016$), as Fig. 2 shows. Mothers' secure attachment style showed similar patterns as that of preoccupied mothers, i.e., exposure to traumatic war events first increased close and positive emotional availability, but then decreased dramatically when the dyad was exposed to a high level of traumatic war events (β = -.17, $t(360) = -3.00$, $p = .003$), as shown in Fig. 3.

Significant main effects of attachment styles were found on both close and positive and distant and negative emotional availability. As hypothesized, mothers with high level of avoidant attachment reported generally a low level of close and positive emotional availability. However, against to the hypothesis, mother with preoccupied attachment reported a high level of close and positive dyadic relationship and a low level of distant and negative emotional availability. Against to our hypothesis, secure maternal attachment was not directly associated with either a high level of close and positive or a low level of distant and negative emotional availability, as indicated by non-significant β−values in step III. Of the background variables, again, younger mother perceived a lower level of close and positive emotional availability than older (β = -.17, $t(360) = -2.06$, $p = .040$).

Traumatic war events did not associate significantly with either maternal mental health problems or emotional availability. Results on the interaction effects between traumatic war events and attachment style (Figs. 2 and 3) hint that these events may have a reversed U-shape association with close and positive interaction, which may explain the non-significant association in linear models. We tested additionally the fit of quadratic model to the data, but results confirmed a significant U-shape association only between traumatic war events and close and positive emotional availability at T2 [$F(8,382) = 6.50$, $p = .002$, 3% explained variance, (adj. $R^2 = .02$)]. The linear model was marginally significant [$F(8,382) = 3.41$, $p = .070$, 1% explained variance, (adj. $R^2 = .01$)]. At T3 the corresponding linear model was non-significant and quadratic model marginally significant [$F(8,369) = 2.94$, $p = .054$, 2% explained variance, (adj. $R^2 = .01$)].

8. Discussion

Life dangers and losses activate attachment behaviour in order to guarantee a sense of safety and protection in both mothers and infants. Therefore, it is informative to learn about the role of maternal attachment style in conditions of war and military violence. Theoretically, secure attachment is considered beneficial and protective, and insecure attachment risky for both maternal and infant wellbeing and development (Bowlby, 1980; George and Solomon, 2008). Yet, except

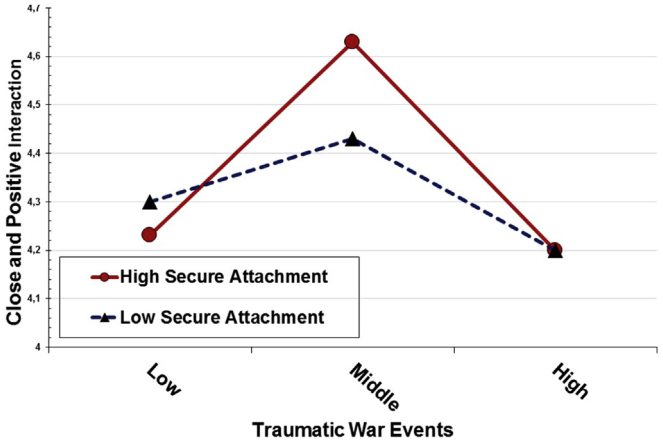

Fig. 3. Interaction effect between traumatic war events and maternal secure attachment style on close and positive dyadic interaction. Slopes drawn from two SD above mean (High secure attachment) and two SD below mean (Low secure attachment).

insecure-avoidant style, our findings among Palestinian mothers and their infants in the aftermath of a major war accorded rather with an alternative view, suggesting that the success of an attachment style in guaranteeing protection depends on its goodness of fit with the environmental demands (Mikulincer and Shaver, 2007). As hypothesized, avoidant maternal attachment style turned out to be risky to emotional availability in mother-infant relationship, when the dyad was exposed to severe traumatic war events, whereas, against the hypothesis, preoccupied attachment showed, to some extent, a protective function in increasingly severe exposure to war trauma. Notably, maternal attachment style played protective vs. risking role only concerning the dyadic emotional availability, but not the mother's own mental health. The result may thus suggest that in conditions of war and military violence, the activation of maternal caregiving system was more important than that of parental attachment system.

8.1. Trauma-specificity and maternal mental health

Research among survivors of terrorist attacks and refugees seeking for safety has confirmed the deteriorating impact of war trauma on maternal mental health (Fellmeth et al., 2017; Harville et al., 2010). Our findings contribute to the field by providing a prospective setting across the first important months shared by mother and infant, and by analysing the role of different types of war trauma in self-reported maternal mental health and mother-perceived emotional availability.

The results suggest differences between short- and long-term impacts of war trauma on mother-reported PTSD and depressive symptoms. While experiences of death and losses, witnessing horrors and life-threat were all associated with maternal PTSD symptoms when the infant was six months, these did not continue to increase these symptoms when the infants were 18 months. Differently, however, only experiences of death and losses were associated with a high level of maternal self-reported depressive symptoms when the infant was six months, but they continued to increase depressiveness also at 18 months. The trauma-specificity concurs with research linking severe losses to depression (Busch, 2009), although empirical studies are mainly available on loss of parents in childhood predicting depression later in life (Simbi et al., 2019) and complex grief leading to depression among widows (Kristiansen et al., 2019).

The post-war conditions in Gaza Strip and unending violence between Israelis and Palestinians can partly explain the persistence of depressive symptoms. Death and losses in war typically involved multiple dramatic, shameful, guilt-evoking and mind-blowing scenes, which can complicate the grief process. Dead bodies could be shattered or lost, and due to long-lasting curfews families could not arrange proper burials of their deceased. Family members felt guilty of not being able to respect their dear ones in accordance with the religious and cultural codes, as the Israeli military delayed or forbid funerals. Generally, loss of family members and seeing close people suffering form a core sense of traumatization, which partly explains the persistence of depressive symptoms in transition to motherhood in war conditions. In similar lines, research on natural disasters, such as earthquakes, confirms that negative mental health consequences of losses of human lives greatly exceed those of the material losses (Sezgin and Punamäki, 2012).

Life-threat with experiences of fleeing and hiding from shelling and bombing connotes profound helplessness, lack of safety, and feeling of being on the mercy of overwhelming alien powerful forces. Characteristic to the 2014 War on Gaza was that due to the military siege, Palestinian families did not have any real possibility to flee and seek for a safe place to hide from excessive Israeli warfare (UN-Human Rights Council, 2014). Due to the international economic boycott the families were deprived from basic commodities, including medicine for their children (Manduca et al., 2017; OCHA, 2016). Caring and protecting infants in these conditions seemed an impossible task and made women overwhelmingly aware and hypervigilant for dangers and threats that are a core dimension of PTSD (LeBeau et al., 2014). Our results also showed that

witnessing horrors, such as seeing massacre and death bodies, increased the risk of maternal self-reported PTSD symptoms. They suffered from involuntary intrusions of these horrifying war scenes and attempted to avoid trauma reminders, which both can interfere with optimal emotional availability in the intimate mother-infant relationship (Van Ee et al., 2012). Among our Palestinian dyads, PTSD symptoms correlated positively with distant and negative emotional availability, but close and positive emotional availability was intact from these symptoms.

Our study is rare in that is involves a follow-up, albeit short, of the impact of traumatic war events on later mental health in pre- and postnatal period. The results show that only experiences of death and losses continued negatively to influence mental health, by predicting a high level of maternal self-reported depressive symptoms. We could not find earlier research on postpartum depression or PTSD among women living in war conditions, although the emergence of both symptoms is globally recognized, including low income countries (Gelaye et al., 2016). Therefore, it is difficult to know whether the phenomenon of attuning the impact of traumatic war events on maternal PTSD, but not depression is general in war conditions or specific to our Palestinian participants. Humanitarian help and preventive interventions among war-affected mothers and infants should tailor specific programs to attune maternal depression, because good maternal mental health is decisive for infant wellbeing and development (Field, 2011; Gelaye et al., 2016).

The finding of the attuned trauma impact on PTSD concurs with follow-up studies among civilian war-survivors (Bonanno, 2004; Neria et al., 2010). Research on mental health trajectories among civilians exposed to terrorist attacks in USA and Israel have revealed, however, more nuanced dynamics in the recovery from war trauma. The identified recovery trajectories revealed that, indeed, a majority of survivors show decreasing mental health problems with time, but among some, mental health problems can emerge gradually or even as delayed reactions. Also, this research detected a resilience trajectory of survivors who typically did not show any deteriorated mental health or were even gaining posttraumatic growth (Bonanno and Mancini, 2012; Itzhaky et al., 2017). Studies in peaceful conditions have identified specific maternal mental health trajectories, reflecting dynamic and diverse paths of stable poor and good mental health, and gradually increasing and decreasing depressive and anxiety symptoms across pre- and postnatal period (Guyon-Harris et al., 2016;. Vänskä et al., 2011). Trajectory studies would be welcome to analyse pre- and postnatal mental health developments among mothers who are caring their infants in war conditions, as trajectory approach could more succinctly and dynamically describe mothers' specific resources and vulnerabilities.

8.2. War trauma and dyadic emotional availability

Of the different traumatic war events, only witnessing horrors was associated with a high level of mother-perceived distant and negative and with a low level close and positive (a marginally significant regression step) dyadic emotional availability, as was hypothesized. This negative impact lasted from infancy to toddlerhood. Civilians are highly vulnerable to atrocities and horrors in contemporary wars, where the use of sophisticated weaponry and deliberate targeting to civilians is a part of warfare (Roberts, 2010). Witnessing violent and frightening scenes can severely interfere with intimacy and closeness that are crucial for optimal dyadic interaction (Kaitz et al., 2009). International law should protect the most vulnerable, and it is inacceptable that mother-infant -dyads have to struggle to maintain normal stability and safety, while powerful nations are testing the effectiveness of lethal and toxic weaponry on civilian neighbourhoods.

Mother's experiences of losses and death or life-threat were not statistically significant for the quality of mother-infant interaction, conceptualized as emotional availability. The finding may reflect the great investments that mothers do in war conditions in order to create feelings of safety for their children and to protect them from external threats and dangers. The question might not be about the objective quality of mother-infant interaction, but rather about mother's efforts to provide the infant optimally safe, loving and close personal and family environment despite, or maybe especially, because the world is so threatening, unsafe, and dangerous.

An additional analysis revealed that the association between traumatic war events and close and positive emotional availability was reversed U-shape. It indicated that whatever highly motivated the caring women were to intensify their close and positive dyadic interaction while struggling with war trauma, when the exposure accumulated they reach the point where "the straw broke the donkey's back". A study found a similar phenomenon concerning impact of war trauma on social relations among Palestinian school-age children. When children were exposed to collective war trauma, they first enjoyed supportive peer and sibling relations, but with the increase of severe trauma and apparent suffering the social relations dramatically deteriorated (Qouta et al., 2008).

The phenomenon of increased mental investment to intact mother-infant interaction when traumatic war events were still moderate might also reflect social support that mothers enjoyed during the 2014 War on Gaza. Experiences of death and losses and life-threat did not deteriorate mother-perceived dyadic emotional availability. We may speculate that they involved collective and shared experiences, as extended families provided shelter to relatives fleeing from destroyed areas. Neighbours and families also attempted to support those who lost their dear ones, and apparently also provided practical and psychological help to the mother-infant dyads. Yet, it is intruiging that death and losses deteriorated women's own mental health, but left their emotional availability intact.

8.3. Goodness of fit between attachment style and war trauma

Attachment theory may explain why the activation of maternal attachment played a protective or risking role only concerning mother-infant -dyadic interaction, but not concerning mothers' own mental health. Pregnancy and becoming a parent activate dormant working models about providing and receiving safety and protection (Stern, 1998). Universally, protecting infant from external and internal dangers is the core mothering task. Unique to war conditions is the fact that, in addition, also life threat, witnessing horrors, and losses activate attachment behaviour.

The hypothesis of the risking role of insecure maternal attachment was confirmed only concerning avoidant style among Palestinian women and their infants. Exposure to traumatic war events was associated with low close and positive interaction in dyads with mothers showing a high level of avoidant attachment. Typically, avoidant mothers restrict their own emotional communication and especially disallow their infants' negative emotions. They are easily emotionally unavailable or unresponsive to the infant's needs, can reject infant's signs of helplessness and distress, and discourage crying, as they value independence (Cassidy and Fox, 1994; Riva-Grucnola, Ierardi and Canevini, 2018). Research among dyads in the aftermath of the 9/11 terrorist attack confirmed that infants showed difficulties in emotion and stress regulation, and were thus more demanding in dyadic interactions (Brand et al., 2006). As infants naturally react with crying and high distress to the war-related horrors and fright, it is evident that avoidant mothers' caring style does not fit-well in situations that demands soothing, protecting and accepting the infant's neediness.

Against to our hypothesis, secure maternal attachment was not able to protect the quality of interaction with the infant when the dyad was exposed to severe war trauma. The secure attachment was beneficial when mothers had encountered only a moderate level of losses, horrors and life-threat. Instead, preoccupied maternal attachment style was generally beneficial, as it was directly associated with a high level of close and positive, and low level of distant and negative emotional availability. The need for closeness and non-distance characterize, indeed, preoccupied attachment style. It is noteworthy that, against the hypothesis, preoccupied maternal attachment played somewhat

protective role when dyads faced very severe war trauma. Thus, apparently intensified closeness could fit well the dyad's needs for safety and togetherness in danger and life threat.

The result is contrary to the general view of preoccupied attachment as a high mental health risk in general (Korver-Nieberg et al., 2014) and especially in child rearing (George and Solomon, 2008). Preoccupied mothers tend to use inadequate or enmeshing strategies of emotion regulation and are often flooded with overwhelming and uncontrollable emotions (Cassidy and Fox, 1994; Mikulincer and Shaver, 2007). They may oscillate between intensively negative and positive feelings and mood states in dyadic interaction, and show arbitrariness in timing and accuracy of responding the infant's signalling their needs (Bosquet Enlow et al., 2011).

How is it then possible that exactly this kind maternal working models were functional in conditions of war and life-threat? According to the attachment theory, insecure styles cannot be considered negative, dysfunctional or pathological themselves, but they rather reflect the psychosocial diversity of behaviour, emotions and cognitions, and both avoidant and preoccupied attachment styles have their strengths and vulnerabilities (Crittenden, 2006; Shaver and Mikulincer, 2002). Instead, disorganized or unresolved attachment style that lack defined or sustained working models can straight forward be risky or predict pathology (George and Solomon, 2008), but our self-reported adult attachment method cannot delineate maternal unresolved attachment. The criterion for functionality of maternal attachment in enhancing emotional availability should reflect its goodness of fit with the environmental demands. In our case, mothers and infants were forced literally to struggle for survival, which requires specific or ultimate maternal response. Preoccupied attachment style apparently fit the demands of vigilance, overwhelming protection and apprehension about infant safety, and even oscillation between various feelings states of hope and despair. The urgency to cling others for help would also be beneficial in a collective disaster, when caring the baby.

Human right organizations such as Save the Children warn that pregnant mothers, fetuses, and infants are especially vulnerable to traumatic war events. The core experience in war is life-threat, experienced in near miss, witnessing others dying, and fearing oneself and children dying. The human right concerns become highly relevant in the light of the contemporary knowledge of the long-term impacts of maternal prenatal and postnatal stress on human development. Maternal stress and anxiety are known to program fetal hypotalamic-pituitary-adrenal (HPA) axis towards greater reactivity and thus prone to multiple problematic emotional, cognitive and health consequences (Davis et al., 2007; Glover, O'Connor, & O'Donnell, 2010). Mothers and their infants who are living in war conditions would urgently need tailored help to prevent the war experiences from interfering with the protecting dyadic interactions and to enhance optimal physiological and emotional infant development. Mothers with different attachment styles show unique responses and meanings of their dyadic interactions, and knowledge and reflection of them are fruitful when tailoring effective help.

8.4. Limitations

Despite the prospective research setting and reasonable sample size, the current study has multiple deficits. First, in assessing maternal mental health, mother-infant dyadic emotional availability and attachment styles, we relied solely on maternal reports, which can cause considerable biases. Using video-recorded material and Emotional Availability Scoring system (Biringen, 2000) would have provided more objective information and a more nuanced classification of dyadic interaction. Concerning self-reported maternal PTSD and depressive symptoms, clinical interviews would have guaranteed more objective detection of mental health problems (Pawlby et al., 2008). Depressive persons are known to show biases towards more desperate and gloomy appraisals and attitudes (Webb and Ayers, 2015). Depressive mothers tend to show biases towards either negative and guilt-ridden or idealizing representations of parenting (Field, 2011; Parsons et al., 2012), which limits the validity of self-reported methods. Finally, we had to use a shortened version of the attachment style questionnaire (ASQ). Although the selection of items in each style is based on high factor loadings, not using the whole scale is open to criticism.

9. Conclusions

Both becoming a mother and facing dangers activate attachment and care-giving behavior to guarantee safety to the fetus and infant. Mothering in conditions of war and military violence is an overwhelmingly demanding task, and mother-infant dyads need legal, social, and psychological assistance. Mother's avoidant attachment style, characterized by denial, withdrawal and narrowed emotional ties, was harmful to mother-infant emotional availability both generally and when the dyad was facing severe war trauma. Preoccupied attachment style with its vigilance and emotional intensity instead and unexpectedly seemed beneficial, which illustrates the goodness of fit between attachment working models and environmental demands. In the face of war atrocities and life-threat, intensifying emotional ties and showing hypervigilance to dangers can serve the dyadic survival, both concretely and in creating interaction. Mothers invest greatly to protect their families and infants in war conditions, and peace movements should intensify their work to prevent wars causing extreme civilian suffering.

Declarations

Author contribution statement

Raija-Leena Punamäki: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Samir R. Qouta, Safwat Y. Diab: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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