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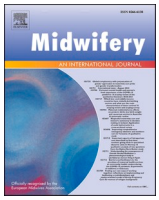

Validation of the City Birth Trauma Scale to assess post-traumatic stress symptoms in maternity staff

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ABSTRACT

Background: Each year, 295,000 women die from pregnancy or childbirth complications, with many more women and babies experiencing severe complications. Maternity staff are often exposed to these events and can develop post-traumatic stress symptoms or disorder (PTSD). However, there are currently no tools to specifically identify and assess birth-related PTSD in maternity staff. This study therefore adapted and validated the City Birth Trauma Scale (City BiTS) for this purpose.

Method: The City BiTS (Maternity staff) was completed by 396 maternity health professionals recruited in three waves between 2016 and 2023. Participants reported their experiences with traumatic birth events and completed the scale to assess PTSD symptoms. Psychometric analyses were used to determine internal consistency, factor structure, and construct validity.

Results: Over half of participants had witnessed severe injuries (55.9 %) or deaths (41.4 %), and 30.7 % met PTSD diagnostic criteria (95 % CI 26.2 - 35.5). The scale demonstrated good internal consistency ($\alpha = 0.95$) and construct validity. PTSD symptoms were associated with greater perceived trauma (*rho* 0.37, $p<.001$), poorer coping (-0.30., $p<.001$), and symptoms were greater after births involving maternal or infant deaths (Mann-Whitney U 18,609, $p = .05$). Both 2-factor and 3-factor structures were supported, with the main subscale of *Birth-related symptoms* accounting for most variance (53.82 %) in both analyses. Remaining items either grouped into one subscale of *General symptoms* (fixed 2-factor model) or split into *Hyperarousal* and *Anhedonia & detachment* subscales (3-factor model).

Conclusion: Traumatic births have a significant psychological impact on maternity staff. The adapted City BiTS (Maternity staff) shows promise for identifying PTSD symptoms in this group, though further refinement of its factor structure is recommended.

Introduction

Each year, around 295,000 women die due to complications in pregnancy or childbirth, and 5 million babies are stillborn or die in the first month after birth (World Health Organisation 2025). Up to 30 times more women and infants experience severe complications and morbidity, such as shoulder dystocia, haemorrhage, stillbirth, or neonatal resuscitation (World Health Organisation 2025; Heitkamp et al., 2021; Tunçalp et al., 2012). Complicated and traumatic births can have a negative impact on maternity staff who provide care, especially when maternal or infant deaths occur. Research shows approximately 85 % of midwives and obstetricians have been exposed to a traumatic birth at work (Schrøder et al., 2016), with midwives likely to attend as many as 60 traumatic births per year (Patterson, 2019). Regular exposure to traumatic events can lead to symptoms of post-traumatic stress disorder (PTSD) in maternity staff (Kendall-Tackett and Beck, 2022). PTSD symptoms include repeated re-living of the event, avoidance of trauma-related stimuli, negative changes in mood and cognition, and hypervigilance (American Psychiatric Association 2022). A systematic review of the perceived impact of witnessing traumatic births on

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maternity staff found a wide range of PTSD prevalence across studies, with between 3.1 % and 46 % of staff meeting criteria for PTSD (Uddin et al., 2022).

In the aftermath of a traumatic birth, common feelings reported by maternity staff include regret and horror, responsibility for what happened and flashbacks to the event, agonising over what they could have done differently to change the outcome, avoiding similar situations by moving roles to a different clinical area, and considering leaving their profession altogether (Kendall-Tackett and Beck, 2022; Uddin et al., 2022; Beck and Gable, 2012; Cavanagh et al., 2020). Midwives reported that exposure to traumatic events can shift their perspective on childbirth, leading to hypervigilance in practice and changes in how they deliver care to patients (Minooee et al., 2021).

Following attendance at a traumatic birth, maternity staff are often expected to show high levels of resilience and may not seek adequate support, preferring to rely on friends and peers rather than official support systems such as chaplains or hospital counselling services (Schrøder et al., 2019). Midwives report feeling bruised and battered or needing to "wear armour to protect their soul" (Bingham et al., 2023). Good support during and after traumatic events can make a significant difference to maternity staff's well-being and ability to cope, and therefore their ability to carry on in their jobs (Kendall-Tackett and Beck, 2022). However, maternity staff report little to no support in the aftermath of traumatic events, with lack of support, lack of access to mental health services, poor debrief sessions and suboptimal workplace culture all contributing to higher levels of burnout and PTSD symptoms (Uddin et al., 2022; Xu et al., 2023). A systematic review of midwives' experiences of birth trauma suggests that support offered to them following a traumatic event is patchy and dependent on who is on shift that day (Aydın and Aktaş, 2021).

When maternity staff suffer from PTSD and related conditions, such as burnout or moral injury, it has a negative impact on them, their families, the maternity service and the healthcare organisation they work in. This is recognised by professional organisations such as the United Kingdom's (UK) Royal College of Obstetricians and Gynaecologists who recommend that "*each organisation delivering maternity and/or gynaecology services should commit to a programme to prevent and provide early intervention for work-related PTSS in all staff members.*" (p.4) in their good-practice guide to preventing and treating PTSD symptoms in maternity staff (Royal College of Obstetricians and Gynaecologists 2024).

It is therefore important to be able to identify those staff affected and offer them appropriate support. However, identification of staff is hindered by the fact that there is no validated tool to assess work-related PTSD in maternity staff. This means identification relies on either the staff member seeking help or on individual clinical assessments which are time consuming and costly. The lack of an assessment tool makes it harder to accurately determine what proportion of the maternity workforce have symptoms of PTSD due to events they were exposed to at work, and therefore makes planning and targeting support services difficult.

A promising tool that could provide a solution is the City Birth Trauma Scale (City BiTS) (Ayers et al., 2018). This scale was originally developed to assess psychological birth trauma and PTSD symptoms in postpartum women (Ayers et al., 2018) and later adapted for use with fathers/birth partners (Webb et al., 2021). It assesses both PTSD symptoms and diagnostic PTSD and has been translated and validated in multiple languages (Caparros-Gonzalez et al., 2021; Handelzalts et al., 2018; Nakić Radoš et al., 2020; Fameli et al., 2023; Sandoz et al., 2021; Osório et al., 2022; Riklikienė et al., 2024; Stén et al., 2023). A recent review of assessment tools recommended it as "a credible tool for assessing psychological birth trauma in clinical practice and research" (Chen et al., 2024).

This study therefore aimed to adapt and validate the City Birth Trauma Scale (City BiTS) to assess PTSD symptoms in maternity staff. Providing a reliable and valid tool to assess PTSD in maternity staff will enable services to quickly identify those who need support after traumatic birth events, and therein inform clinical practice and policies.

Methods

Design

A psychometric study to adapt and assess the reliability and validity of the City Birth Trauma Scale (Maternity staff) using a cross-sectional survey.

Participants

Participants were eligible for the study if they were a health professional working in maternity services in the previous 12 months; were 18 years and older; and had enough fluency with English to understand and respond to the questions. A total of 464 people consented to take part in the study and 396 completed the survey (85 %). Data were collected in three waves: October 2016 to January 2017 ($n = 173$); July 2019 to December 2019 ($n = 105$); and April 2023 to August 2023 ($n = 118$).

Measures

The **City Birth Trauma Scale** measures PTSD according to DSM-5 criteria, specifying the index stressor as a traumatic birth. The original scale contains 29 items which measure the stressor characteristics (Criterion A), symptoms of re-experiencing (Criterion B), avoidance (Criterion C), hyperarousal (Criterion D), and negative cognitions and mood (Criterion E). Items measuring symptoms B to E are shown in Tables 3 and 4. Symptoms are rated for frequency over the last week from 0 ('not at all'), 1 ('once'), 2 ('2–4 times'), or 3 ('5 or more times'). Total symptom scores for Criteria B to E range from 0 to 60. The scale is available via www.citybirthtraumascale.com.

Psychometric validation studies suggest the scale has two subscales of Birth-Related symptoms (intrusions, avoidance) and General Symptoms (hyperarousal, negative cognitions and mood). To meet DSM-5 diagnostic criteria for PTSD, participants have to report a minimum of one re-experiencing symptom, one avoidance symptoms, two symptoms of negative cognitions and mood, and two hyperarousal symptoms at least once in the last week (i.e. a score of 1 or more). Distress and impairment were rated as yes/no/sometimes and coded as present if participants stated yes or sometimes. Duration criteria were that symptoms had to be experienced for at least one month.

Details of the traumatic event: Participants were asked how long ago the index traumatic birth event happened, how traumatic they found the event, how well they felt they coped with the event and how well supported they were during and after the event, if they had sought professional help for their symptoms, and if they currently wanted professional help. There was an opportunity at the end of the survey for participants to provide details about the traumatic event in a free text box if they wished to do so.

Sociodemographic (age, ethnicity and gender) and **occupational** information (job role, length of time in practice and setting in which they work) were included as optional for participants to complete.

Procedure

The City BiTS was adapted for use with maternity staff by a senior midwife (JB) and psychologist who developed the original City BiTS scale (SA). Adaptations were made so the instructions were relevant to maternity staff. Items for stressor criteria A were adapted to ask whether staff thought the "woman or her baby" might be seriously injured or die. Two extra items were added to ask whether the woman or her baby were actually injured or died. All items measuring PTSD symptoms and other criteria remained the same. The adapted version was then reviewed by an advisory group of five midwives to check for face validity, content validity and ease of comprehension. Feedback from the advisory group resulted in minor revisions to the wording of some of the instructions. The final City BiTS (Maternity staff) is provided in supplementary materials and is available via www.citybirthtraumascale.com.

The City BiTS (Maternity staff) and other questions were put online via survey platform Qualtrics (Qualtrics, 2023). Participants were recruited though clinical contacts, social media (e.g. Facebook, Twitter), and snowball techniques. Recruitment was specifically targeted at health professionals working in maternity services (e.g. midwives, obstetricians). Consent to advertise the survey on Facebook pages or other websites was obtained from moderators and research officers of each organisation or website prior to posting adverts and hyperlinks to the survey.

Participants interested in taking part were given information about the study and asked to confirm they were 18 years or older. They were asked to indicate their consent to take part in the study. Participation was completely voluntary and data were anonymous unless participants chose to give their email address to receive their assessment scores and/or a summary of the study results. At the end of the survey, participants were provided with a list of organisations that provide support and advice, as well as an email address for the research team if they had questions about the research.

Ethics

Ethical approval was granted by City, University of London, School of Health and Psychological Sciences Research Ethics Committee (ETH2223–1378).

Statistical analysis

Analyses were conducted using the statistics software SPSS Version 28 for Windows (IBM 2024). Descriptive statistics were calculated for all items in the scale. The sum of items in the symptom subscales (B, C, D and E) was calculated to obtain scores for re-experiencing, avoidance, negative cognitions and mood, and hyperarousal symptom subscales. Total PTSD symptom scores were also calculated. Responses to stressor criteria and questions about the onset of symptoms, duration, distress and impairment were examined individually. Reliability was examined using Cronbach's alpha, which estimates how well the set of questions measures a single overall construct. Psychometric validity was examined using exploratory maximum likelihood factor analysis because we were adapting the scale and applying it to a different population, so confirmatory factor analysis was not appropriate. Readability of the scale was determined using the Flesch readability scale and years of formal education required using the Gunning Fog index. Missing data were dealt with on a pairwise basis in analyses.

Results

Sample characteristics

Participants ranged in age from 20 to 62 years (M = 39.92, SD = 10.71). The majority of healthcare professionals were midwives (76.3 %), female (93.7 %) and of white ethnicity (85.0 %). Most worked in the UK (94 %) in acute inpatient services (77.3 %). Years of practice ranged from <1 year to >10 years, with the largest proportion of participants having 10 or more years of experience (47.9 %) (see Table 1)

Table 1
Sample characteristics.

	N (%) [a]
Ethnicity	Total N = 253
White	215 (85.0)
Asian	8 (3.2)
Mixed or multiple ethnic groups	11 (4.3)
Black/African/Caribbean	15 (5.9)
Other	4 (1.6)
Gender	Total N = 253
Male	14 (5.5)
Female	237 (93.7)
Prefer to self-describe	2 (0.8)
Job Role	Total N = 384
Midwife	293 (76.3)
Maternity support worker	9 (2.3)
Obstetrician	52 (13.5)
Obstetric anaesthetist	7 (1.8)
Theatre staff	7 (1.8)
Other	16 (4.2)
Years of practice	Total N = 385
< 1 year	15 (3.9)
1–5 years	102 (26.5)
6–10 years	84 (21.8)
10+ years	184 (47.8)
Work in the UK	Total N = 383
Yes	360 (94.0)
Work in acute inpatient services	Total N = 384
Yes	297 (77.3)

[a] questions on participants characteristics were optional so missing data means n ranges from 252 to 389.

Differences between data collection waves

Comparison of PTSD in each data collection wave indicated that PTSD symptoms increased significantly over time (Kruskall Wallis 17.23, df 2, p<.001, n = 373). Pairwise comparisons showed these differences were due to the sample in 2016/17 having significantly lower PTSD symptoms than samples recruited in 2019 and 2023. Samples did not differ in age, gender, or how long ago the traumatic birth event happened. However, samples differed in ethnicity with the sample in 2016/17 having a greater proportion of participants from Black/African Caribbean or mixed/multiple ethnic groups than more recent waves (χ^2 = 15.88, df 6, p=.014, n = 249). Years of practice also differed, with the sample in 2023 having fewer years of practice than samples in earlier waves (F(2450)=6.05, p=.003, n = 453).

Traumatic event exposure

Traumatic events reported by participants in the free text (n = 258) included maternal deaths, infant deaths (intrauterine death, stillbirth, neonatal death) and severe complications such as severe postpartum haemorrhage, shoulder dystocia, impacted fetal head, undiagnosed breech birth, cardiac arrest, stroke, liver failure, or emergencies during homebirths. The proportion of the sample reporting traumatic events is shown in Table 2. This shows that 73.4 % of participants believed the woman or infant was at risk of severe injury during the event, and 55.9 % reported that severe injury did occur. Similarly, 57.3 % feared the woman or baby might die, and 41.4 % of participants reported that death did occur. For over half of participants (58.2 %) the traumatic event happened more than one year previously.

PTSD symptoms and prevalence

Total PTSD symptoms ranged from 0 to 60 with a mean of 19.13 (SD

Table 2
Proportion of the sample reporting traumatic stressors and PTSD.

DSM5 PTSD criteria	N	N (%)	95 % CI
Criterion A			
Did you believe the woman or her baby would be seriously injured?	391	287 (73.4)	68.7 – 77.7
Did you believe the woman or her baby would die?	391	224 (57.3)	52.2 – 62.3
Was the woman or her baby seriously injured?	390	218 (55.9)	50.8 – 60.9
Did the woman or her baby die?	391	162 (41.4)	36.5 – 46.5
Total – perceived threat	391	301 (77.0)	72.5 – 81.1
Symptoms			
Total – actual threat	389	247 (63.5)	58.5 – 68.3
Criterion B (*Re*-experiencing)	391	350 (89.5)	86.0 – 92.4
Criterion C (Avoidance)	391	263 (67.3)	62.4 – 71.9
Criterion D (Negative cognitions and mood)	385	321 (83.4)	79.3 – 87.0
Criterion E (Hyperarousal)	384	316 (82.3)	78.1 – 86.0
Criterion F (Duration)	380	202 (53.2)	48.0 – 58.3
Criterion G (Distress or impairment)	369	238 (64.5)	59.4 – 69.4
PTSD Diagnosis			
PTSD cases	391	120 (30.7)	26.2 – 35.5
Possible PTSD exclusion criteria met	371	20 (5.4)	3.3 – 8.2
PTSD after excluding possible differential diagnoses	391	100 (25.6)	21.3 – 30.2
Onset and duration of symptoms			
Time since the event(s)	390		
<6 months		101 (25.9)	
6 months to 1 year		62 (15.9)	
Over 1 year		227 (58.2)	
Onset of symptoms	383		
Before the event		52 (13.6)	
First six months after the event		191 (49.9)	
More than six months after the event		86 (22.5)	
Not applicable (no symptoms)		54 (14.1)	
Duration	381		
<1 month		73 (19.2)	
1–3 months		87 (22.8)	
>3 months		116 (30.4)	
Not applicable (no symptoms)		105 (27.6)	

= 14.95; IQR: 6.00 - 29.00). The majority of healthcare professionals reported at least one symptom (n = 371, 95.37 %). The number of participants who met criteria for a PTSD diagnosis is shown in Table 2. Almost a third of healthcare professionals (30.7 %; 95 % CI 26.2, 35.5) fulfilled diagnostic criteria for PTSD. Twenty of these indicated their PTSD symptoms might be due to medication, alcohol, drugs or physical illness. Excluding these participants gave an adjusted prevalence of 25.6 % (95 % CI 21.3, 30.2) of participants having PTSD.

The majority of healthcare professionals reported that the traumatic birth happened over a year ago (58.2 %) and their symptoms started in the first 6 months after the event (49.9 %). Symptom duration varied, with 19.2 % of the sample reporting symptoms for less than one month, and 30.4 % reporting symptoms for >3 months. When analysis were restricted only to health professionals who reported symptoms, 42.0 % had symptoms lasting >3 months.

Psychometric validity

Two factor analyses were run: (1) an exploratory analysis without the number of factors specified; and (2) an analysis with two factors specified to explore whether the 2-factor-structure found in other versions of the City BiTS (Caparros-Gonzalez et al., 2021; Handelzalts et al., 2018; Nakić Radoš et al., 2020; Fameli et al., 2023; Sandoz et al., 2021; Osório et al., 2022; Riklikienė et al., 2024; Stén et al., 2023) was a good fit. Statistical checks confirmed the sample was adequate for factor analysis (Kaiser-Meyer-Olkin measure = 0.945) and correlations between questions were suitably large (Bartlett's test of sphericity, $\chi^2(190) = 5856.68$, $p < .001$). Maximum likelihood factor analysis with varimax rotation was used.

The first analysis identified three factors with eigenvalues over 1 that accounted for 60.62 % of the variance. The first factor of *Birth-related symptoms* (10-items, 53.82 % of the variance) was the largest, and clearly after the point of inflection on the scree plot (Fig. 1). This factor included symptoms of intrusions about the event, avoidance of the event, and some negative cognitions about the event. The second factor broadly related to symptoms of *Anhedonia and detachment* (4-items, 8.18 % of the variance); and the third factor to symptoms of *Hyperarousal* (5-items, 5.19 % of the variance). Item loadings from the rotated factor matrix are shown in Table 3. This shows that one item did not load clearly on any factor (*not able to remember details of the birth)*, and 5 items cross-loaded on more than one factor at ≥.4. Fit indices show the 3-factor model was adequate (χ^2 = 559.39, df 133, p=.000).

Factor analysis was re-run with rotation restricted to two factors to determine whether this provided a better fit (Table 4). Results replicated the structure found in other versions of the City BiTS (Caparros-Gonzalez et al., 2021; Handelzalts et al., 2018; Nakić Radoš et al., 2020; Fameli et al., 2023; Sandoz et al., 2021; Osório et al., 2022; Riklikienė et al., 2024; Stén et al., 2023) and the two factors accounted for 62 % of the variance. The first factor reflected *Birth-related symptoms* (9 items, 53.82 % of the variance) and the second factor reflects *General symptoms* (10 items, 8.18 % of the variance). Similar to the previous analysis, the item *not able to remember details of the birth* did not load clearly on any factor. Fewer items cross-loaded in this analysis and fit indices show the 2-factor model was also adequate (χ^2 = 746.29, df 151, p=.000).

Internal consistency

Symptom subscales and total symptoms had good internal consistency with Cronbach's alphas above the acceptable level of 0.7: *Total scale* α = 0.95 (n = 373), *Birth-related symptoms* α = 0.93 (n = 384) and *General symptoms* α = 0.93 (n = 381). Cronbach's alphas were also

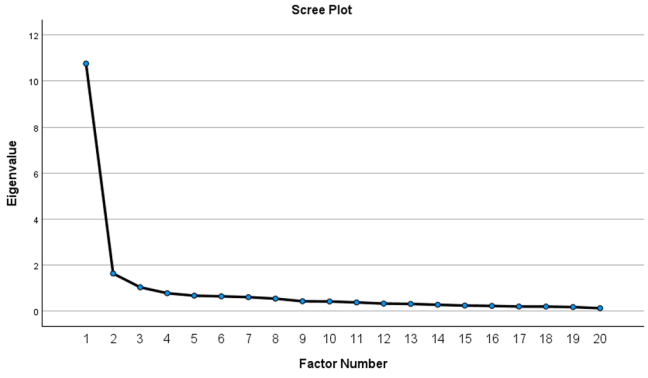

Fig. 1. Exploratory factor analysis scree plot of eigenvalues.

Table 3
Three-factor structure of the City BiTS (Maternity staff).

		Factor 1. Birth-related	Factor 2. Anhedonia	Factor 3. Hyperarousal
B	Intrusions			
3	Recurrent or unwanted memories of the birth that you can't control	0.73		
4	Bad dreams or nightmares about the birth	0.57		
5	Flashbacks to the birth and/or reliving the experience	0.69		
6	Getting upset when reminded of the birth	0.75		
7	Feeling tense or anxious when reminded of the birth	0.76		
C	Avoidance			
8	Trying to avoid thinking about the birth	0.69		
9	Trying to avoid things that remind me of the birth	0.53		
D	Negative mood and cognitions			
10	Not being able to remember details of the birth			
11	Blaming myself or others for what happened during the birth	0.63		
12	Feeling strong negative emotions about the birth	0.77		
13	Feeling negative about myself or thinking something awful will happen	0.54	0.45	0.40
14	Lost interest in activities that were important to me		0.86	
15	Feeling detached from other people		0.75	
16	Not being able to feel positive emotions		0.75	
E	Hyperarousal			
17	Feeling irritable or aggressive		0.45	0.53
18	Feeling self-destructive or acting recklessly		0.49	
19	Feeling tense and on edge	0.46		0.66
20	Feeling jumpy or easily startled			0.64
21	Problems concentrating		0.45	0.60
22	Not sleeping well	0.44		0.47
	Total variance explained	53.82	8.18	5.19

acceptable for the 3-factor subscales *Anhedonia and detachment* (α = 0.89, $n = 389$) and *Hyperarousal* (α = 0.85, $n = 386$). Removing items from the total scale or subscales did not improve the Cronbach's alpha.

Readability

The Flesch readability scale indicated that the City BiTS (Maternity staff) has a reading ease score of 57.2 meaning it should be easily understood by people aged 16–17 years and older. The number of years of formal education required to easily read the scale was 7.88 years (Gunning Fog index).

Construct validity

Construct validity was examined by looking at associations between the City BiTS (Maternity staff) and other variables or known-groups. PTSD symptoms were significantly associated with maternity staff rating the birth event they experienced as more traumatic (Spearman's *rho* 0.37, $p<.001$, $n = 219$) and negatively correlated with how well maternity staff thought they coped with the event (*rho* −0.30., $p<.001$, $n = 216$). There was a small correlation between PTSD symptoms and how supported staff were after the event (*rho 0*.14, $p = .46$, $n = 218$).

Table 4
Two-factor structure of the City BiTS (Maternity staff).

		Factor 1. Birth-related symptoms	Factor 2. General symptoms
B	Intrusions		
3	Recurrent or unwanted memories of the birth that you can't control	0.76	
4	Bad dreams or nightmares about the birth	0.58	
5	Flashbacks to the birth and/or reliving the experience	0.72	
6	Getting upset when reminded of the birth	0.75	
7	Feeling tense or anxious when reminded of the birth	0.77	
C	Avoidance		
8	Trying to avoid thinking about the birth	0.69	
9	Trying to avoid things that remind me of the birth	0.54	
D	Negative mood and cognitions		
10	Not being able to remember details of the birth		
11	Blaming myself or others for what happened during the birth	0.62	
12	Feeling strong negative emotions about the birth	0.77	
13	Feeling negative about myself or thinking something awful will happen	0.56	0.58
14	Lost interest in activities that were important to me		0.82
15	Feeling detached from other people		0.80
16	Not being able to feel positive emotions		0.84
E	Hyperarousal		
17	Feeling irritable or aggressive		0.65
18	Feeling self-destructive or acting recklessly		0.58
19	Feeling tense and on edge	0.55	0.60
20	Feeling jumpy or easily startled		0.63
21	Problems concentrating		0.66
22	Not sleeping well	0.50	0.52
	Total variance explained	53.82	8.18

Known group analyses showed that events in which a woman or baby died resulted in greater total PTSD symptoms than those where the woman or baby survived (Mann-Whitney U 18,609, $p = .055$, $n = 370$). PTSD symptoms were not associated with years of practice, how supported participants were during the event, time since the event, age or gender. There were significant differences between participants from different ethnic groups (Kruskal-Wallis (df 3) 9.23, $p = .026$, $n = 237$). Pairwise comparisons showed this was due to participants with Black/African/Caribbean ethnicity having lower PTSD symptoms than those from white or mixed ethnic backgrounds.

Very few participants received professional help or treatment ($n = 46$, 12.4 % yes) and there were no differences in PTSD symptoms between those who received professional help or not (Kruskal-Wallis (df 2) 2.662, p=.264, $n = 355$).

Discussion

This study highlights the extent of exposure to traumatic birth experienced by health professionals working in maternity services. Findings suggest over half witnessed severe injury (55.9 %) or death (41.4 %) of women or infants during their work. Free text comments suggest some participants were repeatedly exposed to traumatic events. Between a quarter and a third of maternity staff in this sample met

diagnostic criteria for PTSD – 30.7 % in total, and 25.6 % once possible exclusion factors were applied. This prevalence is within the range of previous estimates of 3.1 to 46 % (Uddin et al., 2022), and underlines the importance of recognising trauma in maternity staff and providing effective support to staff after traumatic incidents (Xu et al., 2023; Aydın and Aktaş, 2021).

The City BiTS (Maternity staff) provides a tool with which staff with PTSD symptoms can be identified and provided with targeted support if needed. Psychometric analyses of the scale confirm the scale has good readability, internal consistency and construct validity. However, the factor structure requires further examination. Both the 2-factor and 3-factor solutions were a good fit to the data. The 2-factor solution of *Birth-related symptoms* and *General symptoms* is consistent with other versions of the City BiTS, which makes it simpler to administer and score for people already working with existing versions for women and fathers/birth partners. It also had greater internal consistency.

The issue is therefore whether other items on the scale should be totaled to form one subscale of *General symptoms* or separated into two subscales of *Hyperarousal* and *Anhedonia & detachment.* There are pros and cons to both approaches. The former is consistent with other versions of the City BiTS. However, it is plausible that birth trauma is fundamentally different for healthcare professionals. During the traumatic birth the threat of harm is to the woman or infant, not directly to staff. However, maternity staff have the responsibility of care for that woman and infant so are directly involved in a different way. This is reflected in research showing that maternity staff respond to traumatic births with regret and horror, feelings of responsibility for what happened, and agonise over what they could have done differently (Kendall-Tackett and Beck, 2022; Uddin et al., 2022; Beck and Gable, 2012; Cavanagh et al., 2020).

Given these differences, it is possible that symptoms of birth-related PTSD manifest differently in health professionals. The 3-factor solution of *Birth-related symptoms, Hyperarousal*, and *Anhedonia & detachment* is consistent with some previous research. The subscale of *Hyperarousal* is consistent with qualitative research suggesting traumatic births result in midwives becoming hypervigilant in their practice and changing how they deliver care to patients. (Minooee et al., 2021) The subscale of *Anhedonia & detachment* reflects loss of interest and pleasure in things that used to provide pleasure, feeling detached from other people and acting in a self-destructive way. This may reflect elements of depression, as anhedonia is a key symptom of depression. It may also be due to overlap with moral injury, which can occur in healthcare situations when staff are unable to provide ethically correct or effective care (British Medical Association 2021) so may occur after births where this is involved. Moral injury is associated with psychological distress, increased thoughts of self-harm, and mental illnesses such as PTSD and depression (British Medical Association 2021; Rabin et al., 2023).

Further research and exploration is therefore required to determine the best factor structure and subscales, and possible overlap with moral injury and depression. Regardless of whether the 2- or 3-factor-structure is used, the *Birth-related symptoms* accounted for the most of the variance and the eigenvalue for *Birth-related symptoms* was clearly after the point of inflection in the 3-factor and 2-factor solution. Thus the *Birth-related symptoms* subscale is psychometrically robust in this population. Until further research is available we therefore recommend that the *Birth-related symptoms* subscale and/or the total score are used to provide valid and robust indices of birth-trauma and PTSD in maternity staff.

Strengths and limitations

This study is the first to adapt and test the City BiTS for maternity staff. In doing so, it provides an important tool to raise awareness of PTSD in maternity staff and identify those who need support after traumatic events in birth. This work can also inform clinical guidelines and policy, such as the good practice guide recently published by the Royal College of Obstetricians and Gynaecologists (Royal College of Obstetricians and Gynaecologists 2024). However, the sample was mostly recruited online so is unlikely to be representative of all maternity staff. Samples recruited online and through social media probably over-represent certain groups, such as those who have experienced distressing events. For example, prevalence estimates of birth-related PTSD in women have been found to be higher in online samples compared to samples recruited through community or healthcare settings (Ayers et al., 2009). Estimates of the prevalence of exposure to traumatic birth and PTSD in this study therefore need to be interpreted with caution. Similarly, the majority of this sample were midwives working in in-patient settings, so results may not be generalisable to other professional groups and settings.

Data were collected in three waves over a seven-year period so we cannot discount the possibility that some participants might have taken part in more than one wave, although this is unlikely to have occurred to an extent that it affected statistical findings. Changes in maternity services during the data collection period might mean results do not reflect current experiences of maternity staff. This is reflected in the greater PTSD symptoms observed in staff in more recent waves, which may have been due to changes in maternity services during and after the pandemic, or to differences in ethnicity between samples. Further research is therefore needed to determine whether findings are generalisable in terms of representativeness of the sample and the current maternity care context.

Clinical implications

This study has a number of clinical implications. The high prevalence of PTSD symptoms among maternity staff in this sample underscores the need for early identification of PTSD in the workforce, and the provision of support for staff following traumatic births. The City BiTS (Maternity staff) provides a validated tool for identifying PTSD symptoms in maternity staff that can be integrated into occupational health assessments and wellbeing initiatives. Further refinement of its factor structure will enhance its clinical utility, ensuring accurate identification of staff at risk and tailoring interventions accordingly.

Findings align with existing calls to improve maternity staff wellbeing, as highlighted in guidelines from organisations such as the Royal College of Obstetricians and Gynaecologists (Royal College of Obstetricians and Gynaecologists 2024). There are also implications for patient care and safety, as PTSD symptoms in maternity staff may impact on clinical decision-making and interactions with patients. Training on trauma-informed care is important for maternity staff, as is ensuring adequate support to prevent burnout and maintain high-quality, compassionate care.

Conclusion

This study highlights the significant psychological impact of traumatic births on maternity staff, with over half of staff in this sample witnessing severe injuries or deaths and nearly a third meeting PTSD diagnostic criteria. The adaptation of the City BiTS (Maternity staff) offers a promising tool for identifying PTSD in healthcare professionals working in maternity services, though further refinement of its factor structure is necessary. While the *Birth-related symptoms* subscale is robust, the distinction between *General symptoms* as a single subscale or divided into *Hyperarousal* and *Anhedonia & detachment* requires further research, and may reflect the unique nature of birth trauma in healthcare settings, where moral injury and depression may play a role. Despite limitations related to sampling and data collection over multiple waves, this study provides insights into the extent and impact of PTSD in maternity staff. Future research should focus on validating findings, refining the assessment tool structure, and ensuring targeted support is in place to address the psychological needs of maternity professionals involved in traumatic births.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used Chat GPT to assist in reducing the word count in some sections of the manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

CRediT authorship contribution statement

Alice McInnes: Writing – original draft, Writing – review & editing, Project administration, Data curation. **Janet Bradley:** Writing – review & editing, Project administration, Data curation. **Nazihah Uddin:** Writing – review & editing, Project administration, Data curation. **Ricardo Khine:** Writing – review & editing, Supervision. **Rebecca Webb:** Writing – review & editing, Supervision. **Susan Ayers:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Susan Ayers developed the original City Birth Trauma Scale for women. Susan Ayers and Rebecca Webb developed the version for fathers/birth partners.

All other authors have no competing interests.

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