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ARTICLE

Birth expectations, birth experiences and childbirth-related post-traumatic stress symptoms in mothers and birth companions: Dyadic investigation using response surface analysis

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Abstract

Objectives: During the perinatal period, women and their birth companions form expectations about childbirth. We aimed to examine whether a mismatch between birth expectations and experiences predict childbirth-related post-traumatic stress symptoms (CB-PTSS) for mothers and birth companions. We also explored the influence of the mismatch between mothers' and birth companions' expectations/experiences on CB-PTSS.

Design: Dyadic longitudinal data from the Self-Hypnosis IntraPartum Trial.

Methods: Participants ($n = 469$ mothers; $n = 358$ birth companions) completed questionnaires at 27 and 36 weeks of gestation and 2 and 6 weeks post-partum. We used the measures of birth expectations (36 weeks gestation), birth experiences (2 weeks post-partum) and CB-PTSS (6 weeks post-partum).

Results: Correlations revealed that birth expectations were associated with experiences for both mothers and birth companions but were not consistently associated with CB-PTSS. Birth experiences related to CB-PTSS for both mothers and birth companions. The response surface analysis results

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showed no support for the effect of a mismatch between expectations and experiences on CB-PTSS in mothers or birth companions. Similarly, a mismatch between mothers' and birth companions' expectations or experiences was unrelated to CB-PTSS.

Conclusions: Following previous literature, birth expectations were associated with experiences, and experiences were associated with CB-PTSS. By testing the effect of the match between birth experiences and expectations using an advanced statistical method, we found that experiences play a more substantial role than the match between experiences and expectations in CB-PTSS. The impact of birth experiences on CB-PTSS highlights the importance of respectful and supportive maternity care.

KEYWORDS

birth expectations, birth experiences, dyadic analysis, longitudinal data, post-traumatic stress symptoms, response surface analysis

INTRODUCTION

The perinatal period from pregnancy to 1 year post-partum can be not only a time of happiness and excitement but also a time of uncertainty and stress for women and their loved ones (Khajehei et al., 2020). It is also a time when expectations are formed about many aspects of pregnancy and childbirth. These include physiological aspects (e.g., nutritional needs and hygiene practices); psychological needs (e.g., empathy and support); informational needs (e.g., knowledge about the labour process); social and relational concerns (e.g., attitudes of health care professionals or presence of a birth companion); esteem factors (e.g., feeling respected); a sense of security (e.g., fear of loss); medical concerns (e.g., obstetric interventions); and personal preferences (Iravani et al., 2015). Women and birthing people may have specific expectations about the mode of birth, birth setting and availability of pain relief procedures (Coxon et al., 2017; Larkin et al., 2017; Staneva, 2013).

Fathers and partners also have expectations about pregnancy and childbirth. Research indicates that partners' expectations are relatively similar to those of mothers (Kao et al., 2004) and tend to be centred around the wish to be present during antenatal visits and childbirth (Khajehei et al., 2020); the need to be informed about the birth process (Hildingsson et al., 2011; Sengane & Nolte, 2012); concerns about the availability of guidance from health care professionals (Longworth & Kingdon, 2011); ability to provide comfort (Fenwick et al., 2012; Sengane & Nolte, 2012); and about the interventions that may be required during labour (Gibson, 2014; Schytt & Bergström, 2014).

Nevertheless, supporting and comforting the mother during labour is not limited to fathers or partners. Recent literature has revealed that any person, who was selected and trusted by the mothers regarding their capacity to satisfy the mother's needs during the labour (e.g., calming the mother down, encouraging the mother to apply relaxation techniques and being a messenger between the medical staff and the mother), also known as a 'birth companion', could significantly contribute to a positive labour experience (see Evans et al., 2023, for a systematic review). Birth companions could include fathers, partners, mothers, friends or a doula, just to name a few. The widespread preference of mothers to have a birth companion and the benefits of this practice are confirmed by the World Health Organization (2020). Moreover, a recent study showed that having another birth companion next to the partner was related to lower post-traumatic stress symptoms than having only the partner present (Handelzalts et al., 2022). These findings point to the necessity of further examinations of the crucial

role birth companions play in labour experiences and their psychological consequences, which we aimed to do in this paper.

Being able to imagine birth scenarios and organizing actions accordingly is highly adaptive from an evolutionary standpoint to ensure successful reproduction (Suddendorf et al., 2018). This prospective thinking enables pregnant women and their partners to consider different birth scenarios and consider how they can best manage the birth, all of which influence the choices they make regarding their maternity care (Fishbein & Ajzen, 1975). Several theories and models can be drawn to examine relationships between an individual's expectation of events and their mental health and well-being, as well as satisfaction with care. For example, the expectancy–value model proposes that individuals respond to novel information about a (future) event by attributing new beliefs relating to this event, or modifying existing beliefs (Fishbein & Ajzen, 1975). Additionally, individuals may assign a subjective value to each attribute that their belief is based on. Finally, an expectation is created or modified based on the result of an unconscious calculation, where attitudes are a factorial function of beliefs and values.

If childbearing women are seen as 'consumers' of the maternity care system, then the expectancy–disconfirmation model can be applied to the provision of maternity services (Baron-Epel et al., 2001). This model assumes that women will have individual expectations before attending maternity services to give birth. Compared to their initial expectations, the higher the perceived fulfilment of these expectations, the greater the satisfaction with the care received. However, when perceived fulfilment is lower, then lower satisfaction is likely to be experienced by the women. When expectations are low, it will be easier for care to meet or surpass these, so a high level of satisfaction is more likely. In contrast, when expectations of care are high, then meeting these expectations will be harder, thus likely resulting in low satisfaction (Baron-Epel et al., 2001).

From a psychological point of view, positive and negative expectations about an event potentially impact the experiences, affect and behaviour of individuals (Krafft et al., 2020), which are closely intertwined. In this regard, a large body of research has explored how expectations about childbirth affect childbirth experiences (Ayers & Pickering, 2005; Christiaens & Bracke, 2007; Hildingsson, 2015; Larkin et al., 2012) and whether positive expectations have mainly positive consequences for women (Hauck et al., 2007; Soet et al., 2003; Verreault et al., 2012). Previous research suggests that women with positive expectations tend to rate their births as more satisfying (Goodman et al., 2004; Sato & Umeno, 2011), whereas those with negative expectations are more likely to be dissatisfied with the birth (Waldenström et al., 2004; Wiklund et al., 2008). For instance, women who expected to have a degree of control and autonomy reported having such positive experiences (Ayers & Pickering, 2005). Conversely, women who expected to suffer from severe pain during birth reported negative birth experiences (Hodnett, 2002; Oweis & Abushaikha, 2004).

The relationship between expectations and experience is complex and likely influenced by various factors, including individual factors (e.g., self-efficacy) and structural factors (e.g., maternity care). The match, or mismatch, between what women and their birth companions expect to happen during childbirth and what they experience is also important in whether the birth experience is perceived as positive or negative (DeLuca & Lobel, 2014; Webb et al., 2021). For example, a more negative birth than expected has been associated with traumatic birth and childbirth-related post-traumatic stress symptoms (CB-PTSS) (Soet et al., 2003; Verreault et al., 2012). DeLuca and Lobel (2014) also reported that women who had emergency caesarean sections had more unmet expectations of control and were more dissatisfied with their birth experience.

A mismatch between birth expectations and experiences is associated with reduced birth satisfaction and may also adversely impact women's mental health (Webb et al., 2021), particularly concerning CB-PTSS. For instance, one study showed that women who preferred a planned caesarean section but did not receive one had significantly higher levels of CB-PTSS compared to women who had no such preference and did not receive a caesarean section (Garthus-Niegel et al., 2014). Two further studies found that women whose childbirth experience was more negative than expected had more CB-PTSS (Soet et al., 2003; Webb et al., 2021). Hence, along with other risk factors, such as pain severity, lack of adequate information provision and previous trauma, these studies suggest that unmet expectations

increase the risk of developing CB-PTSS (Webb et al., 2021). The evidence is less consistent for a mismatch being associated with subsequent fear of childbirth or depression, with some studies demonstrating an association (Houston et al., 2015; Sluijs et al., 2020) and others failing to find such a relationship (Phillipson-Price, 1982; Preis et al., 2019; Tanglakmankhong & Perrin, 2010).

To date, there are no published studies investigating the psychological outcomes of a mismatch between expectations and experiences in women and their birth companions. Given the emerging evidence that birth companions may also develop post-partum psychopathology (Evans et al., 2023; Heyne et al., 2022; Thiel et al., 2020), research into the potential impact of a mismatch between birth expectations and experiences in mothers and birth companions is warranted. Additionally, mothers' and their birth companions' experiences, including their mental health, are interdependent, so they influence each other (Evans et al., 2023; Garthus-Niegel et al., 2022; Handelzalts et al., 2022; Seefeld et al., 2022). Illustrating these two points, in a recent systematic review, Evans et al. (2023) revealed that although birth companions report cohesion and closeness with the mother and newborn, they may also face challenges and feel distressed, especially when they see the mother in pain. Therefore, dyadic approaches and applying state-of-the-art statistical techniques, as we followed in this paper, are important to adequately reflect and present such complex relationships and make accurate interpretations and recommendations. Thus, we used the latest technique examining the match between two variables, namely response surface analysis (Shanock et al., 2010) and its dyadic extension (Schönbrodt et al., 2018). This method allowed us to investigate the effect of the match between expectations and experiences on CB-PTSS in addition to their linear, interactive and non-linear effects.

The current study, therefore, aimed to examine whether a mismatch between expectations in pregnancy and birth experiences predicted CB-PTSS 6 weeks post-partum. This was investigated individually for mothers and birth companions. Additionally, we explored whether a mismatch between mothers' and birth companions' expectations/experiences predicts CB-PTSS. Specifically, we aimed to address the following research questions:

1. Does a mismatch between mothers' birth expectations and experiences predict CB-PTSS in mothers?
2. Does a mismatch between birth companions' birth expectations and experiences predict CB-PTSS in birth companions?
3. Does a mismatch between mothers' and birth companions' birth expectations predict CB-PTSS in mothers and birth companions?
4. Does a mismatch between mothers' and birth companions' birth experiences predict CB-PTSS in mothers and birth companions?

Regarding research questions 1 and 2, we hypothesized that a within-person mismatch between expectations (at 36 weeks of pregnancy) and experiences (at 2 weeks post-partum) would be prospectively associated with CB-PTSS (at 6 weeks post-partum). Regarding research questions 3 and 4, prospective associations of within-dyad mismatch between mothers' and birth companions' expectations/experiences with CB-PTSS 6 weeks post-partum were examined in an exploratory manner.

MATERIALS AND METHODS

Sample and design

The data used for these analyses were part of the Self-Hypnosis IntraPartum (SHIP) Trial (Downe et al., 2015), a non-blinded two-group randomized controlled trial (RCT) examining the effect of teaching self-hypnosis techniques antenatally on epidural use among nulliparous, labouring women (Downe et al., 2015). This RCT was carried out from 2010 to 2013 in three National Health Service (NHS) Trusts (hospital organizations) in the Northwest of England. All women received the standard package

of antenatal education provided at their respective NHS Trust, while only the intervention group attended two group sessions on self-hypnosis for anxiety and pain relief during labour. These sessions took place at 32 and 35 weeks of pregnancy and were accompanied by a compact disk to practice at home. This study used data from women and birth companions in both groups, as CB-PTSS levels at 6 weeks post-partum did not differ significantly between intervention and control groups for mothers ($t(397) = .04$, $p = .968$) or birth companions ($t(300) = 1.12$, $p = .262$). For both the intervention and control groups, a birth companion was recruited alongside the women. Among the birth companions, 92% were husbands and partners and the remaining were mothers, sisters or friends.

All participants completed questionnaires at four time points: 27 weeks and 36 weeks gestation, and 2 and 6 weeks post-partum. Women were recruited in the late second trimester of pregnancy and randomized at 36 weeks gestation. In total, $n = 469$ mothers and $n = 358$ birth companions participated in the RCT. On average, women and birth companions were aged 28.87 ($SD = 5.32$) and 33.35 ($SD = 7.77$) respectively. The mean education level was advanced level qualifications (taken at age 18) for women and birth companions, with a high mean household income (range 1–6, $M = 4.93$, $SD = 1.52$). The number of people included in the analysis at each study wave is given in the Appendix S1.

Measures

Expectations of labour

Expectations were measured using the Expectations of Labour Scale (Slade et al., 1993) at 36 weeks gestation. Participants were asked to think about how they expected to feel during labour, defined as 'from the start until the baby's head comes out.' The self-rating scales consisted of 10 items, each specifying a different emotional expectation of labour, five of which were positive (e.g., My labour will be satisfying) and five negative (e.g., My labour will be frightening). Each item was rated on a Likert Scale ranging from 0 = not at all to 7 = extremely. After re-coding the negative items, higher scores represented more positive expectations. We computed the average across items. Internal reliability was acceptable to high for mothers' ($\alpha = .81$) and birth companions' ($\alpha = .74$) expectations.

Experiences of labour

Experiences were measured with the Experiences of Labour Scale (Slade et al., 1993) at 2 weeks post-partum. Post-partum women who had given birth by caesarean section without experiencing labour were asked to move on to the next questionnaire section and therefore did not complete the Experiences of Labour Scale. The scale consisted of 10 items assessing the same emotions we asked for expectations but modified to measure experiences (positive experiences: e.g., My labour was satisfying; negative experiences: e.g., My labour was frightening). We again employed an 8-point scale ranging from 0 = not at all to 7 = extremely and recoded the negative items. Internal reliability levels were high (αs = .85 for mothers; .81 for birth companions).

CB-PTSS

CB-PTSS were measured 6 weeks post-partum with the Impact of Event Scale–Revised (IES-R; Weiss & Marmar, 1997). On this self-rating scale, symptoms of intrusion (eight items), avoidance (seven items) and hyperarousal (seven items) within the last 7 days were assessed with five response categories ranging from 0 = *not at all* to 4 = *extremely*. Participants were asked to think only about the labour and delivery experience when responding to the items. Internal validity was high in the sample of mothers and birth companions (αs = .89). Note that we used average CB-PTSS scores rather than sum scores to facilitate

the interpretation using the possible range on the scale (i.e., 0–4). The correlations between average and sum scores were $r = 1.00$ and $r = .99$ for mothers and birth companions respectively.

Sociodemographic variables

Sociodemographic variables (age, education and household income) were measured at baseline via self-report. Mothers and birth companions reported their highest educational qualification by choosing from one of four categories (none; general certificate of secondary education or equivalent; a level or equivalent; and degree or equivalent), and mothers were asked to assign themselves to one of six annual household income categories ranging from £0 to £37.000 or more.

Analysis

The match between two variables has been widely operationalized as a difference score between the variables (Edwards, 1994), but this method has several limitations. First, difference scores treat the match at different levels as if they mean the same thing. However, in our study, for example, a match between low expectations and low experiences may not be identical to a match at high levels regarding their effects on CB-PTSS. Second, the difference score method largely disregards the main linear effects. Finally, the difference score method fails to investigate the non-linear associations of the match with the outcome, as well as the possible interaction between linear effects.

In this paper, we deal with these limitations by employing the response surface analysis method (RSA; Shanock et al., 2010), which tests the expectations' and experiences' linear, interactive and non-linear effects on CB-PTSS in a polynomial regression model (Figure 1a). For our first and second research questions (RQ), our independent variables were the expectations and experiences of mothers (RQ1) and birth companions (RQ2) respectively. For RQ3 and RQ4, we applied the dyadic extension of the RSA (DRSA; Schönbrodt et al., 2018; see Figure 1b) and regressed mothers' and birth companions' CB-PTSS on their expectations (RQ3) or experiences (RQ4). hese models' results revealed both actor

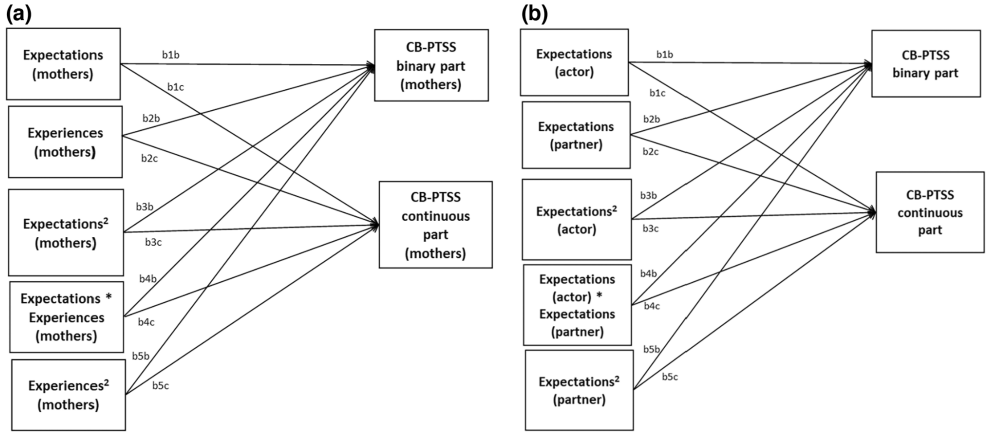

FIGURE 1 (Dyadic) response surface analysis. The model in (a) is used for Research Questions 1 (mothers) and 2 (birth companions), whereas the dyadic model in (b) is used for Research Questions 3 (expectations) and 4 (experiences). In the analysis of (b), the same effects (e.g., actor effect of expectations on CB-PTSS binary part) were kept constant across mothers and birth companions based on the BIC comparisons of models (see Appendix S1). Within-predictors and within-errors correlations are not shown in the figure for the sake of simplicity. The RSA parameters' computation using the models' paths is provided in Tables 3 and 4. The letters 'b' and 'c' at the end of each coefficient in the Figures represent the effects on the binary and continuous parts of the CB-PTSS respectively.

(e.g., the relation of mothers' experiences with their CB-PTSS) and partner effects (e.g., the relation of mothers' experiences with their birth companions' CB-PTSS). Our hypotheses and analysis strategy were pre-registered (https://osf.io/8nm3k).

As a pre-condition to running an RSA, we first confirmed the variance regarding the difference scores in the data (Shanock et al., 2010; see Appendix S1). We benefited from the full-information maximum-likelihood method with robust standard errors to handle the missing data (Enders & Bandalos, 2001). Considering the Likert points ranging from 0 to 7 on the scales of expectations and experiences, we applied a mid-point centring (i.e., a score of 3.5) for these variables to ensure a consistent interpretation for all models. Due to the high percentages of mothers (28%) and birth companions (32%) with zero scores (i.e., no CB-PTSS) in our data, we used two-part models in our analyses to deal with this highly skewed distribution. Thus, we calculated separate RSA estimates for the binary (i.e., zero vs. non-zero CB-PTSS) and continuous (i.e., non-zero CB-PTSS scores) parts of the dependent variable (Zhao et al., 2021).

RSA parameters (known as a1-a5) are computed by the polynomial regression coefficients (b1-b5; see Figure 1a,b for the paths of b1-b5 in the regression model, and Tables 3 and 4 for their coefficients). While the RSA parameters a1 and a2 assess linear and quadratic shapes of the line of congruence (i.e., the line for the match at all levels, e.g., expectations = experiences), respectively, a3 and a4 serve the same purpose for the line of incongruence (i.e., the line for the mismatch at all levels, e.g., expectations = −experiences). Four conditions should be observed to confirm our hypotheses for RQ1 and RQ2: negative a1, positive a4 and non-significant a2 and a3 (Humberg et al., 2019). Negative a1 means that CB-PTSS are negatively and linearly associated with the level where the match between expectations and experiences occurs, meaning that the lowest CB-PTSS are observed when high expectations and high experiences match each other. Positive a4 shows that CB-PTSS have a positive quadratic association with the mismatch between expectations and experiences. This result implies that the mismatch on any side (i.e., expectations > or < experiences) is related to higher levels of CB-PTSS compared to the level of no mismatch. Non-significant a2 indicates that a match at extreme levels of experiences and expectations versus a match at moderate levels is not associated with higher levels of CB-PTSS. Non-significant a3 shows that the mismatch in one direction (e.g., expectations > experiences) is not related to lower levels of CB-PTSS than the mismatch in the other direction (e.g., experiences > expectations). In the DRSA, there is one more condition of a non-significant a5 for supporting the match hypotheses if the other conditions are met (Table 4).

Power

Sample sizes for our non-dyadic research questions (RQ1 and RQ2) fulfil the requirement of at least 200 participants (Schönbrodt et al., 2018). No minimum sample size was reported for the DRSAs (RQ3 and RQ4). Although we aimed to utilize *a posteriori* Monte Carlo simulation for the DRSAs, we could not due to convergence issues. However, we tested the equality of actor and partner effects across mothers and birth companions in the DRSAs and put constraints where applicable (ΔBIC >10; Raftery, 1995) to increase the power of our study (see Appendix S1).

RESULTS

Descriptive statistics and correlations

Table 1 shows the descriptive statistics and correlations between study variables. Mean levels of expectations and experiences were close to the mid-point (i.e., 3.5) for both mothers and birth companions. The levels of CB-PTSS were low on average.

TABLE 1 Descriptive statistics and correlations between study variables.

	M (*SD*)	1	2	3	4	5
1. Mothers' expectations	3.72 (.96)	—				
2. Mothers' experiences	3.56 (1.33)	.38**	—			
3. Mothers' CB-PTSS	.26 (.36)	−.13*	−.26**	—		
4. BC expectations	3.95 (.91)	.30**	.21**	−.05	—	
5. BC experiences	3.90 (1.19)	.14*	.66**	−.14*	.44**	
6. BC CB-PTSS	.24 (.32)	−.01	−.20**	.33**	−.03	−.15*

Abbreviation: BC, Birth companions.
*$p < .05$, **$p < .01$.

TABLE 2 Correlations between difference scores and CB-PTSS symptoms in our data.

	Mothers CB-PTSS	BC CB-PTSS
Difference between mothers' experiences and expectations	−.18**	−.21**
Difference between BC's experiences and expectations	−.13*	−.15*
Difference between mothers' expectations and BC's expectations	−.07	.05
Difference between mothers' experiences and BC's experiences	−.16*	−.03

Abbreviation: BC, Birth companions.
*$p < .05$, **$p = .001$.

Correlations revealed positive within-person associations between birth expectations and experiences and within-dyad associations for all three variables. Mothers' CB-PTSS were significantly associated with them having lower expectations, and them and their birth companions reporting lower experiences. Birth companions' CB-PTSS were significantly related to lower levels of experiences of both mothers and birth companions but did not have any significant associations with their expectations.

Although we used an advanced method for our analyses (i.e., RSA), we also checked the correlations between difference scores and CB-PTSS following the statistical approaches in previous studies with similar research questions (Soet et al., 2003; Verreault et al., 2012). As shown in Table 2, results using difference scores revealed that, when mothers' and birth companions' experiences were better than their expectations, both they and their birth companions were likely to report lower levels of CB-PTSS.

RQ1. Does a mismatch between mothers' birth expectations and experiences predict their CB-PTSS?

The RSA results for RQ1 and RQ2 are presented in Table 3. Results did not support our hypothesis that the level of CB-PTSS is lowest when experiences match expectations. Results for mothers showed better experiences were associated with a lower likelihood of CB-PTSS (binary part, odds ratio = .69) and lower levels of CB-PTSS (continuous part). Explained variances in the RQ1 model were small, with 9% ($p = .02$) for the binary CB-PTSS part and 6% ($p = .04$) for the continuous part.

TABLE 3 RSA results for the match between mothers' (RQ1) or birth companions' (RQ2) experiences and expectations.

	RQ1 (mothers)				RQ2 (birth companions)			
	Binary part		Continuous part		Binary part		Continuous part	
	b	95%CI	*b*	95%CI	*b*	95%CI	*b*	95%CI
Polynomial regression coefficients								
b1 Expectations	−.11	[−.41, .19]	−.01	[−.14, .13]	.07	[−.39, .52]	.12	[−.10, .34]
b2 Experiences	−.38**	[−.61, −.14]	−.17**	[−.27, −.07]	−.26	[−.54, .02]	−.13	[−.28, .03]
b3 Expectations^2	.05	[−.14, .25]	−.05	[−.14, .03]	.27	[−.01, .54]	.06	[−.08, .20]
b4 Expectations × Experiences	−.05	[−.28, .18]	.06	[−.04, .16]	−.07	[−.42, .29]	−.14	[−.33, .06]
b5 Experiences^2	−.01	[−.13, .12]	.03	[−.03, .08]	−.16	[−.33, .01]	.04	[−.07, .14]
RSA parameters								
a1 (LOC, linear)	−.49**	[−.83, −.15]	−.18**	[−.31, −.04]	−.19	[−.62, .23]	−.01	[−.22, .21]
a2 (LOC, quadratic)	.00	[−.24, .24]	−.07	[−.32, .17]	.04	[−.20, .28]	.03	[−.38, .44]
a3 (LOIC, linear)	.27	[−.15, .68]	.17	[−.03, .36]	.32	[−.31, .95]	.25	[−.07, .56]
a4 (LOIC, quadratic)	.09	[−.30, .48]	−.09	[−.26, .09]	.17	[−.48, .83]	.23	[−.09, .55]
Evidence for the match? (a1 <0, a2 = ns, a3 = ns, a4 >0)								
	No, a4 = ns		No, a4 = ns		No, a1 = ns, a4 = ns		No, a1 = ns, a4 = ns	

Note. **$p < .01$. LOC = Line of congruence, LOIC = Line of incongruence, CI = Confidence interval, ns = Non-significant. Calculations of RSA parameters are as follows: a1 = b1 + b2; a2 = b3 + b4 + b5; a3 = b1−b2; a4 = b3−b4 + b5. For a graphical presentation of the paths b1−b5 in the statistical model, please see Figure 1a.

RQ2. Does a mismatch between birth companions' birth expectations and experiences predict their CB-PTSS?

Results for birth companions showed no significant association between their expectations or experiences and CB-PTSS, whether calculated as a binary or continuous part. RQ2 model's explained variance was significant only for the binary part of CB-PTSS (10%, $p = .03$) but not for the continuous part.

RQ3. Does a mismatch between mothers' and birth companions' birth expectations predict CB-PTSS in mothers and birth companions?

We did not obtain any support for the effect of the match between mothers' and birth companions' expectations on their or their partner's CB-PTSS (see Table 4). Results revealed that mothers' and birth companions' expectations were negatively associated with their own likelihood of CB-PTSS on the binary part (i.e., actor effect; odds ratio = .75). There was no actor effect of expectations on continuous CB-PTSS or partner effect on binary or continuous CB-PTSS. The explained variances were consistent and non-significant for both mothers and birth companions.

RQ4. Does a mismatch between mothers' and birth companions' birth experiences predict CB-PTSS in mothers and birth companions?

Results for RQ4 (Table 4) showed that the match between mothers' and birth companions' experiences was not related to the lowest levels of CB-PTSS in mothers or birth companions. However, the results provide evidence for the role of mothers' and birth companions' experiences in their CB-PTSS. The likelihood of CB-PTSS as a binary part (odds ratio = .77) and continuous part of CB-PTSS was negatively

TABLE 4 DRSA results for the match between mothers' and birth companions' expectations (RQ3) or experiences (RQ4).

	RQ3 (expectations)				RQ4 (experiences)			
	Binary part		Continuous part		Binary part		Continuous part	
	b	95%CI	*b*	95%CI	*b*	95%CI	*b*	95%CI
Polynomial regression coefficients								
b1 actor	−.29*	[−.54, −.05]	.03	[−.11, .16]	−.26**	[−.47, −.06]	−.16**	[−.28, −.04]
b2 partner	.21	[−.01, .43]	−.03	[−.16, .10]	−.18	[−.39, .03]	.01	[−.10, .12]
b3 actor^2	.10	[−.07, .26]	.00	[−.10, .11]	−.11	[−.25, .04]	−.01	[−.09, .06]
b4 actor × partner	−.10	[−.34, .14]	−.08	[−.25, .09]	.06	[−.21, .34]	.04	[−.08, .16]
b5 partner^2	−.07	[−.21, .08]	−.02	[−.13, .08]	.03	[−.14, .20]	.01	[−.06, .08]
RSA parameters								
a1 (LOC, linear)	−.08	[−.40, .23]	.00	[−.16, .16]	−.44**	[−.64, −.25]	−.15**	[−.25, −.05]
a2 (LOC, quadratic)	−.07	[−.27, .14]	−.10	[−.21, .02]	−.02	[−.13, .10]	.03	[−.03, .10]
a3 (LOIC, linear)	−.50**	[−.84, −.16]	.05	[−.16, .26]	−.08	[−.45, .29]	−.17	[−.37, .04]
a4 (LOIC, quadratic)	.13	[−.30, .56]	.06	[−.25, .37]	−.14	[−.68, .41]	−.04	[−.28, .19]
a5	.16	[−.04, .37]	.03	[−.12, .17]	−.14	[−.28, .00]	−.02	[−.10, .05]
Evidence for the match? (a1 <0, a2 = ns, a3 = ns, a4 >0, a5 = ns)								
	No, a1 = ns, a3 = not ns and a4 = ns		No, a1 = ns and a4 = ns		No, a4 = ns		No, a4 = ns	

Note: Calculations of RSA parameters are as follows: a1 = b1 + b2; a2 = b3 + b4 + b5; a3 = b1−b2; a4 = b3−b4 + b5; a5 = b3−b5. For a graphical presentation of the paths b1−b5 in the statistical model, please see Figure 1b.

Abbreviations: CI, confidence interval; LOC, line of congruence; LOIC, line of incongruence; ns, non-significant.

*p < .05, **p < .01.

associated with experiences (i.e., actor effect). The results did not yield any partner effect for experiences. Significant explained variances in the binary part were small at 7% (p = .01) for mothers and 9% (p = .01) for birth companions. Explained variances in the continuous part were not significant.

Sensitivity analyses

For sensitivity analyses, we re-ran the analyses above, including the control variables (age, education and income), excluding the outliers, excluding incomplete surveys and excluding the dyads without both partners. Furthermore, we excluded the non-partner birth companions (8% were mothers, sisters and friends) and conducted the analysis with the remaining sample. Across all those analyses, the results did not change regarding the lack of support for the match hypothesis. Given that only 8% of the mothers (n = 34) had a non-partner birth companion (e.g., mother, sister), re-running the model with only these participants was not feasible due to insufficient statistical power. Thus, we could not compare the results across the mothers with partner birth companions versus non-partner birth companions. Nevertheless, we presented the results of the analysis with partner birth companions in Appendix S1.

DISCUSSION

This paper reports the first analysis of dyadic data collected on birth expectations and experiences of mothers and birth companions, using secondary data from the SHIP Trial (Downe et al., 2015). Results

do not support the hypothesis that a mismatch between a person's expectations and experiences of birth is associated with greater CB-PTSS, either in mothers or birth companions. Dyadic analyses found no support for the actor or partner effect of the match between mothers' and birth companions' expectations or experiences on CB-PTSS. Results did support the importance of birth experiences in mothers' and birth companions' CB-PTSS, with those who had more positive birth experiences reporting less CB-PTSS.

Birth expectations, experiences and CB-PTSS

Expectations and experiences of birth were associated among individuals (e.g., mothers' high expectations were related to positive experiences), which is consistent with previous research (Goodman et al., 2004; Sato & Umeno, 2011; Waldenström et al., 2004; Wiklund et al., 2008). Expectations and experiences of birth were also associated between mothers and birth companions, indicating that dyads are likely to have similar expectations and experiences during birth. However, this study found very little support for an association between expectations of birth and CB-PTSS in either mothers or birth companions, suggesting the birth experience itself is more important in whether individuals develop CB-PTSS.

The link between negative birth experiences and the development of CB-PTSS is consistent with previous meta-analyses of risk factors for CB-PTSS in women. A meta-analysis by Ayers et al. (2016) showed that of risk factors in birth, negative birth experiences were the strongest predictor of CB-PTSS. Another meta-analysis by Grekin and O'Hara (2014), looking at differences in risk factors for CB-PTSS in community and at-risk samples, indicated that negative birth experiences and post-partum depression were most strongly associated with higher CB-PTSS in community samples, whereas infant complications and post-partum depression were most strongly associated with higher CB-PTSS in high-risk samples. Moreover, it has been argued that, although negative birth experiences and CB-PTSS are associated, different underlying and influencing factors might be identified, which should be examined separately (McKelvin et al., 2021). For example, in the development of CB-PTSS, post-natal experiences relating to the care of a new baby and complicating factors, such as co-morbid mental health symptoms, play an important role and may influence CB-PTSS onset, severity and maintenance. The importance of post-natal experiences and care is illustrated by a qualitative study of mothers attending an infant mental health day clinic because of persistent severe infant regulatory problems (Nuyts et al., 2021). Findings of this study refer to women's unmet expectations concerning the care for their infant and experiences of despair for not feeling heard during post-natal care. Thus, future research should focus on a broader spectrum of experiences, including experiences related to caregiving or parenting challenges, to identify additional risks and protective mechanisms.

Mismatch hypothesis

This study provides little support for the hypothesis that a mismatch between expectations and experiences of birth is associated with poorer outcomes. Although a few of the bivariate and regression results suggest that more positive experiences as compared to expectations might be negatively associated with the likelihood of developing CB-PTSS, the RSA results did not support the hypothesis for the effect of the match between mothers' and birth companions' expectations or experiences being associated with CB-PTSS. Additional sensitivity analyses examining this after controlling for potential confounding variables of age, education and income, or excluding outliers and non-partner birth companions showed similar results – indicating no support for the mismatch hypothesis. This finding contradicts previous research showing that unmet expectations can increase women's risk of developing CB-PTSS (Webb et al., 2021). However, the way in which a mismatch has been examined also varies widely. For example, one study used a mismatch in type of birth, where women who would have wanted but did not have a

caesarean section had greater levels of CB-PTSS than women who had the type of birth they expected (Garthus-Niegel et al., 2014). In the current study, our measure of expectations and experiences looked at expected and actual emotions during birth (e.g., frightening and embarrassing). Ours was, therefore, a measure of subjective expectations and experiences, but not objective obstetric events and outcomes.

The studies that were most similar to our study were conducted by Soet et al. (2003) and Verreault et al. (2012) because (a) emotions during labour were included in their assessments of expectations and experiences, and (b) they tested the effect of the mismatch between experiences and expectations on CB-PTSS. Those two studies showed that CB-PTSS were lower when experiences were better than expectations. The main difference between our study and those studies is the analysis method. In both studies, the mismatch was operationalized as a difference score between experiences and expectations. Note that we also found significant correlations with CB-PTSS when the difference scores in our data are considered. Nevertheless, recent advancements have shown that results derived from models with difference scores are misleading (for a detailed discussion, see Schönbrodt et al., 2018; Shanock et al., 2010). For example, a difference score could be zero for a mother whose expectations and experiences are equal at the highest or lowest levels. This reflects the necessity that the main effects of expectations and experiences should also be considered, which we did using the RSA. Our RSA results shed light on the crucial role of experiences, rather than the match between experiences and expectations, in CB-PTSS. Future research is needed to tease out the different predictive values of subjective and objective experiences.

Moreover, multiple other risk factors contribute to the development of CB-PTSS, such as poor support and care, unplanned delivery mode, mental health problems, powerlessness and lack of adequate information (Khsim et al., 2022; Sommerlad et al., 2021). For example, trait anxiety has been found to be a predictor of CB-PTSS in women with and without risk of pre-term birth, whereas planned delivery mode has been found to have a reducing effect on CB-PTSS in these samples (Sommerlad et al., 2021). The importance of mode of birth as a risk factor for CB-PTSS has been well established (Dekel et al., 2019; Khsim et al., 2022; Ryding et al., 1998; Soderquist et al., 2009). For example, when elective caesarean birth and emergency caesarean births are compared, significantly lower levels of CB-PTSS are found for elective caesareans (Ryding et al., 1998; Soderquist et al., 2009). Similarly, a meta-analysis found that instrumental vaginal birth was associated with a higher CB-PTSS score than spontaneous vaginal birth (Carter et al., 2022). In the context of increased intervention rates in maternity care worldwide, the fact that women with instrumental or emergency caesarean births are at greater risk of CB-PTSS is concerning (Ryding et al., 1997; Soderquist et al., 2002). It is essential that future research not only considers the risk factors for the development of CB-PTSS but also the nature of the support women and birth companions receive after birth (Bohren et al., 2017). For example, Holopainen et al. (2020) found that women who had experienced a previous birth as traumatic were more likely to have a positive experience in a subsequent birth if they felt in control. Last but not least, there is ample evidence that health care professionals' positive and reinforcing behaviours can improve physical and mental health outcomes in the post-partum period (Bohren et al., 2017; Sommerlad et al., 2021). Given our findings and the dearth of studies examining the specific role of birth companions as a potential mitigating factor against the development of CB-PTSS, this remains an important area for future research.

Strengths and limitations

An essential strength of the current study is the application of robust dyadic analyses of birth expectations and birth experiences for mothers and birth companions. Some limitations also need to be considered. As we used secondary data from SHIP Trial (Downe et al., 2015), we could not examine the differential effects of the relationship status (e.g., partner, relative and friend) between the woman giving birth and the birth companion due to the power limitations in our advanced analysis. Consequently, future research should examine subsamples regarding different types of birth companions. Furthermore, the quality of the relationship (e.g., closeness and trust) between mothers and birth companions and

the extent of the involvement of birth companions in parenting after birth (e.g., co-parenting) should be evaluated in further studies. They might be influenced by expectations and experiences of labour, or they may moderate the links between expectations/experiences and CB-PTSS.

Although our hypotheses were not supported, we suggest that this dyadic approach should be tested in future studies on birth expectations and birth experiences because the analysis method seems to determine the difference in findings between current and previous studies. Based on difference scores between experiences and expectations, we found the same associations with CB-PTSS as in previous studies. Additionally, the results of this study provide a further understanding of the relationship between birth experiences and CB-PTSS. Since a positive birth experience helps reduce CB-PTSS in mothers and birth companions, care and management during birth should focus on providing a pleasant environment, transparent processes and respectful and supportive care.

Implications

Although we have referred to some implications during the discussions of our findings, this study has several practical implications. Our findings especially highlight the importance of mothers' and birth companions' *experiences* of labour for lowering the risk for CB-PTSS. Thus, health care providers need to focus on fostering positive and empowering birth environments by providing respectful and person-centred care, aligning with the mothers' and birth companions' preferences and needs (for a comprehensive discussion of recommendations for practice, policy and research, please see Ayers et al., 2024). Medical services must enable staff to have time to listen to mothers and birth companions and to accommodate their values, choices and decisions. Where circumstances mean that women need to consider alternatives to their expected birth plans, medical staff should explain the situation fully and follow as much of the original plans as possible, along with new decisions made by parents. In an emergency, a full explanation of what happened and why should be given after the event (Demirci et al., 2024).

Birth companions should also be treated respectfully, and medical staff should be aware that companions vicariously experience the birth. Enabling them to understand what is happening/has happened is important, both for the companions themselves and for the mother they are accompanying. Future research should focus on disentangling the impact of different types of birth companions on birth experiences and post-partum mental health. For these studies, a dyadic approach should be used that considers the interdependence between mothers and their birth companions. Furthermore, more research is needed on ways to support mothers and birth companions after a negative or traumatic birth experience to prevent the development of CB-PTSS. The potential comforting role of birth companions for the mother in the post-partum period has especially been understudied.

As previous research showed that not only the quality of care but also people's expectations of labour play a significant role (e.g., Chabbert et al., 2021; Hoffmann et al., 2023), it is also important to adequately prepare mothers and birth companions for the birth process by promoting realistic ideas and discussing multiple outcomes (e.g., vaginal birth and unplanned caesarean section). The importance of antenatal preparation is illustrated by studies finding women who attended birth preparation classes have lower CB-PTSS (intrusions) compared with women who did not attend those classes (Avignon et al., 2022).

CONCLUSION

In summary, this study is the first to investigate birth expectations and experiences dyadically in mothers and birth companions. Results support previous findings that an individual's expectations are associated with subsequent experiences, but there was little evidence of a relationship between expectations and CB-PTSS. In contrast, birth experiences were associated with CB-PTSS for both mothers and birth companions, which is consistent with previous literature on risk factors for CB-PTSS. This study found no evidence to support the mismatch hypothesis where a mismatch between

expectations and experiences of birth is hypothesized to affect CB-PTSS. The impact of birth experiences on CB-PTSS, evidenced by this and other studies, highlights the importance of respectful and supportive maternity care.

AUTHOR CONTRIBUTIONS

Asuman Buyukcan-Tetik: Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; formal analysis; supervision. **Lara Seefeld:** Conceptualization; investigation; methodology; writing – review and editing; formal analysis. **Luisa Bergunde:** Conceptualization; investigation; writing – review and editing; methodology; formal analysis. **Turan Deniz Ergun:** Investigation; methodology; writing – review and editing; formal analysis. **Pelin Dikmen-Yildiz:** Conceptualization; investigation; methodology; writing – review and editing. **Antje Horsch:** Conceptualization; investigation; methodology; writing – review and editing. **Susan Garthus-Niegel:** Conceptualization; investigation; methodology; writing – review and editing. **Mirjam Oosterman:** Conceptualization; investigation; methodology; writing – review and editing. **Joan Lalor:** Conceptualization; investigation; methodology; writing – review and editing. **Tobias Weigl:** Writing – review and editing; conceptualization; investigation; methodology. **Annick Bogaerts:** Conceptualization; investigation; methodology; writing – review and editing. **Sarah Van Haeken:** Conceptualization; investigation; methodology; writing – review and editing. **Soo Downe:** Conceptualization; investigation; methodology; writing – review and editing; funding acquisition; supervision; resources; data curation. **Susan Ayers:** Conceptualization; investigation; writing – original draft; writing – review and editing; methodology; project administration; resources.

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DATA AVAILABILITY STATEMENT

Researchers should contact the lead investigator of the SHIP Project, Soo Downe, if they would like to access the dataset: sdowne@uclan.ac.uk.

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