Childbirth-Related Posttraumatic Stress Disorder: Definition, Risk factors, Pathophysiology, Diagnosis, Prevention, and Treatment

Antje Horsch PhD[1,2*+], Susan Garthus-Niegel PhD[3,4,5*], Susan Ayers PhD[6], Prabha Chandra, MD[7], Katharina Hartmann Dr.Phil.[8], Edi Vaisbuch, MD[9,10], Joan Lalor PhD[11]

[*] joint first authors

[1] Institute of Higher Education and Research in Healthcare, University of Lausanne, Lausanne, Switzerland

[2] Department Woman-mother-child, Lausanne University Hospital, Lausanne.

[3] Institute for Systems Medicine (ISM), Faculty of Medicine, Medical School Hamburg, Hamburg, Germany

[4] Institute and Policlinic of Occupational and Social Medicine, Faculty of Medicine, Technische Universität Dresden, Dresden, Germany

[5] Department of Childhood and Families, Norwegian Institute of Public Health, Oslo, Norway.

[6] Centre for Maternal and Child Health Research, School of Health and Psychological Sciences, City, University of London, EC1V 0HB, UK.

[7] Department of Psychiatry, National Institute of Mental Health and Neurosciences, Bangalore, India.

[8] Mother Hood e.V., Bonn, Germany.

[9] Department of Obstetrics and Gynecology, Kaplan Medical Center, Rehovot, Israel.

[10] Faculty of Medicine, Hebrew University of Jerusalem, Jerusalem, Israel.

[11] School of Nursing and Midwifery, Trinity College Dublin, Ireland.

[+] Corresponding author:

Professor Antje Horsch, Institute of Higher Education and Research in Healthcare, University of Lausanne, Route de la Corniche 10, 1010 Lausanne, Switzerland.

E-mail: antje.horsch@chuv.ch

ORCID: 0000-0002-9950-9661

Abstract

Psychological birth trauma and childbirth-related posttraumatic stress disorder represent a substantial burden of disease, with 6.6 million mothers and 1.7 million fathers or co-parents affected by childbirth-related posttraumatic stress disorder worldwide each year. There is mounting evidence to indicate that parents who develop childbirth-related posttraumatic stress disorder do so as a direct result of a traumatic childbirth experience. High risk groups, such as those who experience preterm birth, stillbirth, or pre-eclampsia, have increased prevalence rates. The main risks include antenatal factors (e.g., depression in pregnancy, fear of childbirth, poor health or complications in pregnancy, history of trauma or sexual abuse, or mental health problems), perinatal factors (e.g., negative subjective birth experience, operative birth, obstetric complications, and severe maternal morbidity as well as maternal near misses, lack of support, dissociation), and postpartum factors (e.g., depression, postpartum physical complications, and poor coping and stress).

The link between birth events and childbirth-related posttraumatic stress disorder provides a valuable opportunity to prevent traumatic childbirths and childbirth-related posttraumatic stress disorder from occurring in the first place. Childbirth-related posttraumatic stress disorder is an extremely distressing mental disorder and has a substantial negative impact on those giving birth, fathers or co-parents, and potentially the whole family. Still, a traumatic childbirth experience and childbirth-related posttraumatic stress disorder remain largely unrecognized in maternity services and are not routinely screened for during pregnancy and postpartum. In fact, there are gaps in the evidence on *how*, *when*, and *who* to screen.

Similarly, there is a lack of evidence on how best to treat those affected. Primary prevention efforts (e.g., screening for antenatal risk factors, use of Trauma-Informed Care) intend to prevent a traumatic childbirth experience and childbirth-related posttraumatic stress disorder from occurring in

the first place by eliminating or reducing risk factors for childbirth-related posttraumatic stress disorder. Secondary prevention approaches (e.g., trauma-focused psychological therapies, early psychological interventions) aim to identify those who have had a traumatic childbirth experience and intervene to prevent the development of childbirth-related posttraumatic stress disorder. Tertiary prevention (e.g., trauma-focused cognitive behavioural therapy and eye movement desensitization and reprocessing) seeks to ensure that people with childbirth-related posttraumatic stress disorder are identified and treated to recovery, so that childbirth-related posttraumatic stress disorder does not become chronic.

Adequate prevention, screening, and intervention could alleviate a considerable amount of suffering in affected families. In the light of the available research on the impact of childbirth-related posttraumatic stress disorder on families, it is important to develop and evaluate assessment, prevention, and treatment interventions that target the woman/birthing person, the couple dyad, the parent-infant dyad, and the family as a whole. Further research should focus on the inclusion of couples in different constellations and, more generally, on the inclusion of more diverse populations in diverse settings. The paucity of national and international policy guidance on the prevention, care, and treatment of psychological birth trauma, and the lack of formal psychological birth trauma services and training, highlights the need to engage with service managers and policy makers.

Keywords: traumatic birth; PTSD; pregnancy; delivery; mother; parent; infant; tokophobia; fear of birth; trauma informed care; negative birth experience; operative birth; obstetric complications; severe maternal morbidity; dissociation; poor coping

Background

Worldwide, over 140 million births occur every year (1). To reduce discrimination against women, one of eight Millennium Development Goals was to improve maternal health (2). The World Health Organization states that every woman has 'the right to the highest attainable standard of health, which includes the right to dignified, respectful health care' (3). In intrapartum care, this means striving for a positive childbirth experience (4). However, pregnancy and birth can involve complications leading to morbidity or mortality. Global rates of infant mortality are currently 2.9%, maternal mortality 0.2%, and 'near miss' maternal mortality ranges from 0.4 to 1.6% (5-8).

The physiological process of labor and birth involves stress hormones. In late labor, stress hormones such as epinephrine, prolactin, and cortisol naturally increase to promote contractions, facilitate the effect of oxytocin, and promote physiological changes in the newborn that maximize their chances of surviving the transition through the vaginal canal and establishing respiration (9). However, additional stressors during labor, such as obstetric complications, have the potential to interfere with or disrupt those normal physiological processes.

Traumatic birth and PTSD: Definitions

Studies show that between 9% and 50% of mothers report their birth experience as traumatic (10, 11). A traumatic birth has been defined as 'a woman's experience of interactions and/or events directly related to childbirth that caused overwhelming distressing emotions and reactions, leading to short- and/ or long-term negative impacts on a woman's health and wellbeing' (12). Another approach is to use psychiatric diagnostic criteria for traumatic stressors, such as the Diagnostic and Statistical Manuals 5th Edition (DSM-5) criteria in which childbirth is deemed traumatic if there is a perceived

threat to the life of the mother and/or infant and/or severe physical injury occurred (13). Childbirth situations can be objectively traumatic, when the life of the mother and/or her newborn is at risk, such as during emergency caesarean sections or preterm births. However, a traumatic birth experience is subjectively defined (14). This means that women may have experienced their labor as traumatic, even if objectively there was no life threat to their life or the life of their newborn.

Traumatic births can lead to the development of childbirth-related posttraumatic stress disorder (PTSD). Parents can also have pre-existing PTSD in pregnancy and after birth due to other traumatic events. The literature refers to postpartum PTSD or childbirth-related PTSD interchangeably but the distinction between these is illustrated in Figure 1 (15).

- insert Figure 1 -

Hence, childbirth-related PTSD refers to the psychological symptoms that develop after, or as direct a consequence of, having had a traumatic birth (12). PTSD has four groups of symptoms: re-experiencing the traumatic event, avoidance of reminders of the event, negative alterations in mood and cognition, and hyperarousal. According to DSM 5, to obtain a diagnosis of PTSD, at least one re-experiencing and one avoidance symptom, and at least two symptoms of negative alterations in mood and cognition and two symptoms of hyperarousal are required (Table 1). The most recent meta-analysis showed childbirth-related PTSD affects between 3–6% of mothers and 1.2% of fathers (15). In mothers, greater prevalence rates (12–13%) are found for sub-clinical post-traumatic stress symptoms (15, 16) and for those in high-risk groups, such as those who have preterm births, stillbirths, or severe complications such as pre-eclampsia (16–19%) (16, 17). Studies from low- and middle-income countries suggest similar or higher prevalence rates of between 3 and 20% (18-20).

Psychological birth trauma and childbirth-related PTSD form a substantial disease burden, with childbirth-related PTSD affecting 6.6 million mothers and 1.7 million fathers or co-parents every year worldwide (based on the prevalence rates above) (15). PTSD is an extremely distressing mental disorder and those affected "struggle to survive each day while battling terrifying nightmares and flashbacks of the birth, anger, anxiety, depression, and painful isolation from the world of [parent]hood" (21). Hence, childbirth-related PTSD has a substantial negative impact on those giving birth, fathers or co-parents, and potentially the whole family. Evidence shows childbirth-related PTSD is highly comorbid with depression (22) and fear of subsequent births (23). Childbirth-related PTSD symptoms are also associated with requests for a caesarean delivery during subsequent pregnancies (24) and reduced breastfeeding (25). Evidence for the impact of childbirth-related PTSD on the infant is inconsistent, but some studies suggest an association with poor child development (26), child sleep problems (27), and possible complications in the mother-infant relationship for some women (28). More recently, there is suggestion from research on other traumas of a possible intergenerational transmission of vulnerability and trauma, which may affect the offspring through different pathways (29). For example, in pregnancy, intense stress or trauma may lead to epigenetic changes in response to stress exposure that can be transmitted to the infant (30). However, most of the evidence so far is based on single studies, using different measures; therefore, larger studies with prospective designs and validated measures are needed before firm conclusions can be drawn.

Perinatal mental health problems such as childbirth-related PTSD also impose high economic costs. The cost of common perinatal mental health problems is estimated at £8.1 billion in the United Kingdom (31), and $14 billion in the United States of America (32) for each one-year birth cohort, with

a substantial proportion of these costs associated with the impact on the child. The costs of psychological birth trauma have yet to be established. However, despite these potential costs, a study of 18 European countries found significant gaps in formalized care for psychological birth trauma (33).

Risk factors

The main risk factors and causes of childbirth-related PTSD were summarised in a diathesis-stress model of psychological birth trauma (Figure 2). Diathesis-stress models are used in health sciences to summarize how an individual's pre-existing vulnerabilities (diathesis) interact with stressful events to determine health outcomes. The diathesis-stress model of childbirth-related PTSD was developed from a meta-analysis of risk factors from 50 studies across 15 countries (20). This model summarises possible interactions between the main risk factors for childbirth-related PTSD. During pregnancy, risk factors most strongly associated with PTSD were depression (r = 0.51), fear of childbirth (r = 0.41), poor health or complications of pregnancy (r = 0.38), history of trauma (r = 0.39), or previous psychological therapy for pregnancy or birth-related problems (r = 0.32). During birth, risk factors most strongly associated with PTSD were negative subjective birth experiences (r = 0.59), operative birth (assisted vaginal delivery or Cesarean delivery (r = 0.48)), and dissociation (r = 0.32) (including depersonalization, derealization, and emotional numbness (34)). Support during birth was a protective factor (r = -0.38), Although not included in this model, obstetric or neonatal complications (e.g., maternal morbidity, infant admission to NICU) were associated with PTSD but not as strongly as the risk and protective factors shown. The main postpartum risk factors were concurrent depression (r = 0.60), additional stress and poor coping (r = 0.30) (15, 20, 21).

- insert Figure 2 -

In contrast to other perinatal mental health disorders, with childbirth-related PTSD there is an opportunity to prevent it by preventing traumatic childbirths in the first place. As shown, a key factor in improving birth outcomes and buffering against childbirth-related PTSD is good support from staff during labour and birth (22). Conversely poor support is associated with poorer birth outcomes and greater risk of childbirth-related PTSD, as is mistreatment during childbirth (23).

> *"If I complained about pain, they abused me in such vulgar language - When you slept with husband, you enjoyed - now why are you screaming, just lie down."* Indian mother (16)

Pathophysiology

Following traumatic events, individuals with PTSD report increased stress perception and feel chronically stressed (35). The physiological stress response system is composed of the sympathetic and the parasympathetic branches of the autonomous nervous system and the hypothalamic-pituitary-adrenal (HPA) axis. Under stress conditions, HPA activation increases (leading to elevated cortisol release), whereas the parasympathetic nervous system activation withdraws (leading to reduced high frequency power heart rate, i.e., 0.15–0.40 Hz), and the sympathetic nervous system activation intensifies (leading to increased low frequency power heart rate, i.e., 0.06–0.10 Hz). This results in a short-term imbalance of the autonomic nervous system, which is measured by calculating the low frequency/high frequency ratio) (36). PTSD is also related to changes in the physiological stress response systems (37, 38), such as increased heart rate and reduced parasympathetic activity compared to controls (39), and dysregulated activation of the HPA axis (40). The HPA axis plays a key role in controlling the body's stress response, and it's dysregulation can lead to abnormalities in the release of stress hormones such as cortisol, that may contribute to exagerated stress responses and emotional

disturbances. A meta-analysis showed that patients with PTSD also had altered autonomic nervous system responses at rest compared to controls (i.e., reduced high frequency and low frequency power, with a higher reduction in high frequency than low frequency power, and increased high frequency/low frequency ratio), indicating a lack of adaptive capacity of the cardiovascular system (37). Magnetic resonance imaging (MRI) studies (both structural and functional MRI) also suggest PTSD results in gray matter atrophy, altered white matter integrity, and focal neural activity alterations and impaired functional connectivity leading to alterations to brain systems responsible for fear learning and responses to threat (i.e., the anterior cingulate, amygdala, hippocampus, and insula) (41). Functional MRI studies demonstrate altered spontaneous neural activity in patients with PTSD compared with combined trauma-exposed and non trauma-exposed controls, incuding lower activity in the cerebellum (pyramis), globus pallidus, posterior insula, and middle frontal gyrus and higher activity in the parahippocampal gurus/amygdala and ventral anterior cingulate cortex (41). Such pathophysiological changes also result in a limited capacity to adapt to additional stressful circumstances.

There is currently no data on whether childbirth-related PTSD is associated with similar changes. The few studies on the pathophysiology of childbirth-related PTSD provide some support for dysregulations of the stress response system occurring in mothers following a psychologically traumatic childbirth. For example, a study found women who had a traumatic birth reported higher perceived stress levels in response to an infant stress paradigm compared with controls (42). Women who had a traumatic birth had higher high frequency power, and lower low frequency/high frequency ratio when controlling for the role of the perceived life threat for the infant, with moderate to large effect sizes. Likewise, another study of women with childbirth-related PTSD showed elevated psychophysiological reactivity (as quantified by skin conductance, heart rate, and left lateral frontalis and corrugator electromyogram

responses) during scripted mental imagery of their childbirth experience. These elevated physiological responses were similar to those seen in people with PTSD resulting from other types of trauma (43). Furthermore, two studies found that following a negative subjective birth experience, individuals who had lower hair concentrations of the glucocorticoids cortisol (*B* = 2.74, *SE* = 1.09, 95% *CI* [0.58; 4.90]) and cortisone (*B* = 1.86, *SE* = 0.87, 95% *CI* [0.15; 3.57]) as well as the endocannabinoid anandamide (*B* = 1.01, *SE* = 0.50, 95% *CI* [0.08; 2.06]) during the third trimester of pregnancy, reported higher symptom levels of CB-PTSD (44, 45). Figure 3 depicts a schematic representation of a hair follicle of which the scalp-near 2 to 3 cm hair segment is typically used for hair analysis to quantify levels of glucocorticoid hormones and also endocannabinoid ligands. With an average hair growth rate of 1 cm per month, these are assumed to reflect secretion over the previous 2 to 3 months (46-48).

- insert Figure 3 -

However, research on the pathophysiology of childbirth-related PTSD is limited with inconsistent results. Physiological changes that accompany pregnancy and birth, including hormonal changes, also influence autonomic nervous system and hypothalamic-pituitary-adrenal activity, adding further complexity (49). For example, oxytocin is involved in physiological processes during birth and breastfeeding, as well as being implicated in maternal behaviors, maternal affective processes (e.g., bonding), and stress responses (50). Oxytocin and oxytocin receptors increase during pregnancy and birth, and oxytocin levels are three to four times higher at birth than at the beginning of labor (51). Animal and human studies show the oxytocinergic system can buffer against stress responses, and is associated with affiliative behaviours, such as positive maternal caregiving and bonding behaviors, particularly in those exposed to stress (43). This has led to the ‘tend-befriend’ theory of stress

responses in females, who are thought to be more likely to turn to others for support and protection in response to stress, which is partly mediated by the oxytocinergic system (52).

Dysregulations in the stress response system are likely to not only affect mothers but also to provoke changes in stress response systems in their infants. Whilst there is evidence for the intergenerational transmission of stress- and trauma-related changes in utero (53), there is very little research on whether and through which mechanisms (e.g., epigenetics) maternal childbirth-related PTSD is related to dysregulations in infants' stress response functioning (54). Initial evidence, from human and animal research, suggests that exposure to stressors in early life may be associated with alterations in the epigenetic signatures of genes involved in stress responsivity, thereby resulting in dysfunctions of the HPA-axis (55). Maternal psychological disorders may negatively affect mother-child interactional behavior critical to healthy development of children (56) and this has also been indicated for childbirth-related PTSD (57). Thus, it could be that altered mother-infant interactions related to the mother's childbirth-related PTSD represent a form of early life stress exposure that may shape the epigenetic signatures and thereby the activity of genes within the developing organism (56) yet longitudinal research exploring these mechanisms specific to childbirth-related PTSD is clearly warranted. The literature on infant development suggests synchronization of mothers and infant's physiological stress systems can occur to help infants develop emotion regulation capacity (58). This is also influenced by maternal sensitivity to the infant's cues (59). However, no research has so far looked at this in the context of childbirth-related PTSD and results from other high-risk maternal populations are inconclusive (60).

There are also non-physiological mechanisms through which psychological birth trauma and childbirth-related PTSD may impact on the infant, including poor maternal emotion regulation, negative parenting

styles, difficulties establishing a secure attachment relationship with the infant, and greater exposure to trauma environments e.g., adverse childhood events (61). Indeed, mothers with childbirth-related PTSD have been observed to have lower maternal sensitivity (57), less adequate interaction distance with the child (62), and more self-reported difficulties bonding with their infant (63). No studies so far have investigated how early changes in parenting and the parent-infant relationship after traumatic childbirth may impact on infant physiology.

Diagnosis and screening

Traumatic birth experiences and childbirth-related PTSD remain largely unrecognized in maternity services and are not routinely screened for during pregnancy and postpartum (64). Those affected are therefore not routinely identified or treated for childbirth-related PTSD (65). A psychiatric diagnosis of childbirth-related PTSD is made using the diagnostic criteria shown in Table 1 (13, 66) with childbirth as the index trauma. Symptoms of PTSD have to be experienced for at least one month in order to distinguish it from acute stress responses, such as Acute Stress Disorder. The one month timeframe also allows for non-treatment related remission, which occurs in approximately 44% of those with PTSD symptoms (67). The reliability of psychiatric diagnoses has always been a challenge (68), and diagnostic criteria like those in Table 1 help increase reliability. However, the diagnostic criteria for PTSD have changed historically and there are still differences between PTSD criteria in the DSM5 from the American Psychiatric Association and the ICD11 from the World Health Organisation. Despite this, there appears to be reasonable cross-cultural replicability of PTSD (69, 70).

- insert Table 1 -

Barriers to identification include lack of awareness of childbirth-related PTSD among women and health professionals (71, 72), lack of consensus on the best way to screen for childbirth-related PTSD, and lack of clinical guidelines on assessment and treatment of childbirth-related PTSD. Screening for mental health problems in pregnancy and after birth is acceptable to women (73) and part of routine maternity care in many countries. However, no research has evaluated screening programmes for childbirth-related PTSD and whether it leads to improved outcomes for women and infants.

> '*She was the first person who made me feel like it was okay to not be okay, that the way I was feeling was not how it was going to be for the rest of my life… that one nurse just asking that simple question and following up on it changed everything.'* UK mother (15).

A critical question in screening and assessment is *how to do it effectively*. Until recently, identifying and assessing childbirth-related PTSD was confounded by a lack of validated screening tools. Thus, questionnaires developed for use with other groups were typically used, such as military veterans (e.g., Impact of Event Scale (74); Posttraumatic Checklist for DSM 5 (75); PTSD Symptom Self-Report Scale (76)). The most commonly used clinician-rated interview measure is the Clinician-Administered PTSD Scale for DSM–5 (77). Measures developed specifically for assessing childbirth-related PTSD are the Traumatic Events Scale (78), Perinatal PTSD Questionnaire (79), and City Birth Trauma Scale (80). However, there is little information available on the diagnostic accuracy of these measures for childbirth-related PTSD. Other screening tools, such as the Antenatal Risk Questionnaire, take a broader approach and assess a range of psychosocial risk factors (e.g., child abuse, pre-existing mental health issues, sexual/intimate partner violence, substance misuse) rather than trauma symptoms (81). Further, a recent study provided proof of concept that postnatal women's narratives, analysed using a

machine learning model, could identify women who are likely to have childbirth-related PTSD with relatively high accuracy. The women with childbirth-related PTSD gave longer narratives and used more negative emotional expressions and death-related words when describing their childbirth experience than women without childbirth-related PTSD, which could be an identifier for clinicians when interacting with postnatal women (82).

Other factors to consider include *who to screen* (i.e., whether screening should be universal or include only those in high-risk groups, such as those with maternal or neonatal complications or history of trauma); *when to screen*; and *whether screening is conducted as a one- or two-stage process*. A one-stage process involves screening once for psychological birth trauma and PTSD, whereas a two-stage process might use a broad screening tool as a first step to identify women with any form of psychological distress, and then follow-up with a more specific screening tool to determine the type of distress or disorder present. Diagnostic criteria specify PTSD symptoms should be experienced for at least one month, suggesting assessment of PTSD should be done one or more months postpartum. However, early assessment of traumatic childbirth experiences is desirable to identify individuals at high risk and offer interventions to prevent the development of childbirth-related PTSD. A two-stage approach may therefore be appropriate, where women and people at high risk of childbirth-related PTSD are identified shortly after birth, potentially offered preventative intervention at this stage, and followed up to one or more months after birth to assess childbirth-related PTSD and offered treatment where needed.

Prevention and treatment

Interventions to prevent or treat childbirth-related PTSD can be implemented at several time points: during pregnancy, peripartum, or postpartum. **Primary prevention** aims to prevent a traumatic childbirth experience and childbirth-related PTSD occurring in the first place by removing or reducing risk factors for childbirth-related PTSD. Approaches might include screening for antenatal risk factors for childbirth-related PTSD (e.g., pregnancy complications, fear of childbirth) and/or altering care during birth to ameliorate or prevent childbirth-related PTSD from occurring.

The concept of trauma-informed care is receiving attention across a range of healthcare settings as a way to avoid exacerbating or triggering trauma (83). Trauma-informed care has been defined as based on four key principles (the 4 Rs): (1) Realisation of the widespread nature of trauma; (2) Recognition of unresolved trauma; (3) Response by incorporating knowledge into practice; and (4) Resistance of re-traumatisation (84). Pregnancy and birth can be a time when previous trauma is triggered, and women/birth givers and partners re-experience intrusions of that trauma. Therefore, clinicians need to recognise individuals at increased risk and implement care plans to minimise re-traumatisation and/or prevent new trauma from occurring. Figure 4 gives an example of a trauma-informed approach to care with a specific focus on preventing birth-related trauma, and a recognition of previous trauma with specific trauma-focused interventions.

- insert Figure 4 -

The international consensus definition of ‘traumatic childbirth experience’ cited above (12) focuses on the importance of the woman’s subjective experience as central, and has pointed out that a traumatic childbirth experience also involves interactions with caregivers and events, is directly related to childbirth, causing overwhelming and stressful emotions and reactions which can have short or longterm impacts on health and wellbeing. Therefore it should be acknowledged that the context in

which maternity care is delivered can contribute to negative psychological outcomes. Trauma-informed care is an emerging approach to care, and the Substance Abuse and Mental Health Services Administration (85) has outlined a set of four assumptions known as the **4 R's.** A trauma-informed approach to care espouses that all staff in an organisation have a **realisation** of the widespread nature and effects of trauma, and its impact on individuals/families and organisations, The traumatic event(s) may have occurred in the past (i.e., adverse childhood events/sexual abuse, domestic violence etc), or the event may be current. It is also important to note that secondary traumatic stress may be experienced by health professionals related to hearing an individual's story or by witnessing/participating in a traumatic event (86). The second **R** is aimed at supporting staff to **recognise** the signs of trauma such as agitation, irritability, anxiety/depression, anger, easily startled by noise, sweating/palpitations, flashbacks, re-experiencing the trauma, difficulty trusting/concentrating, numbness, self-blame, guilt or shame. As previously mentioned, a history of childhood mistreatment and sexual abuse is an important specific trauma history in maternity care as intimate contact with women (for example during vaginal examination) can trigger symptoms (87). However, it should be noted that for some women it is the birth experience itself which constitutes the traumatic event. It is essential that the organisation at a wider level **responds** (3rd **R**) by integrating knowledge about trauma into its structures, policies and practices to support patients/families and staff. Finally, through the integration of a trauma-informed approach into the care provided the organisation aims to **resist re-traumatisation** of individuals (and groups) through supporting staff to recognise the organisational practices that may trigger painful memories for those with a trauma history. If a trauma-informed approach to care is to be adopted by clinicians, it requires organisational support. Whilst trauma-informed approaches are intuitively appealing, there is little research evaluating whether these approaches actually reduce childbirth-related PTSD (88). The American College of Obstetricians and

Gynecologists have recognised that it is critical that obstetrician-gynecologists recognise the impact of trauma on health outcomes and that linicians should seek to implement strategies to prevent re-traumatisation (89). However, to date, a single approach as to how trauma-informed care should be implemented and evaluated has yet to emerge (89, 90).

As mentioned in the section on risk factors, a key area for intervention is support during birth. It is well-established that continuous support during labour is important in positive birth outcomes, such as fewer operative births and greater birth satisfaction (91). Support is also associated with reduced childbirth-related PTSD symptoms (92), and may be particularly important for those who experience complications during birth, have a history of trauma, and/or high levels of intervention (93). Support during labour and birth is therefore critical in terms of reducing risk, preventing psychological birth trauma, and increasing resilience. Clinicians can therefore use an approach consistent with the principles of trauma-informed care by recognising women at risk and responding in a supportive manner that minimizes potential trauma/avoids re-traumatisation.

> *'It felt like rape. I panicked. I was conscious enough to tell the midwife I was having rape flashbacks, but she could not really offer any help. In fact I had freaked her out.'* USA mother (79)

Secondary prevention approaches aim to identify those who had a traumatic childbirth experience and intervene early to prevent the development of childbirth-related PTSD. Such approaches attempt to interfere with trauma memory processes (e.g., trauma memory consolidation), physiological stress responses to trauma (e.g., skin-to-skin contact with the infant to promote oxytocin release), or promote

emotional processing of the trauma and reappraisal (e.g., writing about the traumatic birth). Interventions include expressive writing interventions, midwifery-led debriefing, trauma-focused cognitive behaviour therapy, eye movement desensitization and reprocessing, and single-session behavioural interventions using Tetris gameplay to interfere with memory consolidation processes (94).

Reviews and meta-analyses of approaches to secondary prevention draw mixed conclusions. Some find trauma-focused psychological therapies such as exposure therapy, trauma-focused cognitive behavioural therapy, and eye movement desensitization and reprocessing result in a moderate reduction in childbirth-related PTSD symptoms in the short term (up to 3 months postpartum) compared to usual care (95). Others identify expressive writing, psychoeducation, and early psychological interventions delivered within 12 weeks after traumatic birth as potentially helpful (96). Evidence of the effectiveness of trauma-focused debriefing is controversial and these types of interventions are not recommended following childbirth (97).

Tertiary prevention or treatment aims to ensure people with childbirth-related PTSD are identified and treated to recovery, so that childbirth-related PTSD does not become chronic. These approaches are informed by evidence for the treatment of PTSD following other traumas, which finds trauma-focused psychotherapy, including cognitive behaviour therapy (CBT) and eye movement desensitisation and reprocessing, to be effective (98). A recent review of treatment guidelines for general PTSD concluded that one third of guidelines recommended psychotherapy over pharmacotherapy as first-line treatment (99). All guidelines highlight cognitive behaviour therapy as the first-line psychological treatment for PTSD, which includes several specific therapies, such as cognitive processing therapy, prolonged exposure therapy, and image rehearsal therapy. Pharmacotherapy may be considered when PTSD

symptoms are severe and psychotherapy does not provide sufficient results or when associated with other comorbid mental disorders, such as depression or sleep disorders. Antidepressants such as selective serotonin reuptake inhibitors (SSRIs) or serotonin-norepinephrine reuptake inhibitors (SNRIs) may alleviate symptoms of anxiety, depression, and intrusive thoughts associated with PTSD (100-102). In addition, Prazosin, an alpha-1 adrenergic receptor antagonist, may be used to treat individuals with PTSD who suffer from nightmares and sleep disturbances (103).

For treatment of childbirth-related PTSD, a meta-analysis of trauma-focused psychological therapies found a moderate effect compared to usual care (95). A more recent systematic review concluded trauma-focused cognitive behaviour therapy and eye movement desensitisation and reprocessing may be effective but that more evidence is needed, especially from randomized controlled trials (104). In particular, more studies are needed that differentiate between low and high-risk groups, low and high-resource settings, and use longer term follow-up periods to determine which approach is most effective and acceptable for treating childbirth-related PTSD. Whether combining trauma-focused psychotherapy with pharmacologic treatment is also effective in childbirth-related PTSD remains to be explored.

Implications for practice and policy

It has always been the case that many aspects of clinical care currently deemed as ‘usual’ are not underpinned by robust evidence of effectiveness or positive impacts on clinical outcomes. As outlined above, there is little evidence on how to best assess, prevent, and treat childbirth-related PTSD, but this does not remove the need and responsibility to take pragmatic steps, whilst evidence for a particular treatment is generated. In the meantime, we can draw on evidence on assessment and treatment of PTSD following other traumas to provide specifically tailored interventions building on existing

evidence-based treatments for PTSD, whilst incorporating therapeutic elements relevant to this period, such as parent-child bonding, hypervigilance to physical cues, shattered childbirth expectations etc.

Earlier in this review, major risk factors for the development of childbirth-related PTSD were outlined, such as complications in pregnancy, operative birth, lack of support in birth, and additional stress and poor coping after birth. Some of these risk factors can be easily addressed by incorporating institutional strategies to promote continuity of care and by allocating resources for maternity staff training and education in trauma-informed care. Models of clinical care can be adapted to minimise negative interactions with caregivers that increase the risk of childbirth-related PTSD. This can be done by taking a trauma-informed approach to care and/or by identifying individuals at high risk of childbirth-related PTSD (83), as outlined in Figure 4. Recognition of past traumas, continuity of care, good support and communication during pregnancy, continuous one-to-one support in labour, and asking about people's birth experiences are changes that require little resources and can be incorporated into practice immediately. These are not new concepts but perhaps need to be foregrounded in the context of preventing and reducing psychological birth trauma and childbirth-related PTSD. Thus, changing the way we provide care to a more trauma-informed approach can begin whilst evidence is being generated on the optimum methods of prevention and treatment for childbirth-related PTSD within different models of maternity care.

Psychological birth trauma and childbirth-related PTSD require the same recognition and focus given to postnatal depression, and effective approaches to the assessment and prevention of psychological psychological birth trauma and childbirth-related PTSD are required (61). National and international professional guidelines need to be developed to increase awareness of childbirth-related PTSD and

highlight evidence-based strategies for assessment, prevention, and treatment (105). The current lack of national and international policy guidance on the prevention, care, and treatment of psychological birth trauma, as well as the absence of formal psychological birth trauma services and training (33) shows the need to engage with service managers and policy makers. Healthcare policy to guide and develop perinatal mental health services should also include awareness of childbirth-related PTSD and recommendations for assessment, prevention, and treatment, as previously outlined. There are very few evidence-based guidelines for the assessment, prevention, and treatment of childbirth-related PTSD, with a few notable exceptions (106, 107). Management of childbirth-related PTSD is therefore usually based on guidelines pertaining to general PTSD in adults, such as the National Institute of Health and Care Excellence guidelines (108). According to these, general principles of care include peer support, maintaining safe environments, as well as involving and supporting family and carers. In addition to the clinical aspects of care, service improvement must be seen within the larger political dimension.

In summary, evidence to date emphasizes that a significant percentage of parents suffer from traumatic childbirth experience and childbirth-related PTSD worldwide. Adequate prevention, screening, and intervention could alleviate a considerable amount of suffering in affected families. Against the background of available research on the impact of childbirth-related PTSD on families, it is important to design and evaluate assessment, prevention, and treatment targeting the woman/birthing person, couple dyad, parent-infant dyad, and family as a whole. Further research should focus on the inclusion of couples in different constellations and, more generally, on the inclusion of more diverse populations in diverse settings. The paucity of national and international policy guidance on the prevention, care, and treatment of psychological birth trauma, as well as the absence of formal psychological birth trauma services and training shows the need to engage with service managers and policy makers.

Acknowledgements

This work was funded by the European Union (EU) Cooperation in Science and Technology (COST) Programme (CA18211: DEVoTION: Perinatal Mental Health and Birth-Related Trauma: Maximising best practice and optimal outcomes). The views expressed are those of the authors and not necessarily those of the EU or COST.

Glossary of terms

PTSD	Posttraumatic Stress Disorder
Psychological birth trauma	Interactions and/or events directly related to childbirth that cause overwhelming distressing emotions and reactions with negative impacts on a woman's health and wellbeing
Childbirth-related PTSD	Psychological symptoms that develop after, or as a direct consequence of, having had a traumatic birth
Trauma-informed care	Based on 4 key principles (the 4 Rs): realisation about trauma, recognition of the signs of trauma, response to trauma and resisting re-traumatization
DSM-5	The Diagnostic and Statistical Manual of Mental Disorders (5^{th} edition) of the American Psychiatric Association
ICD-11	The International Classification of Diseases (11th revision), published by the World Health Organization
Dissociation	A complex array of reactions to trauma, including depersonalization, derealization, and emotional numbness
CBT	Cognitive behavioural therapy, a family of therapies including cognitive processing therapy, prolonged exposure therapy, and image rehearsal therapy

References

1. Ritchie H, Mathieu E. How many people die and how many are born each year? : Our World in Data; 2023 [Available from: https://ourworldindata.org/births-and-deaths.
2. United Nations. The Millennium Development Goals Report. New York; 2015.
3. World Health Organization. The prevention and elimination of disrespect and abuse during facility-based childbirth: WHO statement. 2015.
4. World Health Organization. WHO recommendations: intrapartum care for a positive childbirth experience. 2018.
5. Organization WH. Infant mortality [Available from: https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/infant-mortality.
6. Organization WH. Maternal mortality [Available from: https://data.unicef.org/topic/maternal-health/maternal-mortality/.
7. Heitkamp A, Meulenbroek A, van Roosmalen J, Gebhardt S, Vollmer L, de Vries JI, et al. Maternal mortality: near-miss events in middle-income countries, a systematic review. Bull World Health Organ. 2021;99(10):693-707f.
8. Tunçalp O, Hindin MJ, Souza JP, Chou D, Say L. The prevalence of maternal near miss: a systematic review. Bjog. 2012;119(6):653-61.
9. Sakala C, Romano AM, Buckley SJ. Hormonal Physiology of Childbearing, an Essential Framework for Maternal–Newborn Nursing. Journal of Obstetric, Gynecologic & Neonatal Nursing. 2016;45(2):264-75.
10. O'Donovan A, Alcorn KL, Patrick JC, Creedy DK, Dawe S, Devilly GJ. Predicting posttraumatic stress disorder after childbirth. Midwifery. 2014;30(8):935-41.
11. Stramrood CA, Paarlberg KM, Huis In 't Veld EM, Berger LW, Vingerhoets AJ, Schultz WC, et al. Posttraumatic stress following childbirth in homelike- and hospital settings. J Psychosom Obstet Gynaecol. 2011;32(2):88-97.
12. Leinweber J, Fontein-Kuipers Y, Thomson G, Karlsdottir SI, Nilsson C, Ekstrom-Bergstrom A, et al. Developing a woman-centered, inclusive definition of traumatic childbirth experiences: A discussion paper. Birth. 2022;49(4):687-96.
13. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: American Psychiatric Publishing; 2013.
14. Beck CT. Birth trauma: in the eye of the beholder. Nursing Research. 2004;53(1):28-35.
15. Heyne CS, Kazmierczak M, Souday R, Horesh D, Lambregtse-van den Berg M, Weigl T, et al. Prevalence and risk factors of birth-related posttraumatic stress among parents: A comparative systematic review and meta-analysis. Clin Psychol Rev. 2022;94:102157.
16. Yildiz PD, Ayers S, Phillips L. The prevalence of posttraumatic stress disorder in pregnancy and after birth: A systematic review and meta-analysis. J Affect Disord. 2017;208:634-45.
17. Grekin R, O'Hara MW. Prevalence and risk factors of postpartum posttraumatic stress disorder: A meta-analysis. Clinical Psychology Review. 2014;34(5):389-401.
18. Adewuya AO, Ologun YA, Ibigbami OS. Post-traumatic stress disorder after childbirth in Nigerian women: prevalence and risk factors. Bjog. 2006;113(3):284-8.
19. Shiva L, Desai G, Satyanarayana VA, Venkataram P, Chandra PS. Negative Childbirth Experience and Post-traumatic Stress Disorder - A Study Among Postpartum Women in South India. Front Psychiatry. 2021;12:640014.

20. Gankanda WI, Gunathilake I, Kahawala NL, Ranaweera AKP. Prevalence and associated factors of post-traumatic stress disorder (PTSD) among a cohort of Srilankan post-partum mothers: a cross-sectional study. BMC Pregnancy Childbirth. 2021;21(1):626.
21. Beck CT. Post-traumatic stress disorder due to childbirth: the aftermath. Nursing research. 2004;53(4):216-24.
22. Dekel S, Ein-Dor T, Dishy GA, Mayopoulos PA. Beyond postpartum depression: posttraumatic stress-depressive response following childbirth. Arch Womens Ment Health. 2020;23(4):557-64.
23. Garthus-Niegel S, Horsch A, von Soest T, Haga SM, Drozd F, Ayers S, et al. Posttraumatic stress symptoms following childbirth: associations with prenatal attachment in subsequent pregnancies. Arch Womens Ment Health. 2020;23:547-55.
24. Hollander M, de Miranda E, van Dillen J, de Graaf I, Vandenbussche F, Holten L. Women's motivations for choosing a high risk birth setting against medical advice in the Netherlands: a qualitative analysis. BMC Pregnancy Childbirth. 2017;17(1):423.
25. Garthus-Niegel S, Horsch A, Ayers S, Junge-Hoffmeister J, Weidner K, Eberhard-Gran M. The influence of postpartum PTSD on breastfeeding: A longitudinal population-based study. Birth. 2017.
26. Garthus-Niegel S, Ayers S, Martini J, von Soest T, Eberhard-Gran M. The impact of postpartum post-traumatic stress disorder symptoms on child development: a population-based, 2-year follow-up study. Psychol Med. 2017;47(1):161-70.
27. Garthus-Niegel S, Horsch A, Bickle Graz M, Martini J, von Soest T, Weidner K, et al. The prospective relationship between postpartum PTSD and child sleep: A 2-year follow-up study. Journal of Affective Disorders. 2018;241:71-9.
28. Van Sieleghem S, Danckaerts M, Rieken R, Okkerse JME, de Jonge E, Bramer WM, et al. Childbirth related PTSD and its association with infant outcome: A systematic review. Early Human Development. 2022;174:105667.
29. Horsch A, Stuijfzand S. Intergenerational transfer of perinatal trauma-related consequences. J Reprod Infant Psychol. 2019;37(3):221-3.
30. Yehuda R, Bierer LM. The relevance of epigenetics to PTSD: implications for the DSM-V. J Trauma Stress. 2009;22(5):427-34.
31. Bauer A, Parsonage M, Knapp M, Iemmi V, Adelaja B. The costs of perinatal mental health problems. London; 2014.
32. Luca DL, Margiotta C, Staatz C, Garlow E, Christensen A, Zivin K. Financial Toll of Untreated Perinatal Mood and Anxiety Disorders Among 2017 Births in the United States. American Journal of Public Health. 2020;110(6):888-96.
33. Thomson G, Diop MQ, Stuijfzand S, Horsch A, Lalor JG, de Abreu W, et al. Policy, service, and training provision for women following a traumatic birth: an international knowledge mapping exercise. BMC Health Services Research. 2021;21(1):1206.
34. Thompson-Hollands J, Jun JJ, Sloan DM. The Association Between Peritraumatic Dissociation and PTSD Symptoms: The Mediating Role of Negative Beliefs About the Self. Journal of Traumatic Stress. 2017;30(2):190-4.
35. Bot I, Kuiper J. Stressed brain, stressed heart? The Lancet. 2017;389(10071):770-1.
36. Del Giudice M, Ellis BJ, Shirtcliff EA. The Adaptive Calibration Model of stress responsivity. Neurosci Biobehav Rev. 2011;35(7):1562-92.
37. Nagpal M, Gleichauf K, Ginsberg J. Meta-analysis of heart rate variability as a psychophysiological indicator of posttraumatic stress disorder. Journal of Trauma & Treatment. 2013;3(182):2167-1222.1000182.

38. Pitman RK, Rasmusson AM, Koenen KC, Shin LM, Orr SP, Gilbertson MW, et al. Biological studies of post-traumatic stress disorder. Nature Reviews Neuroscience. 2012;13(11):769-87.
39. Schneider M, Schwerdtfeger A. Autonomic dysfunction in posttraumatic stress disorder indexed by heart rate variability: a meta-analysis. Psychological medicine. 2020;50(12):1937-48.
40. Miller GE, Chen E, Zhou ES. If it goes up, must it come down? Chronic stress and the hypothalamic-pituitary-adrenocortical axis in humans. Psychol Bull. 2007;133(1):25-45.
41. Kunimatsu A, Yasaka K, Akai H, Kunimatsu N, Abe O. MRI findings in posttraumatic stress disorder. Journal of Magnetic Resonance Imaging. 2020;52(2):380-96.
42. Sandoz V, Stuijfzand S, Lacroix A, Deforges C, Quillet Diop M, Ehlert U, et al. The Lausanne Infant Crying Stress Paradigm: Validation of an Early Postpartum Stress Paradigm with Women at Low vs. High Risk of Childbirth-Related Posttraumatic Stress Disorder. 2021;11(6):472.
43. Chan SJ, Thiel F, Kaimal AJ, Pitman RK, Orr SP, Dekel S. Validation of childbirth-related posttraumatic stress disorder using psychophysiological assessment. American Journal of Obstetrics & Gynecology. 2022;227(4):656-9.
44. Steudte-Schmiedgen S, Schälicke S, Bergunde L, Karl M, Weise V, Junge-Hoffmeister J, et al. Hair glucocorticoids during pregnancy in the context of trauma exposure and their predictive value for the development of childbirth-related posttraumatic stress disorder symptoms. Psychoneuroendocrinology. 2023;148:105973.
45. Bergunde L, Karl, M., Schaelicke, S., Weise, K., Mack, J., von Soest, T., Weidner, K., T., Gao, W., Garthus- Niegel, S., Schmiedgen, S. Childbirth-related posttraumatic stress symptoms – examining associations with hair endocannabinoid concentrations during pregnancy and lifetime trauma. Translational Psychiatry in press.
46. Gao W, Walther A, Wekenborg M, Penz M, Kirschbaum C. Determination of endocannabinoids and N-acylethanolamines in human hair with LC-MS/MS and their relation to symptoms of depression, burnout, and anxiety. Talanta. 2020;217:121006.
47. Gao W, Stalder T, Foley P, Rauh M, Deng H, Kirschbaum C. Quantitative analysis of steroid hormones in human hair using a column-switching LC–APCI–MS/MS assay. Journal of Chromatography B. 2013;928:1-8.
48. Wennig R. Potential problems with the interpretation of hair analysis results. Forensic science international. 2000;107(1-3):5-12.
49. Soma-Pillay P, Nelson-Piercy C, Tolppanen H, Mebazaa A. Physiological changes in pregnancy. Cardiovasc J Afr. 2016;27(2):89-94.
50. Witteveen AB, Stramrood CAI, Henrichs J, Flanagan JC, van Pampus MG, Olff M. The oxytocinergic system in PTSD following traumatic childbirth: endogenous and exogenous oxytocin in the peripartum period. Arch Womens Ment Health. 2020;23(3):317-29.
51. Uvnäs-Moberg K, Ekström-Bergström A, Berg M, Buckley S, Pajalic Z, Hadjigeorgiou E, et al. Maternal plasma levels of oxytocin during physiological childbirth – a systematic review with implications for uterine contractions and central actions of oxytocin. BMC Pregnancy and Childbirth. 2019;19(1):285.
52. Taylor SE, Klein LC, Lewis BP, Gruenewald TL, Gurung RA, Updegraff JA. Biobehavioral responses to stress in females: tend-and-befriend, not fight-or-flight. Psychological review. 2000;107(3):411.
53. Bowers ME, Yehuda R. Intergenerational Transmission of Stress in Humans. Neuropsychopharmacology. 2016;41(1):232-44.

54. Bergunde L, Garthus-Niegel S, Alexander N, Steudte-Schmiedgen S. Perinatal mental health research: towards an integrative biopsychosocial approach. Journal of Reproductive and Infant Psychology. 2022;40(4):325-8.
55. Jawahar MC, Murgatroyd C, Harrison EL, Baune BT. Epigenetic alterations following early postnatal stress: a review on novel aetiological mechanisms of common psychiatric disorders. Clinical Epigenetics. 2015;7(1):122.
56. Monk C, Spicer J, Champagne FA. Linking prenatal maternal adversity to developmental outcomes in infants: The role of epigenetic pathways. Development and Psychopathology. 2012;24(4):1361-76.
57. Cook N, Ayers S, Horsch A. Maternal posttraumatic stress disorder during the perinatal period and child outcomes: A systematic review. Journal of Affective Disorders. 2018;225(Supplement C):18-31.
58. Abney DH, daSilva EB, Bertenthal BI. Associations between infant–mother physiological synchrony and 4-and 6-month-old infants' emotion regulation. Developmental Psychobiology. 2021;63(6):e22161.
59. Feldman R. Parent–infant synchrony and the construction of shared timing; physiological precursors, developmental outcomes, and risk conditions. Journal of Child psychology and Psychiatry. 2007;48(3-4):329-54.
60. Smith C, Jones EJ, Charman T, Clackson K, Mirza F, Wass S. Anxious parents show higher physiological synchrony with their infants. Psychological Medicine. 2022;52(14):3040-50.
61. Van Sieleghem S, Danckaerts M, Rieken R, Okkerse JM, de Jonge E, Bramer WM, et al. Childbirth related PTSD and its association with infant outcome: A systematic review. Early Human Development. 2022:105667.
62. Ionio C, Di Blasio P. Post-traumatic stress symptoms after childbirth and early mother–child interactions: an exploratory study. Journal of Reproductive and Infant Psychology. 2014;32(2):163-81.
63. Stuijfzand S, Garthus-Niegel S, Horsch AJFip. Parental birth-related PTSD symptoms and bonding in the early postpartum period: a prospective population-based cohort study. 2020;11.
64. Delicate A, Ayers S, McMullen S. Health-care practitioners' assessment and observations of birth trauma in mothers and partners. J Reprod Infant Psychol. 2022;40(1):34-46.
65. Delicate A, Ayers S, McMullen S. Health care practitioners' views of the support women, partners, and the couple relationship require for birth trauma: current practice and potential improvements. Prim Health Care Res Dev. 2020;21:e40.
66. Cloitre M, Garvert DW, Brewin CR, Bryant RA, Maercker A. Evidence for proposed ICD-11 PTSD and complex PTSD: A latent profile analysis. European journal of psychotraumatology. 2013;4(1):20706.
67. Morina N, Wicherts JM, Lobbrecht J, Priebe S. Remission from post-traumatic stress disorder in adults: a systematic review and meta-analysis of long term outcome studies. Clin Psychol Rev. 2014;34(3):249-55.
68. Aboraya A, Rankin E, France C, El-Missiry A, John C. The reliability of psychiatric diagnosis revisited: The clinician's guide to improve the reliability of psychiatric diagnosis. Psychiatry (Edgmont). 2006;3(1):41.
69. Fried EI, Eidhof MB, Palic S, Costantini G, Huisman-van Dijk HM, Bockting CL, et al. Replicability and generalizability of posttraumatic stress disorder (PTSD) networks: A cross-cultural multisite study of PTSD symptoms in four trauma patient samples. Clinical Psychological Science. 2018;6(3):335-51.

70. Knefel M, Lueger-Schuster B, Bisson J, Karatzias T, Kazlauskas E, Roberts NP. A cross-cultural comparison of ICD-11 complex posttraumatic stress disorder symptom networks in Austria, the United Kingdom, and Lithuania. Journal of Traumatic Stress. 2020;33(1):41-51.
71. van Dinter-Douma EE, de Vries NE, Aarts-Greven M, Stramrood CAI, van Pampus MG. Screening for trauma and anxiety recognition: knowledge, management and attitudes amongst gynecologists regarding women with fear of childbirth and postpartum posttraumatic stress disorder. The Journal of Maternal-Fetal & Neonatal Medicine. 2020;33(16):2759-67.
72. de Vries NE, Stramrood CAI, Sligter LM, Sluijs AM, van Pampus MG. Midwives' practices and knowledge about fear of childbirth and postpartum posttraumatic stress disorder. Women Birth. 2020;33(1):e95-e104.
73. Kingston D, McDonald S, Tough S, Austin M-P, Hegadoren K, Lasiuk G. Public views of acceptability of perinatal mental health screening and treatment preference: a population based survey. BMC Pregnancy and Childbirth. 2014;14(1):67.
74. Horowitz M, Wilner N, Alvarez W. Impact of Event Scale: a measure of subjective stress. Psychosom Med. 1979;41(3):209-18.
75. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The posttraumatic stress disorder checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. Journal of traumatic stress. 2015;28(6):489-98.
76. Foa EB, Cashman L, Jaycox L, Perry K. The validation of a self-report measure of posttraumatic sress disorder : the posttraumatic diagnostic scale. Psychological Assessment. 1997;9(4):445-51.
77. Weathers FW, Bovin MJ, Lee DJ, Sloan DM, Schnurr PP, Kaloupek DG, et al. The Clinician-Administered PTSD Scale for DSM–5 (CAPS-5): Development and initial psychometric evaluation in military veterans. Psychological assessment. 2018;30(3):383.
78. Wijma K, Wijma B, Zar M. Psychometric aspects of the W-DEQ; a new questionnaire for the measurement of fear of childbirth. Journal of Psychosomatic Obstetrics & Gynecology. 1998;19(2):84-97.
79. Quinnell FA, Hynan MT. Convergent and discriminant validity of the Perinatal PTSD Questionnaire (PPQ): A preliminary study. Journal of Traumatic Stress. 1999;12(1):193-9.
80. Ayers S, Wright DB, Thornton A. Development of a Measure of Postpartum PTSD: The City Birth Trauma Scale. 2018;9(409).
81. Reilly N, Loxton D, Black E, Austin M-P. The Antenatal Risk Questionnaire-Revised: Development, use and test-retest reliability in a community sample of pregnant women in Australia. Journal of Affective Disorders. 2021;293:43-50.
82. Bartal A, Jagodnik KM, Chan SJ, Babu MS, Dekel S. Identifying women with postdelivery posttraumatic stress disorder using natural language processing of personal childbirth narratives. American Journal of Obstetrics & Gynecology MFM. 2023;5(3):100834.
83. Vogel TM, Coffin E. Trauma-Informed Care on Labor and Delivery. Anesthesiology Clinics. 2021;39(4):779-91.
84. Stephanie Dueger PhD L. Protecting children and young people: Trauma informed care in the perinatal period. Journal of Prenatal & Perinatal Psychology & Health. 2016;30(4):307.
85. SAMSHA. SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach Rockville: MD: Substance Abuse and Mental Health Services Administration; 2014 [Available from: https://ncsacw.acf.hhs.gov/userfiles/files/SAMHSA_Trauma.pdf.

86. Favrod C, Jan du Chêne L, Martin Soelch C, Garthus-Niegel S, Tolsa J-F, Legault F, et al. Mental health symptoms and work-related stressors in hospital midwives and NICU nurses: A mixed methods study. Frontiers in psychiatry. 2018;9:364.
87. Montgomery E. Feeling safe: a metasynthesis of the maternity care needs of women who were sexually abused in childhood. Birth. 2013;40(2):88-95.
88. de Graaff LF, Honig A, van Pampus MG, Stramrood CAI. Preventing post-traumatic stress disorder following childbirth and traumatic birth experiences: a systematic review. Acta Obstetricia et Gynecologica Scandinavica. 2018;97(6):648-56.
89. American College of Obstetricians Gynecologists Committee on Health Care for Underserved Women. Caring for patients who have experienced trauma: ACOG Committee Opinion, number 825. Obstetrics and gynecology. 2021;137(4):e94-e9.
90. Law C, Wolfenden L, Sperlich M, Taylor J. A good practice guide to support implementation of trauma-informed care in the perinatal period. The Centre for Early Child Development (Blackpool, UK) Commissioned by NHS England and NHS Improvement in. 2019.
91. Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. Cochrane database of systematic reviews. 2013(7).
92. Ayers S, Bond R, Bertullies S, Wijma K. The aetiology of post-traumatic stress following childbirth: a meta-analysis and theoretical framework. Psychological medicine. 2016;46(06):1121-34.
93. Ford E, Ayers S. Support during birth interacts with prior trauma and birth intervention to predict postnatal post-traumatic stress symptoms. Psychology & Health. 2011;26(12):1553-70.
94. Horsch A, Vial Y, Favrod C, Harari MM, Blackwell SE, Watson P, et al. Reducing intrusive traumatic memories after emergency caesarean section: A proof-of-principle randomized controlled study. Behav Res Ther. 2017;94:36-47.
95. Furuta M, Horsch A, Ng ESW, Bick D, Spain D, Sin J. Effectiveness of Trauma-Focused Psychological Therapies for Treating Post-traumatic Stress Disorder Symptoms in Women Following Childbirth: A Systematic Review and Meta-Analysis. Frontiers in Psychiatry. 2018;9(591).
96. Taylor Miller P, Sinclair M, Gillen P, McCullough J, Miller P, Farrell D, et al. Early psychological interventions for prevention and treatment of post-traumatic stress disorder (PTSD) and post-traumatic stress symptoms in post-partum women: A systematic review and meta-analysis. Plos one. 2021;16(11):e0258170.
97. Excellence NIoC. Antenatal and postnatal mental health: clinical management and service guidance. CG192. 2014.
98. Roberts NP, Kitchiner NJ, Kenardy J, Lewis CE, Bisson JI. Early psychological intervention following recent trauma: A systematic review and meta-analysis. Eur J Psychotraumatol. 2019;10(1):1695486.
99. Martin A, Naunton M, Kosari S, Peterson G, Thomas J, Christenson JK. Treatment guidelines for PTSD: a systematic review. Journal of Clinical Medicine. 2021;10(18):4175.
100. Stein DJ, Ipser JC, Seedat S, Sager C, Amos T. Pharmacotherapy for post traumatic stress disorder (PTSD). Cochrane database of systematic reviews. 2006(1).
101. Davidson J, Baldwin D, Stein DJ, Kuper E, Benattia I, Ahmed S, et al. Treatment of posttraumatic stress disorder with venlafaxine extended release: a 6-month randomized controlled trial. Archives of general psychiatry. 2006;63(10):1158-65.
102. Davidson J, Rothbaum BO, Tucker P, Asnis G, Benattia I, Musgnung JJ. Venlafaxine extended release in posttraumatic stress disorder: a sertraline-and placebo-controlled study. Journal of clinical psychopharmacology. 2006;26(3):259-67.

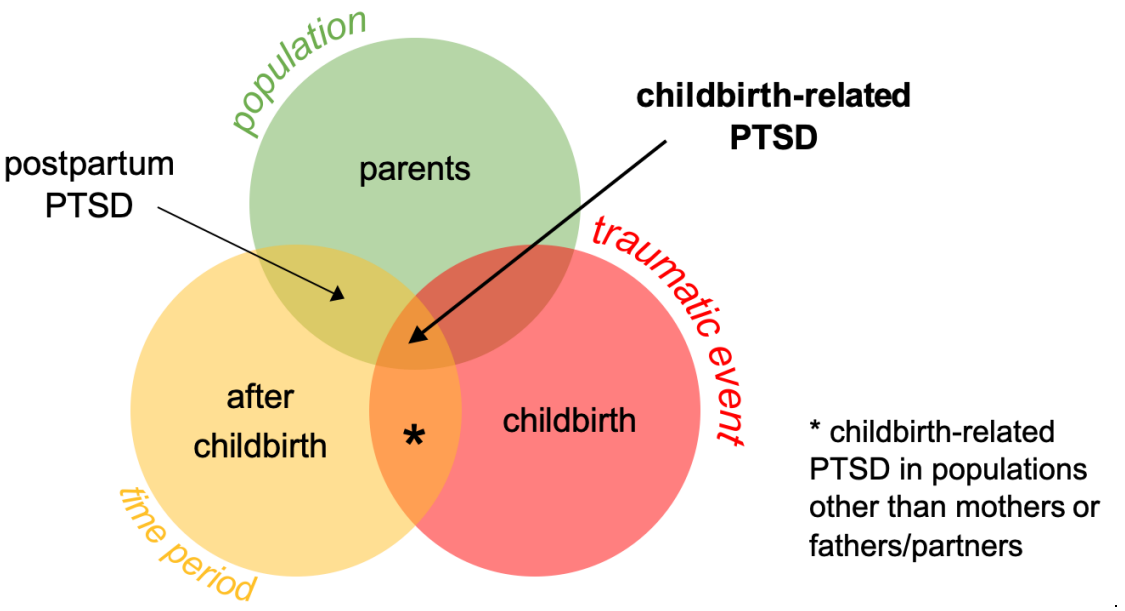
103. Khachatryan D, Groll D, Booij L, Sepehry AA, Schuetz CG. Prazosin for treating sleep disturbances in adults with posttraumatic stress disorder: a systematic review and meta-analysis of randomized controlled trials. General hospital psychiatry. 2016;39:46-52.
104. de Bruijn L, Stramrood CA, Lambregtse-van den Berg MP, Rius Ottenheim N. Treatment of posttraumatic stress disorder following childbirth. Journal of Psychosomatic Obstetrics & Gynecology. 2019:1-10.
105. Ayers S HA, Garthus-Niegel S, Nieuwenhuijze M, Bogaerts A, Hartmann K, Karlsdottir SI, Oosterman M, Tecirli G, Turner JD, Lalor J. Traumatic birth and childbirth-related post-traumatic stress disorder: Recommendations for practice, policy and research. under review.
106. England N. Supporting mental healthcare in a maternity and neonatal setting: Good practice guide and case studies: NHS England; 2021 [Available from: https://www.england.nhs.uk/publication/supporting-mental-healthcare-in-a-maternity-and-neonatal-setting-good-practice-guide-and-case-studies/.
107. Gynaecologie NVvO. RICHTLIJN: Bevallingsgerelateerde posttraumatische-stressstoornis (PTSS) en posttraumatische-stressstoornisklachten (PTSSklachten) 2019 [Available from: https://www.nvog.nl/wp-content/uploads/2019/11/Bevallingsgerelateerde-posttraumatische-stressstoornis-PTSS-en-posttraumatische-stressstoornisklachten-PTSS-klachten.pdf.
108. National Collaborating Centre for Mental H. National Institute for Health and Clinical Excellence: Guidance. Post-Traumatic Stress Disorder: The Management of PTSD in Adults and Children in Primary and Secondary Care. Leicester (UK): Gaskell
The Royal College of Psychiatrists & The British Psychological Society.; 2005.

Table 1. Diagnostic criteria for posttraumatic stress disorder (12, 53)

Posttraumatic stress disorder (PTSD)	
DSM-5 (2013)	**ICD-11 (2018)**
A. Exposure to actual or threatened death, serious injury, or sexual violence	• Exposure to an extremely thratening or horrific event or series of events
B. Intrusions (at least one symptom)	• **Re-experiencing**
C. Avoidance (at least one symptom)	• **Avoidance**
D. Changes in cognition and mood (at least two symptoms)	
E. Arousal & reactivity (at least two symptoms)	• **Persistent perception of heightened current threat**
F. Duration more than 1 month	• Must last for at least several weeks
G. Clinically significant distress or impairment of function	• Significant impairment in personal, family, social, educational, occupational, or other important areas of functioning
H. Due to event, not due to physiological effects of a substance or medical condition	

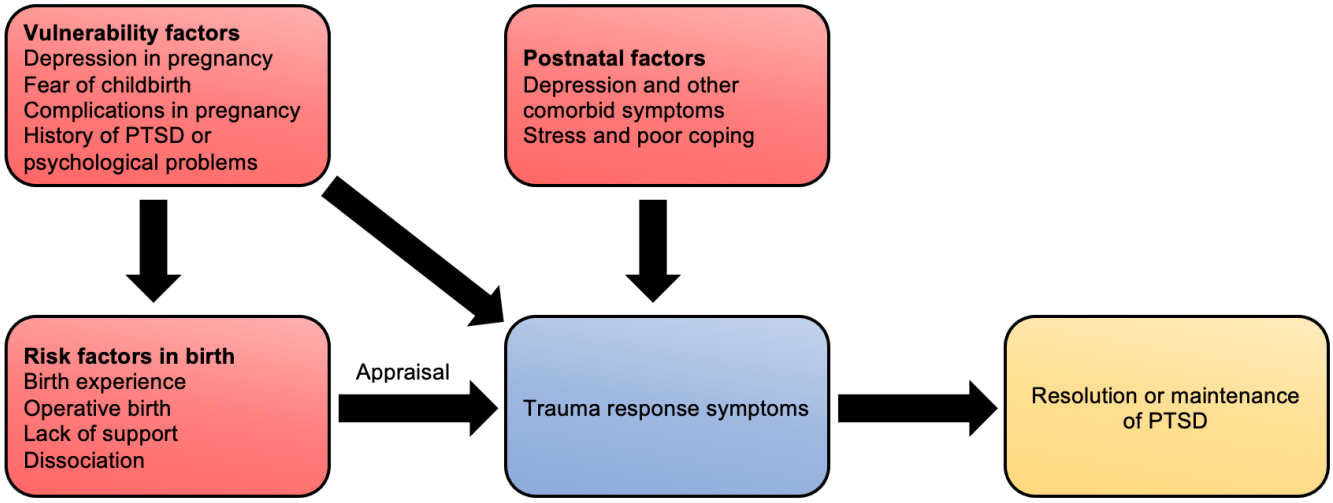
* DSM - Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
* ICD - International Classification of Diseases
Note: **B. Intrusions** are recurrent, involuntary, and intrusive distressing memories of the traumatic event or recurrent distressing dreams in which the content and/or affect of the dream are related to the traumatic event or dissociative reactions (e.g., flashbacks) in which the individual feels or acts as if the traumatic event were recurring or intense or prolonged psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event or marked physiological reactions to internal or external cues that symbolize or resemble an aspect of the traumatic event. **C. Avoidance** or efforts to avoid distressing memories, thoughts, or feelings about or closely associated with the traumatic event or external reminders that arouse distressing memories, thoughts, or feelings about or closely associated with the traumatic event. **D. Inability** to remember an important aspect of the traumatic event or persistent and exaggerated negative beliefs or expectations about oneself, others, or the world or Persistent, distorted cognitions about the cause or consequences of the traumatic event that lead the individual to blame himself/herself or others or persistent negative emotional state or markedly diminished interest or participation in significant activities or feelings of detachment or estrangement from others or persistent inability to experience positive emotions. **E. Irritable behavior** and angry outbursts or reckless or self-destructive behavior or hypervigilance or exaggerated startle response or problems with concentration or sleep disturbance.
Figure 1. Postpartum posttraumatic stress disorder and childbirth-related posttraumatic stress disorder

(13)



Adapted and reproduced with permission from Heyne CS, Kazmierczak M, Souday R, Horesh D, Lambregtse-van den Berg M, Weigl T, Horsch A, Oosterman M, Dikmen-Yildiz P, Garthus-Niegel S. Prevalence and risk factors of birth-related posttraumatic stress among parents: A comparative systematic review and meta-analysis. Clin Psychol Rev. 2022 Jun;94:102157. (13)

Figure 2. Diathesis-stress model of childbirth-related posttraumatic stress disorder (PTSD) (69)



Adapted and reproduced with permission from Ayers S, Bond R, Bertullies S, Wijma K. The aetiology of post-traumatic stress following childbirth: a meta-analysis and theoretical framework. Psychol Med. 2016 Apr;46(6):1121-34. (69)

Figure 3. Schematic representation of a hair follicle of which the scalp-near hair segment is used for hair analysis to quantify levels of glucocorticoid hormones and endocannabinoid ligands

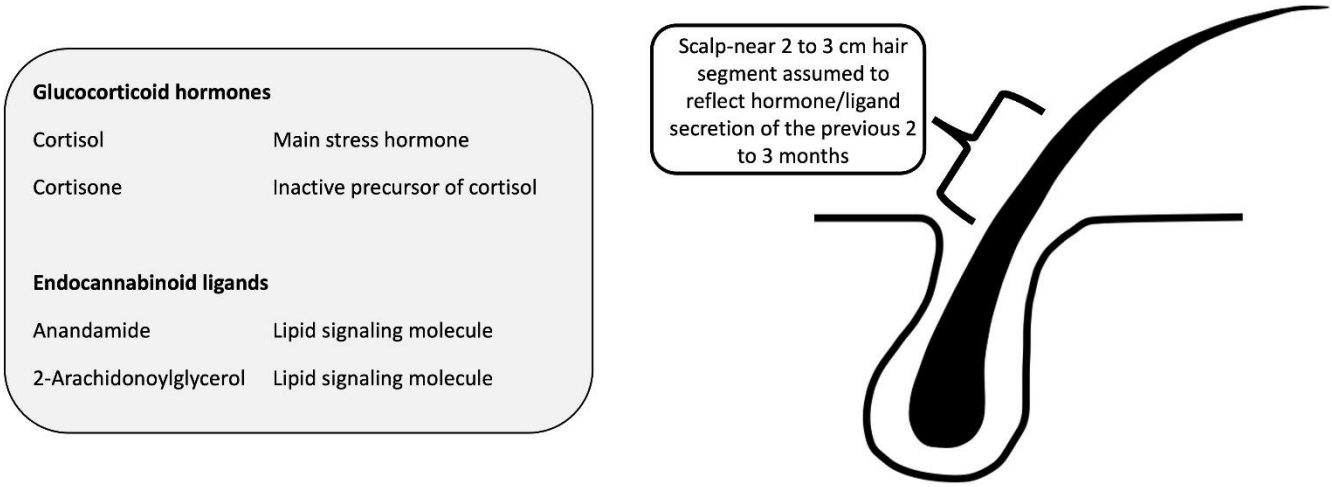
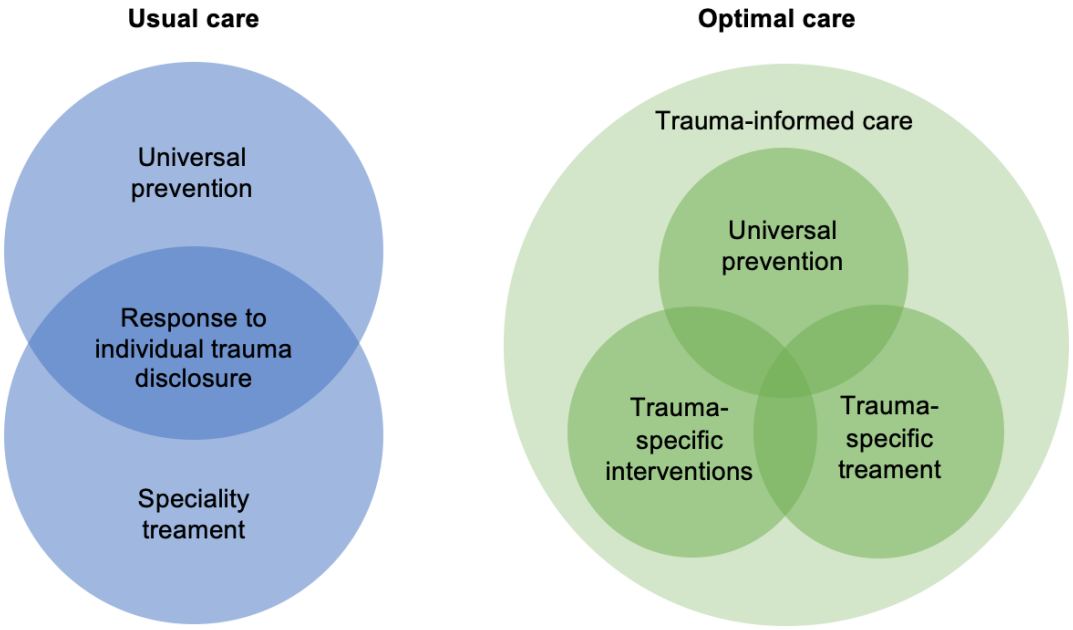


Figure 4. Trauma-informed care



Adapted and reproduced with permission from J. Seng & J. Taylor (Eds), Protecting Children and Young People: Trauma-Informed Care in the Perinatal Period. 2015. Edinburgh & London: Dunedin Academic Press.