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**Factors associated with post-traumatic stress symptoms (PTSS) 4-6 weeks and 6 months  
after birth: A longitudinal population-based study**

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## **1. Introduction**

For over two decades there has been sufficient evidence to suggest that Post-traumatic Stress Disorder (PTSD) can occur in pregnancy and after birth. A recent meta-analysis reported that 3% of pregnant women and 4% women who have recently given birth experience PTSD (Yildiz et al., 2017). These rates are substantially higher for women with high-risk conditions: 18.95% in pregnancy and 18.5% in postpartum (Yildiz et al., 2017). Although there is little research on the effect of postpartum PTSD or post-traumatic stress symptoms (PTSS) on mother-infant relationship, there is suggestive evidence that mothers with PTSD postpartum or elevated PTSS report bonding difficulties with their babies (Davies et al., 2008) and may engage in more intrusive behaviours towards their infants (Ionio and Di Blasio, 2013). Qualitative research also suggests that postpartum PTSS are linked with a range of family difficulties, including loss of interest or avoidance of sex (Nicholls and Ayers, 2007), marital distress (Ayers et al., 2006) and ambivalence about future pregnancies (Fenech and Thomson, 2014).

The aetiology of birth-related PTSS is multifactorial (Ayers et al., 2016), and likely to involve ante-, intra- and postpartum factors that interact over time during perinatal period. Possible antepartum factors are history of psychological problems (Soderquist et al., 2009; Zambaldi et al., 2011); previous traumatic experiences (Lev-Wiesel et al., 2009) including traumatic birth (Olde et al., 2006; Polachek et al., 2012) and sexual abuse (Cigoli et al., 2009; Soet et al., 2003); pregnancy complications (Adewuya et al., 2006; Modarres et al., 2012); fear of birth (Soderquist et al., 2009); depression (Cohen et al., 2004; Lev-Wiesel et al., 2009) and high trait-anxiety (Czarnocka and Slade, 2000; Olde et al., 2006). Intra-partum variables include obstetrical interventions (Milosavljevic et al., 2016; Soet et al., 2003), pain and distress (Menage, 1993; Soet et al., 2003), feeling out of control (Leeds and Hargreaves,

2008; Olde et al., 2006) and lack of support from health professionals (Cigoli et al., 2009; Czarnocka and Slade, 2000). Postpartum factors such as depression (Ayers et al., 2016; Grekin and O'Hara, 2014; Zaers et al., 2008), lack of social support (Noyman-Veksler et al., 2015; Verreault et al., 2012) and lower levels of coping and stress (Ayers et al., 2016) have also emerged as possible risk or maintaining factors for birth-related PTSS.

Although there has been extensive amount of research on the correlates of birth-related PTSS; some gaps in our knowledge remain. First, most of the studies conducted did not control for PTSS in pregnancy, which is essential for establishing risk factors for PTSS after birth. It is likely that postpartum PTSS may be continuity of PTSS developed in or before pregnancy. Second, relatively little attention has been given to the role of ante- and postpartum anxiety as a predictor of PTSS postpartum, though some anxiety is involved in PTSS. Longitudinal studies are needed to explore not only antepartum anxiety but also other antepartum determinants of PTSS after birth. Third, evidence on the prospective longitudinal course of the relationship between anxiety, depression and PTSD is still limited. Further, little data is available on maintaining factors of birth-related PTSD (Garthus-Niegel et al., 2015). Among the very few studies, antenatal depression symptoms, perinatal somatoform dissociation and insomnia were associated with long-term PTSS (Garthus-Niegel et al., 2015; Haagen et al., 2015). Notably, predictors for both short- and long-term postpartum PTSS need to be distinguished and identified.

Finally, the prevalence rates for perinatal psychological disorders including PTSD and its symptoms are estimated be higher in low and middle-income countries compared to high-income countries (Fisher et al., 2012). However, there is very little research from low and middle-income countries investigating the phenomenon of birth-related PTSS that might differ by cultural context. Among the studies that have been done, the prevalence of birth-related PTSD was notably higher at 11.9% in Turkey and 20% in Iran (Dikmen-Yildiz et al.,

2017a; Modarres et al., 2012). This suggests that a significant number of women with severe PTSS may be missed in those countries as a result limited recognition of PTSS after birth. Given the possible adverse effects on mother and baby, the identification of factors that predict postpartum PTSS is warranted, which would inform screening policies and possible early interventions for effected women. In addition, any research conducted on women with non-Western backgrounds can inform whether the mechanisms involved in aetiology of birth-related PTSS are similar across countries. The current study was based in Turkey, which is a rapidly developing middle-income country. Turkey has the third highest Caesarean section rate in the world according to Organization for Economic Cooperation and Development (OECD, 2011) and other obstetric interventions are also commonly used to speed up delivery (Gokce Isbir et al., 2016). Maternity wards in state hospitals in Turkey are also communal and women labour around other women who may be expressing pain and fear (Sercekus and Okumus, 2009). For these reasons birth-related PTSD may be of concern in Turkey, however, to date only one study has examined the risk factors for PTSS after birth in Turkey (Gokce Isbir et al., 2016). This study found that low self-efficacy and high outcome expectancy in pregnancy as well as poor postpartum adaptation and urinary catheterization predicted PTSS after birth. However, this study was conducted in a specific, rural area of Turkey with a small convenience sample and did not control PTSD in pregnancy and assess depression and anxiety as predictors. The present study therefore aimed to address these gaps in knowledge by examining ante- and postpartum variables associated with PTSS 4-6 weeks and 6-months after birth in a large population-based sample of women in a middle-income country, Turkey.

## **2. Methodology**

### *2.1. Study Design*

A prospective longitudinal study, The Pregnancy and Childbirth in Turkey (PACT) project, was conducted in three major cities of Turkey - Istanbul, Ankara and Izmir - between May

2014 and June 2015. Data were collected in three waves: 26 to 35 weeks of pregnancy; 4-6 weeks postpartum and 6-months postpartum. Socio-demographic, obstetric and psychosocial information measured in each of the three waves is summarised in Figure 1.

## *2.2. Sample*

Participants were recruited from three state maternity hospitals in Turkey, which provide free antenatal care services for low and high-risk pregnant women. Following informed consent, women aged at 18 or over and with gestational 26 to 35 weeks were included in the study. Exclusion criteria included fetal loss, stillbirth and neonatal death. All women waiting for their antenatal appointment were approached to take part. Of the 1004 eligible pregnant women, 950 (94.6%) agreed to take part in and completed the antenatal measures. At 4-6 weeks postpartum, a total of 92 women dropped out yielding 858 (90.3%) women for first follow-up analyses. At 6-month postpartum, the final sample consisted of 829 women (87.2%). There were no significant differences between responders ( $n = 829$ ) and non-responders ( $n = 121$ ) on demographic, obstetric or psychosocial variables measured.

## *2.3. Measures*

### *2.3.1 Outcome measure*

#### *Post-traumatic stress after birth*

The Post-traumatic Diagnostic Scale (PDS; Foa et al., 1997) was used to assess PTSS and trauma history. The PDS has different parts corresponding to six diagnostic criteria of DSM-IV, including the event, duration, functional impairment and three symptom clusters, which allows diagnosis of PTSD in addition to assessment of severity of PTSS. The first part of the PDS includes a checklist of 11 traumatic events with an additional option for “unspecified”. Trauma history was calculated based on the number of these previous traumatic events. Symptom severity is assessed by 17 items, scored from 0 to 3 (higher score indicating more post-traumatic stress symptoms). The convergent validity of the PDS was evaluated against

the Structured Clinical Interview (SCID) in postpartum women in Turkey and found to have good validity (Dikmen-Yildiz et al., 2017b). For the purpose of the research, women in postpartum period were asked to answer the questions in relation to their birth experiences, rather than a general trauma.

### *2.3.2 Predictors*

#### *Depression*

Symptoms of antepartum and postpartum depression were measured by the Edinburgh Depression Scale (EPDS; Cox et al., 1987). The EPDS includes 10 items rated on a scale 0-3, where the higher score indicates higher severity of depression. The Turkish version of the EPDS was used in the present study, which has been validated in Turkish population and had good psychometric properties (Aydin et al., 2004).

#### *Anxiety*

The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A, Zigmond and Snaith, 1983) was employed to assess anxiety symptoms in pregnancy and after birth. The HADS-A contains 7 items, graded on a scale 0 to 3. The higher the HADS score, the greater is the severity of anxiety. The HADS has been found have good reliability and validity in both the original (Bjelland et al., 2002) and the relevant Turkish version (Aydemir, 1997).

#### *Social support*

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) was used to measure women's perceived support from family, friends and significant others during pregnancy and postpartum. The MSPSS is a 12-item questionnaire rated on a 7-point scale with higher scores represent higher support. Translated version of the MSPSS which demonstrated satisfactory psychometric performance in Turkish population (Eker and Arkar, 1995) was used in this study.

### *Fear of childbirth*

The Wijma Delivery Expectancy/Experience Questionnaire (WDEQ) has been used to measure fear of childbirth in relation to expectancies before birth (WDEQ-A) and experiences after birth (WDEQ-B) (Wijma et al., 1997). The WDEQ-A and WDEQ-B have been validated in Turkey and found to be reliable tools in measuring fear of childbirth in Turkish pregnant and postpartum women (Korukcu et al., 2016; Korukcu et al., 2012). Although the WDEQ is a 33-item questionnaire, this study used 10 items to reduce respondent burden and to maximise response rate. The Cronbach's alphas for the shortened versions of WDEQ-A and WDEQ-B in study sample were 89.5 and 92.5, respectively.

### *Socio-demographic, obstetric-related and other variables*

Several socio-demographic and obstetric characteristics were examined in pregnancy, 4-6 weeks and 6-months postpartum (Fig. 1). Among the variables investigated, satisfaction with birth health professionals was assessed by asking women to rate to what extent they felt satisfied with health care professionals involved in their birth.

### *2.4. Procedure*

Ethical approvals were obtained from the Research Ethics Committee of City, University of London, in the UK and Kocaeli University in Turkey. All pregnant women attending their antenatal appointment in three maternity hospitals in Istanbul, Ankara and Izmir were approached by the researcher and informed about the study while waiting for their routine appointment. Informed consent was obtained from interested women who were then provided with a set of questionnaires to be completed. Where necessary, the researcher read the items to women and participants rated their responses. Participants were contacted at 4-6 weeks after birth and administered the second set of questionnaires through telephone interview (Fig. 1). Women were followed again at 6-months postpartum and administered the third set

of questionnaires via telephone interview. At each wave, if the participant did not answer telephone call, she was re-called one or two times.

### *2.5. Statistical analyses*

Descriptive statistics were used to describe the characteristics of the study sample and to examine the rates of PTSD and PTSS at three assessment time points. Some variables were coded as dummy variables to be further used in correlation and regression analyses (Table 2). Spearman correlations were conducted to examine the relationships between study variables. The variables with correlation values greater than .2 and significance level less than .05 were included in hierarchical multiple regression analyses, which allowed to examine the role of explanatory variables on the outcome in a chronological order while controlling for the confounding covariate variables. Based on the Tabachnick and Fidell (2007)'s criteria ( $50+8k$ , where  $k$  refers to number of predictors), the sample sizes for both assessments were large enough to conduct regression analyses with 10 predictors at 4-6 weeks and 17 at 6-months postpartum. A preliminary assumption check indicated that there were 11 outliers at 4-6 weeks postpartum and 16 at 6-months postpartum, identified by Mahalanobis distance. However, as their corresponding Cook's distances were less than 1, they were all retained in the analyses to preserve power. The standardized residual plot for PTSS at 6 months postpartum showed a relatively straight line suggesting that there were some violations of normality. However, since the transformation of the data demonstrated only minimal effect on the results, the untransformed data were used for ease of interpretation. The results of the transformed data were also provided where differences occurred. All of the remaining assumptions for regression were met. SPSS (version 22) was used to analyse the data. The  $p$  value was set at .05.

### **3. Results**

#### *3.1. Study population*

The mean age of the participants was 27.6 years ( $SD = 5.28$ ). Participants were mainly Turkish (91%), married (99.5%) and unemployed (83%). About one-fifth of the women stated that they lived with a relative other than their spouse or children. One tenth of the participants experienced a previous obstetric complication. The majority planned their pregnancy (82%) and reported no history of pregnancy loss (72%), whilst 22% of the women reported history of miscarriage and 6.3% of the women reported history of stillbirth or other neonatal loss. More than 40% of the women were primiparas and most gave birth at 37 weeks or later (94.6%). Over half of the women delivered vaginally (56.3%) and the rest via caesarean section.

#### *3.2. Prevalence of PTSD symptoms and cases in pregnancy and 4-6 weeks and 6 months after birth*

Table 1 shows the proportion of women who reported intrusion, avoidance and arousal symptoms of PTSD and met PTSD criteria in three assessment phases. Fifty-five (5.8%) women endorsed full PTSD diagnostic criteria in pregnancy. After birth, PTSS were measured in relation to birth and a total of 102 (11.9%) and 76 (9.2%) women fulfilled all PTSD criteria at 4-6 weeks and 6 months postpartum, respectively. A negative birth experience appeared to substantially interfere with women's functioning in early and late postpartum, where over half of women reported impairment in two or more areas. PTSS were highly elevated immediately after birth and persisted to 6 months postpartum. More detailed information on the prevalence and comorbidity of PTSD, anxiety and depression has been reported elsewhere (Dikmen-Yildiz et al., 2017a).

#### *3.3. Variables associated with PTSD symptoms at 4-6 weeks and 6 months postpartum*

Relationships between the demographic, obstetric, psychosocial and outcome variables are shown in Table 2. It can be seen that there are significant but weak associations between the demographic variables and postpartum PTSS, with slightly different patterns across time points. Most of the obstetric factors were also weakly associated with PTSS after birth, except intra-partum complications. The correlation for PTSS between the two postpartum time points was significant and large ( $r_s = .511$ ). All of the psychosocial variables were substantially correlated with PTSS at both 4-6 weeks (ranging from  $r_s = .17$  to  $.58$ ) and 6 months (ranging from  $.17$  to  $.60$ ). The associations were in the predicted direction, with higher levels of anxiety depression, fear of childbirth and lower levels of social support associated with higher postpartum PTSS.

#### *3.4. Predictors of PTSD symptoms at 4-6 weeks and 6 months postpartum*

To ascertain the relative importance of the predictor variables for PTSD symptomatology, two further multiple regression analyses were carried out. All variables that were significantly correlated with postpartum PTSS ( $p < .05$ ) and had moderate or large correlations ( $\geq .2$ ) were chronologically entered into a regression model. Antepartum variables were entered in the first step, intra-partum variables were entered at the second step, and immediate postpartum variables were entered in the third step. For PTSS at 6-months postpartum, the fourth step included postpartum complications, occurrence of any traumatic event after birth and need for psychological help, followed by concurrent psychosocial measures in step five. Results are shown in Table 3.

*4-6 weeks postpartum:* The following variables were significantly associated with PTSS 4-6 weeks postpartum: symptoms of antenatal anxiety and PTSS; satisfaction with the health professionals and social support at 4-6 weeks postpartum and concurrent symptoms of depression and fear of childbirth. The model was significant and explained 57% of the variance in PTSD scores after birth (Table 3). The strongest predictors of postpartum PTSS at

4-6 weeks were concurrent postnatal depression ( $\beta = .35, p < .01$ ) and fear of childbirth ( $\beta = .26, p < .01$ ), suggesting that women with concurrent depressive symptoms and higher levels of fear of birth were more likely to have more severe PTSS in the early postpartum period.

*6-months postpartum:* As presented in Table 4, twelve variables were significant predictors of PTSS 6-months after birth: antenatal anxiety symptoms and PTSS; satisfaction with health professionals and intra-partum complications; PTSS, fear of childbirth and social support at 4-6 weeks postpartum; occurrence of additional traumatic events in the 6 months following birth and need for psychological help; concurrent anxiety and depression symptoms and poor social support at 6-months postpartum. The final model was significant, accounting for 58% of the variance in predicting chronic PTSS. PTSS at 4-6 weeks postpartum was the most significant predictor of postpartum PTSS at 6 months ( $\beta = .29, p < .01$ ). Concurrent depression symptoms were strongly related to higher PTSD symptoms ( $\beta = .22, p < .01$ ). The level of social support at 6-months postpartum was negatively associated with PTSS, implying that the less social support perceived, the greater PTSS experienced ( $\beta = -.17, p < .01$ ). It should be noted that when regression analyses were performed on transformed data, symptoms of anxiety and PTSS in pregnancy and experience of additional traumatic event after birth did not significantly predict PTSS at 6-months postpartum. Therefore, these variables should be cautiously interpreted.

As shown, the predictors of PTSS at 4-6 weeks and 6-months postpartum were slightly different: (a) intra-partum complications failed to account for PTSS 4-6 weeks postpartum; (b) postpartum depression symptoms at 4-6 weeks did not predict PTSS at 6-months postpartum; (c) concurrent anxiety symptoms predicted PTSS at 6-months postpartum whereas they did not at 4-6 weeks postpartum.

#### **4. Discussion**

This paper reports ante- and postpartum predictors of birth-related PTSS in Turkish women using a population-based longitudinal design to identify risk factors for PTSS at 4-6 weeks and 6-months postpartum. The majority of the risk factors observed in this study were consistent with two recent meta-analyses (Ayers et al., 2016; Grekin and O'Hara, 2014), suggesting that, although Turkish women's responses to postpartum PTSD symptomatology are likely to be culturally shaped, the aetiology of birth-related PTSS is fairly consistent across different cultures.

More than one-third of women perceived their birth as traumatic, meeting criterion A of DSM-IV at both time points, which is within the 19 – 45% range reported for in studies of traumatic births in high income countries (Alcorn et al., 2010; Ayers et al., 2009). A smaller number of women developed full PTSD, which showed that a traumatic birth does not always result in PTSD. However, a large percentage of women experienced some PTSS after birth and most sustained their symptoms to 6-months postpartum, indicating that PTSS after birth are fairly common and can be chronic among Turkish women.

The variables that were consistently associated with PTSS at both time points postpartum were anxiety symptoms and PTSS in pregnancy, satisfaction with health professionals, fear of childbirth and social support at 4-6 weeks postpartum. The literature on the role of antepartum anxiety in predicting postpartum PTSS is equivocal with some studies finding no association between antepartum anxiety levels and postpartum PTSS (Creedy et al., 2000) and others finding an association (Haagen et al., 2015; Zaers et al., 2008). A number of shared clinical symptoms between anxiety and PTSD might explain this association. Alternatively, high level of anxiety in pregnancy may increase the risk for having negative childbirth experience, or itself may complicate the birth. Regardless of the birth experience, some level of anxiety may also predispose women to develop PTSS after birth. There is some evidence supporting this possibility that anxiety sensitivity in pregnancy is

associated with PTSS after birth (Fairbrother and Woody, 2007; Keogh et al., 2002). Preventative actions may be designed to mitigate the impact of difficult births on women with higher levels of anxiety in pregnancy. However, for chronic PTSS, this finding should be interpreted cautiously due to different results obtained on raw and transformed data.

PTSS predicted PTSS throughout the perinatal period. PTSS in pregnancy was associated with PTSS at both time points postpartum, and PTSS at 4-6 weeks emerged as the most robust predictor of PTSS at 6-months postpartum, which is consistent with prior research (Lev-Wiesel et al., 2009; Milosavljevic et al., 2016; Onoye et al., 2009). This suggests that antepartum PTSS may exacerbate following negative birth experience and postpartum PTSS may worsen over time if not treated. In this study, postpartum PTSS was measured predominantly in relation to childbirth. PTSD symptomatology in pregnancy may therefore create vulnerability to experience the birth as traumatic or reflect transfer of antepartum PTSS to birth-related PTSS. Alternatively, birth-related PTSS may reflect the continuation of non-specific symptoms of PTSD in pregnancy, such as hyper-arousal. This research highlighted the importance of identifying and treating women with PTSS in pregnancy given that they are not only at higher risk of pregnancy complications and adverse perinatal outcomes (Ayers and Ford, 2014) but also of postpartum PTSS which may have negative impact on women and the baby (Koen et al., 2016; Parfitt et al., 2014).

The chronicity of PTSS is evidenced in this study by similar rates of PTSD at 4-6 weeks (11.9%) and 6-months postpartum (9.2%). Although a high percentage of women with moderate to severe postpartum PTSS reported the need for psychological help most did not have treatment, which presumably contributed to the perseverance of PTSS. Therefore, identification of these women immediately after birth is crucial to provide prompt treatment and ascertain their psychological well-being.

Depression, anxiety and PTSD were highly comorbid – particularly concurrent measures. This is consistent with several studies conducted in postpartum and other populations (Denis et al., 2011; Leeds and Hargreaves, 2008; Soderquist et al., 2009; Srkalovic Imsiragic et al., 2016). This suggests that women with pre-existing or concomitant depression/anxiety may be more vulnerable to PTSS; or depression/anxiety may develop as a result of severe PTSS or vice versa. In this respect, a woman may differ in her responses to a traumatic birth, with predominant PTSD, anxiety or depression which may determine “purity” or comorbidity with others. Notably, even after controlling for prior PTSD symptoms, depressive and anxiety symptoms were still predictive of PTSS at 6-months postpartum, suggesting that changes in PTSS may also depend on increases or decreases in depressive and anxiety symptomatology. This is not surprising given the triple comorbidity of depression, anxiety and PTSD after birth (Agius et al., 2016). However, antepartum depression fails to predict early and chronic PTSS. This finding was comparable to that reported by Verreault et al. (2012), although others found the contrary (Haagen et al., 2015; Soderquist et al., 2009).

The finding that satisfaction with the health professionals was associated with short- and long-term PTSS after birth corresponds well with other studies (Olde et al., 2006; Soet et al., 2003). Women with complicated births, compared to those without, may be more prone to be less satisfied with the health professionals by making external attributions for their negative birth experiences. There is some evidence that individuals with PTSS tend to attribute the cause of the unpleasant event to external factors (Elwood et al., 2009). It is also possible that in case of difficult birth and high level of anxiety, women tend to interpret the situation as more negative or threatening in accordance with attentional biases theory, which may decrease their satisfaction with the health professionals (Cisler and Koster, 2010). However, these remains speculative at present and warrants further research attention.

A range of studies have supported the relationship between fear of childbirth and PTSS (Gokce Isbir et al., 2016; Soderquist et al., 2009; Srkalovic Imsiragic et al., 2016) and the current study has added to this body of evidence, finding that postpartum PTSS was highly associated with postpartum fear of childbirth. However, this association was not found for fear of childbirth in pregnancy. This suggests that secondary tokophobia (fear of childbirth after experiencing a traumatic birth) is likely in women with PTSS after birth. Plausibly, women experiencing fear of childbirth following birth were more likely to have difficult birth experiences and develop some PTSS. Besides, women with severe fear of childbirth may be more prone to negatively appraise the birth because they are already vigilant for any evidence of threat (Zar et al., 2001) and this may be critical to whether they develop PTSS. Identification of postpartum women with fear of childbirth is important given that it reflects the degree of women's perceptions of overall experience and, if it is negative, this may persist up to one year postpartum in women with PTSS (Wijma et al., 1997). Although the short versions of WDEQ-A and WDEQ-B were used, both had high internal consistencies and were sensitive enough to separate the women with/out fear of childbirth. However, this needs consideration when interpreting the findings.

Research has yielded mixed findings concerning the relationship between social support and birth-related PTSS. In the present study, social support was inversely correlated with PTSS at both time points, which is in agreement with previous research (Soet et al., 2003; Zaers et al., 2008), suggesting a potential attenuating role for birth-related PTSS. This may, on the other hand, suggest that low social support may maintain or exacerbate postpartum PTSS in the long run. There is evidence that social support is better predictor for long-term PTSS in other populations (Ozer et al., 2003). However, whether high social support acts as buffer to mitigate the impact of PTSS or poor social support acts a risk for PTSD symptom severity or chronicity remains unanswered in the current study. More

research is needed to examine the role of social support in the development and persistence of PTSS after birth.

Intra-partum complications were associated with long-term PTSD symptomatology, which is plausible given that physical complications of birth may require more time to integrate in certain women (Waldenstrom, 2004). However, surprisingly, the type of delivery was not associated with PTSS which is inconsistent with the recent meta-analysis (Ayers et al., 2016). This may be because caesarean section is very common in Turkey and therefore might be seen as more acceptable, which may minimise any potential negative psychological consequences. Experience of any other traumatic event after birth was also associated with PTSS maintenance.

Overall, these findings are generally consistent with the diathesis-stress model of birth-related PTSD proposed by Ayers et al. (2016): the development of PTSS was determined by either some antepartum psychological factors which predisposed women to have a negative birth experience or the interaction of these factors with situational some factors during birth. Then, the resolution or chronicity of symptom, in this study, are a function of concomitant depressive/anxiety symptomatology, the level of social support, the occurrence of an additional traumatic event and whether receiving treatment or not.

#### *4.1. Strengths and Limitations*

The strengths of this study are that it had three assessment points, a high response rate, and a large sample which included low and high-risk obstetric populations. However, the limitations of this study are that it may not be representative of women treated in private hospitals; it used self-report measures and shortened versions of the WDEQ-A/WDEQ-B; and used a single question to assess satisfaction level of women with the health professionals. This study commenced on when DSM-IV-TR was the prevailing diagnostic model. Given the

changes imposed by DSM-V, a replication of this study addressing using DSM-V criteria would be useful.

## **5. Conclusion**

This is the first population-based prospective longitudinal study of birth-related PTSS in Turkey, investigating psychosocial variables involved in initial and long-term PTSS after birth. Given the large proportion of variance in PTSS at both time points accounted for, the studied risk factors are able to accurately identify women who are at risk for birth-related PTSS. The findings of this study showed that clinically significant levels of anxiety and PTSD in pregnancy were associated with short- and long-term PTSS. Higher levels of anxiety, depression or fear of childbirth along with limited social support in postpartum period also increased the risk of birth-related PTSS, suggesting the consideration of comorbidity and highlighting the need to screen for PTSS in the presence of the other or vice versa. Although this may not be easily achievable in Turkey with current limited resources, time, and health policies, knowing risk factors for PTSS after birth may facilitate an early detection of possible cases of PTSD and provide the basis for further clinical investigations. While more research is needed to determine other possible factors associated with birth-related PTSS, this study contributes to the existing body of knowledge by examining a wide range of risk factors for short- and long-term PTSS that were hypothesized to operate during perinatal period.

## References

- Adewuya, A.O., Ologun, Y.A., Ibigbami, O.S., 2006. Post-traumatic stress disorder after childbirth in Nigerian women: prevalence and risk factors. *BJOG* 113, 284-288.
- Agius, A., Xuereb, R.B., Carrick-Sen, D., Sultana, R., Rankin, J., 2016. The co-existence of depression, anxiety and post-traumatic stress symptoms in the perinatal period: A systematic review. *Midwifery* 36, 70-79.
- Alcorn, K.L., O'Donovan, A., Patrick, J.C., Creed, D., Devilly, G.J., 2010. A prospective longitudinal study of the prevalence of post-traumatic stress disorder resulting from childbirth events. *Psychol. Med.* 40, 1849-1859.
- Aydemir, O., 1997. Hastane Anksiyete ve Depresyon Olcegi Turkce Formunun Gecerlilik ve Guvenilirlik Calismasi. *Turk Psikiyatri Derg* 8, 280-228.
- Aydin, N., Inandi, T., Yigit, A., Hodoglugil, N.N., 2004. Validation of the Turkish version of the Edinburgh Postnatal Depression Scale among women within their first postpartum year. *Soc Psychiatry Psychiatr Epidemiol* 39, 483-486.
- Ayers, S., Bond, R., Bertullies, S., Wijma, K., 2016. The aetiology of post-traumatic stress following childbirth: a meta-analysis and theoretical framework. *Psychol. Med.* 46, 1121-1134.
- Ayers, S., Eagle, A., Waring, H., 2006. The effects of childbirth-related post-traumatic stress disorder on women and their relationships: a qualitative study. *Psychol Health Med* 11, 389-398.
- Ayers, S., Ford, E., 2014. Post-traumatic stress during pregnancy and the postpartum period, In: Wenzel, A. (Ed.), *Oxford Handbook of Perinatal Psychology*. Oxford University Press, United States
- Ayers, S., Harris, R., Sawyer, A., Parfitt, Y., Ford, E., 2009. Posttraumatic stress disorder after childbirth: analysis of symptom presentation and sampling. *J Affect Disord* 119, 200-204.
- Bjelland, I., Dahl, A.A., Haug, T.T., Neckelmann, D., 2002. The validity of the Hospital Anxiety and Depression Scale. An updated literature review. *Journal of Psychosomatic Research* 52, 69-77.
- Cigoli, V., Gilli, G., Saita, E., 2009. Relational factors in psychopathological responses to childbirth. *J Psychosom Obstet Gynaecol* 27, 91-97.
- Cisler, J.M., Koster, E.H.W., 2010. Mechanisms of Attentional Biases towards Threat in the Anxiety Disorders: An Integrative Review. *Clin Psychol Rev.* 30, 203.
- Cohen, M.M., Ansara, D., Schei, B., Stuckless, N., Stewart, D.E., 2004. Posttraumatic stress disorder after pregnancy, labor, and delivery. *Journal of Women's Health (Larchmt)* 13, 315-324.
- Cox, J.L., Holden, J.M., Sagovsky, R., 1987. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 150, 782-786.

- Creedy, D.K., Shochet, I.M., Horsfall, J., 2000. Childbirth and the development of acute trauma symptoms: incidence and contributing factors. *Birth* 27, 104-111.
- Czarnocka, J., Slade, P., 2000. Prevalence and predictors of post-traumatic stress symptoms following childbirth. *British Journal of Clinical Psychology* 39 ( Pt 1), 35-51.
- Davies, J., Slade, P., Wright, I., Stewart, P., 2008. Posttraumatic stress symptoms following childbirth and mothers' perceptions of their infants. *Infant Ment Health J* 29, 537-554.
- Denis, A., Parant, O., Callahan, S., 2011. Post- traumatic stress disorder related to birth: a prospective longitudinal study in a French population. *J Reprod Infant Psychol* 29, 125-135.
- Dikmen-Yildiz, P., Ayers, S., Phillips, L., 2017a. Depression, anxiety, PTSD and comorbidity in perinatal women: a longitudinal population-based study. Manuscript submitted for publication.
- Dikmen-Yildiz, P., Ayers, S., Phillips, L., 2017b. Screening for birth-related PTSD: Psychometric properties of the Turkish version of the Posttraumatic Diagnostic Scale in postpartum women in Turkey. *European Journal of Psychotraumatology*, 8(1), online first.
- Eker, D., Arkar, H., 1995. Çokboyutlu Algılanan Sosyal Destek Ölçeği'nin faktör yapısı, geçerlik ve güvenilirliği. *Türk Psikiyatri Derg* 34, 45-55.
- Elwood, L.S., Hahn, K.S., Olatunji, B.O., Williams, N.L., 2009. Cognitive vulnerabilities to the development of PTSD: a review of four vulnerabilities and the proposal of an integrative vulnerability model. *Clin Psychol Rev.* 29, 87-100.
- Fairbrother, N., Woody, S.R., 2007. Fear of childbirth and obstetrical events as predictors of postnatal symptoms of depression and post-traumatic stress disorder. *J Psychosom Obstet Gynaecol* 28, 239-242.
- Fenech, G., Thomson, G., 2014. Tormented by ghosts from their past': a meta-synthesis to explore the psychosocial implications of a traumatic birth on maternal well-being. *Midwifery* 30, 185-193.
- Fisher, J., Cabral de Mello, M., Patel, V., Rahman, A., Tran, T., Holton, S., Holmes, W., 2012. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: a systematic review. *Bull World Health Organ* 90, 139G-149G.
- Foa, E.B., Cashman, L., Jaycox, L., Perry, K., 1997. The Validation of a Self-Report Measure of Posttraumatic Stress Disorder: The Posttraumatic Diagnostic Scale. *Psychol Assessment* 9, 445-451.
- Garthus-Niegel, S., Ayers, S., von Soest, T., Torgersen, L., Eberhard-Gran, M., 2015. Maintaining factors of posttraumatic stress symptoms following childbirth: A population-based, two-year follow-up study. *J Affect Disord* 172, 146-152.
- Gokce Isbir, G., Inci, F., Bektas, M., Dikmen Yildiz, P., Ayers, S., 2016. Risk factors associated with post-traumatic stress symptoms following childbirth in Turkey. *Midwifery* 41, 96-103.
- Grekin, R., O'Hara, M.W., 2014. Prevalence and risk factors of postpartum posttraumatic stress disorder: a meta-analysis. *Clin Psychol Rev.* 34, 389-401.
- Haagen, J.F., Moerbeek, M., Olde, E., van der Hart, O., Kleber, R.J., 2015. PTSD after childbirth: A predictive ethological model for symptom development. *J Affect Disord* 185, 135-143.
- Ionio, C., Di Blasio, P., 2013. Post-traumatic stress symptoms after childbirth and early mother-child interactions: an exploratory study. *J Reprod Infant Psychol* 32, 163-181.
- Keogh, E., Ayers, S., Francis, H., 2002. Does Anxiety Sensitivity Predict Post-Traumatic Stress Symptoms Following Childbirth? A Preliminary Report. *Cogn Behav Ther* 31, 145-155.
- Koen, N., Brittain, K., Donald, K.A., Barnett, W., Koopowitz, S., Mare, K., Zar, H.J., Stein, D.J., 2016. Psychological trauma and posttraumatic stress disorder: risk factors and associations with birth outcomes in the Drakenstein Child Health Study. *Eur J Psychotraumatol* 7, 28720.
- Korukcu, O., Bulut, O., Kukulcu, K., 2016. Psychometric Evaluation of the Wijma Delivery Expectancy/Experience Questionnaire Version B. *Health Care Women International* 37, 550-567.
- Korukcu, O., Kukulcu, K., Firat, M.Z., 2012. The reliability and validity of the Turkish version of the Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) with pregnant women. *J Psychiatr Ment Health Nurs* 19, 193-202.
- Leeds, L., Hargreaves, I., 2008. The psychological consequences of childbirth. *J Reprod Infant Psychol* 26, 108-122.

- Lev-Wiesel, R., Chen, R., Daphna-Tekoah, S., Hod, M., 2009. Past traumatic events: are they a risk factor for high-risk pregnancy, delivery complications, and postpartum posttraumatic symptoms? *Journal of Women's Health (Larchmt)* 18, 119-125.
- Menage, J., 1993. Post-traumatic stress disorder in women who have undergone obstetric and/or gynaecological procedures: A consecutive series of 30 cases of PTSD. *J Reprod Infant Psychol* 11, 221-228.
- Milosavljevic, M., Lecic Tosevski, D., Soldatovic, I., Vukovic, O., Miljevic, C., Peljto, A., Kostic, M., Olf, M., 2016. Posttraumatic Stress Disorder after Vaginal Delivery at Primiparous Women. *Sci Rep* 6, 27554.
- Modarres, M., Afrasiabi, S., Rahnama, P., Montazeri, A., 2012. Prevalence and risk factors of childbirth-related post-traumatic stress symptoms. *BMC Pregnancy Childbirth* 12, 88.
- Nicholls, K., Ayers, S., 2007. Childbirth-related post-traumatic stress disorder in couples: a qualitative study. *Br J Health Psychol* 12, 491-509.
- Noyman-Veksler, G., Herishanu-Gilutz, S., Kofman, O., Holchberg, G., Shahar, G., 2015. Post-natal psychopathology and bonding with the infant among first-time mothers undergoing a caesarian section and vaginal delivery: sense of coherence and social support as moderators. *Psychol Health* 30, 441-455.
- OECD, 2011. *Health at a glance 2011*, Paris.
- Olde, E., van der Hart, O., Kleber, R., van Son, M., 2006. Posttraumatic stress following childbirth: a review. *Clin Psychol Rev* 26, 1-16.
- Onoye, J.M., Goebert, D., Morland, L., Matsu, C., Wright, T., 2009. PTSD and postpartum mental health in a sample of Caucasian, Asian, and Pacific Islander women. *Arch Womens Ment Health* 12, 393-400.
- Ozer, E.J., Best, S.R., Lipsey, T.L., Weiss, D.S., 2003. Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. *Psychol Bull* 129, 52-73.
- Parfitt, Y., Pike, A., Ayers, S., 2014. Infant Developmental Outcomes: A Family Systems Perspective. *Infant Child Dev* 23, 353-373.
- Polachek, I.S., Harari, L.H., Baum, M., Strous, R.D., 2012. Postpartum Post-Traumatic Stress Disorder symptoms: The Uninvited Birth Companion. *Isr Med Assoc J* 14, 347-353.
- Sercekus, P., Okumus, H., 2009. Fears associated with childbirth among nulliparous women in Turkey. *Midwifery* 25, 155-162.
- Soderquist, J., Wijma, B., Thorbert, G., Wijma, K., 2009. Risk factors in pregnancy for post-traumatic stress and depression after childbirth. *BJOG* 116, 672-680.
- Soet, J.E., Brack, G.A., Dilorio, C., 2003. Prevalence and predictors of women's experience of psychological trauma during childbirth. *Birth-Iss Perinat C* 30, 36-46.
- Srkalovic Imsiragic, A., Begic, D., Simicevic, L., Bajic, Z., 2016. Prediction of posttraumatic stress disorder symptomatology after childbirth - A Croatian longitudinal study. *Women Birth*.
- Tabachnick, B.G., Fidell, L.S., 2007. *Using Multivariate Statistics*, 5th ed. Allyn & Bacon, Boston, MA.
- Verreault, N., Da Costa, D., Marchand, A., Ireland, K., Banack, H., Dritsa, M., Khalife, S., 2012. PTSD following childbirth: a prospective study of incidence and risk factors in Canadian women. *J Psychosom Res* 73, 257-263.
- Waldenstrom, U., 2004. Why do some women change their opinion about childbirth over time? *Birth* 31, 102-107.
- Wijma, K., Soderquist, J., Wijma, B., 1997. Posttraumatic stress disorder after childbirth: a cross sectional study. *J Anxiety Disord* 11, 587-597.
- Yildiz, P.D., Ayers, S., Phillips, L., 2017. The prevalence of posttraumatic stress disorder in pregnancy and after birth: A systematic review and meta-analysis. *J Affect Disord* 208, 634-645.
- Zaers, S., Waschke, M., Ehlert, U., 2008. Depressive symptoms and symptoms of post-traumatic stress disorder in women after childbirth. *J Psychosom Obstet Gynaecol* 29, 61-71.
- Zambaldi, C.F., Cantilino, A., Sougey, E.B., 2011. Bio-socio-demographic factors associated with post-traumatic stress disorder in a sample of postpartum Brazilian women. *Arch Womens Ment Health* 14, 435-439.

- Zar, M., Wijma, K., Wijma, B., 2001. Pre- and Postpartum Fear of Childbirth in Nulliparous and Parous Women. *Scand J Behav Ther* 30, 75-84.
- Zigmond, A.S., Snaith, R.P., 1983. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 67, 361-370.
- Zimet, G.D., Dahlem, N.W., Zimet, S.G., Farley, G.K., 1988. The Multidimensional Scale of Perceived Social Support. *J Pers Assess* 52, 30-41.

**Table 1**

Rates of PTSD cases and symptoms according to DSM-IV criteria

PTSD criteria	Pregnancy % (n)	4-6 weeks postpartum % (n)	6-months postpartum % (n)
(A) Traumatic stressor	18.4% (175)	37.2% (319)	34.4% (285)
(A1) Exposure to stressor	21.1% (200)	38.6% (331)	35.2% (292)
(A2) Fear response	21.8% (207)	67.2% (577)	69.7% (578)
(B) Intrusion symptoms $\geq 1$	22.6% (215)	68.8% (590)	75% (622)
(C) Avoidance and arousal symptoms $\geq 3$	7.7% (73)	25.5% (219)	22% (182)
(D) Arousal symptoms $\geq 2$	19.6% (186)	48.5% (416)	47% (390)
(E) Duration	16.1% (153)	83.8% (719)	85.3% (707)
(F) Functional impairment	11.7% (111)	54.7% (470)	52.6% (436)
PTSD cases	5.8% (55)	11.9% (102)	9.2% (76)
No symptoms	74.2% (706)	14% (120)	4.7% (39)
Mean (SD)	2.24 (5.91)	7.09 (7.57)	6.67 (7.03)

**Table 2**

Correlations between predictor variables and post-traumatic stress symptoms

	PTSD symptoms	
	4-6 weeks postpartum <i>N</i> = 858	6 months postpartum <i>N</i> = 829
<b>Demographics</b>		
Age	-.13***	-.04
Education <sup>a</sup>	-.05	-.11**
Income <sup>b</sup>	-.16***	-.15***
Marital status <sup>c</sup>	.11**	.07
Family structure <sup>d</sup>	.01	.15**
Working status <sup>e</sup>	-.17***	-.11**
<b>Obstetrics</b>		
Parity <sup>e</sup>	-.02	.08*
Planned pregnancy <sup>e</sup>	-.09***	-.16***
History of complicated birth <sup>e</sup>	.05	.06
The number of stillbirths	.02	.10**
The number of miscarriages	-.02	-.01
Delivery mode <sup>f</sup>	-.08*	-.01
Infant-related complication <sup>e</sup>	.02	.05
Gestational age <sup>g</sup>	-.05	-.18***
Gender of the baby <sup>h</sup>	.09*	.06
Antepartum complication <sup>e</sup>	.14***	.11**
Intrapartum complication <sup>e</sup>	<b>.23***</b>	<b>.28***</b>
Postpartum complication <sup>e</sup>		<b>.21***</b>
Breastfeeding difficulties <sup>e</sup>		.16***
<b>Psycho-social variables</b>		
Prior trauma	.17***	.19***
History of any psychological problem	.05	.10**
Anxiety symptoms in pregnancy	<b>.29***</b>	<b>.23***</b>
Depression symptoms in pregnancy	<b>.31***</b>	<b>.25***</b>
PTSD symptoms in pregnancy	<b>.21***</b>	<b>.22***</b>
Fear of childbirth symptoms in pregnancy	<b>.26***</b>	.19***
Social support in pregnancy	-.18***	<b>-.24***</b>
Satisfaction with health professionals	<b>-.36***</b>	<b>-.33***</b>
Anxiety symptoms at 4-6 weeks postpartum	<b>.47***</b>	<b>.38***</b>
Depression symptoms at 4-6 weeks postpartum	<b>.58***</b>	<b>.46***</b>
PTSD symptoms at 4-6 weeks postpartum		<b>.51***</b>
Fear of childbirth symptoms at 4-6 weeks postpartum	<b>.53***</b>	<b>.39***</b>
Social support at 4-6 weeks postpartum	<b>-.47***</b>	<b>-.42***</b>
Anxiety symptoms at 6 months postpartum		<b>.50***</b>
Depression symptoms at 6 months postpartum		<b>.60***</b>
Social support 6 months postpartum		<b>-.49**</b>
Insomnia following birth <sup>e</sup>		.17***
Any traumatic event after birth <sup>e</sup>		<b>.22***</b>
Need for psychological help <sup>e</sup>		<b>.58***</b>

<sup>a</sup> Education level: 0, illiterate; 1, literate; 2, primary school; 3, secondary school; 4, high school, 5, university or higher degree. <sup>b</sup> Income: 0, ≤1500 TL; 1, 1501-2000 TL; 2, 2001-2500TL; 3, 2501-3000 TL; 4, >3000 TL. <sup>c</sup> Marital status: 0, married; 1, separated but not divorced; 2, divorced; 3, other. <sup>d</sup> Family structure: 0, nuclear; 1, extended. <sup>e</sup> These variables were coded as dummy variables (yes vs. no). <sup>f</sup> Delivery mode: 0, vaginal delivery; 1, c-section by spinal, epidural or general anaesthetic methods. <sup>g</sup> Gestational age: 0, preterm; 1, full-term. <sup>h</sup> Gender of the baby: 0, girl; 1, boy. \*p < .05; \*\*p < .01; \*\*\* p < .001.

**Table 3**Summary of hierarchical regression analyses predicting postpartum PTSD symptoms at 4-6 weeks ( $n = 858$ )

	Model 1 Antepartum symptoms $\beta$	Model 2 Intra-partum symptoms $\beta$	Model 3 Immediate Postpartum symptoms $\beta$
Anxiety symptoms in pregnancy	.06	.09*	.08**
Depression symptoms in pregnancy	.16***	.11**	.01
PTSD symptoms in pregnancy	.23***	.17***	.10***
Fear of childbirth symptoms in pregnancy	.12***	.06	-.05
Satisfaction with health professionals		-.39***	-.23***
Intra-partum complications <sup>a</sup>		.13***	.04
Anxiety symptoms at 4-6 weeks postpartum			.02
Depression symptoms at 4-6 weeks postpartum			.35***
Fear of childbirth symptoms at 4-6 weeks postpartum			.26***
Social support at 4-6 weeks postpartum			-.09**
$R^2$	.17	.36	.57
$F$	42.02***	79.18***	111.30***

<sup>a</sup> Intra-partum complications were coded as dummy variable. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\*  $p < .001$ .

**Table 4**Summary of hierarchical regression analyses predicting PTSD symptoms at 6 months postpartum ( $n = 829$ )

	Model 1	Model 2	Model 3	Model 4	Model 5
	Antepartum symptoms	Intra-partum factors	Immediate postpartum symptoms	Late psychosocial factors	Late postpartum symptoms
	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
Anxiety symptoms in pregnancy <sup>a</sup>	.03	.03	-.03	-.02	-.07*
Depression symptoms in pregnancy	.05	.01	-.04	-.05	-.05
PTSD symptoms in pregnancy <sup>a</sup>	.27***	.21***	.13***	.11***	.07**
Social support in pregnancy	-.09*	-.08*	-.07	-.09*	-.06
Satisfaction with health professionals		-.36***	-.18***	-.16***	-.13***
Intra-partum complications <sup>b</sup>		.15***	.08**	.07*	.06*
Anxiety symptoms at 4-6 weeks postpartum			.07	.06	.02
Depression symptoms at 4-6 weeks postpartum			.07	-.03	-.07
PTSD symptoms at 4-6 weeks postpartum			.30***	.29***	.29***
Fear of childbirth symptoms at 4-6 weeks postpartum			.04	.04	.06*
Social support at 4-6 weeks postpartum			.07	.08	.18***
Postpartum complications <sup>b</sup>				.03	-.02
Traumatic event after birth <sup>a,b</sup>				.18***	.13***
Need for psychological help <sup>b</sup>				.22***	.11**
Anxiety symptoms at 6-months postpartum					.17***
Depression symptoms at 6-months postpartum					.22***
Social support at 6-months postpartum					-.17***
$R^2$	.11	.29	.42	.48	.58
$F$	24.80***	56.44***	54.15***	57.30***	71.98***

<sup>a</sup> These variables were not significant predictors of PTSD symptoms at 6 months postpartum when hierarchical regression analyses were conducted on transformed data. <sup>b</sup> These variables were coded as dummy variables. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .