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Running head: STRESS AND SUPPORT IN BIRTH

Stressful events and support during birth: The effect on anxiety, mood and perceived control

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Abstract

Following childbirth, 16% of women may have anxiety disorders and 2% develop PTSD. It is important to identify factors that influence women's emotional reactions to birth. This study investigated how stressful events and support from hospital staff during birth each affect women's anxiety and perceived control. *Methods:* A between-subjects experimental design used birth-stories to manipulate levels of stressful events (high/low) and support from hospital staff (high/low) during birth. Participants (n = 137) imagined undergoing one of the birth experiences and rated their perceived control, mood and anxiety. *Results:* Manipulation checks indicated the birth-stories reliably elicited mood responses. Anxiety, mood and perceived control were more strongly influenced by support than by stressful events. There was a significant interaction between stressful events and support for perceived control. *Conclusions:* Level of support from hospital staff during birth has a greater effect on women's emotional reactions than stressful events. Supportive care during birth increases perceived control and reduces anxiety and negative mood.

Glossary

Parity: the condition or fact of having borne children

Parous: Having given birth one or more times.

Nullipara: A woman who has never borne a child (adj. Nulliparous)

Childbirth is a challenging and significant life event that affects a large number of women each year. The events of birth are stressful for most women and can involve a range of obstetric complications and intervention. Actual life threat to the woman or baby occurs in just under 1% of cases in Western or developed settings (Baskett & Sternadel, 1998; Confidential Enquiry into Maternal and Child Health, 2007; Murphy & Charlett, 2002), rising to between 3 and 17% in various developing countries (Adisasmita, Deviany, Nandiaty, Stanton, & Ronsmans, 2008; Kaye, Mirembe, Aziga, & Namulema, 2003; Wilson & Salihu, 2007). After birth, women are vulnerable to postnatal psychological disorders such as depression, anxiety, and attachment disorders (Brockington, 2004). Estimates of postnatal depression are that it affects around 13% of women after birth (O'Hara & Swain, 1996), and is likely to be comorbid with anxiety disorders (Czarnocka & Slade, 2000; Wenzel, Haugen, Jackson, & Brendle, 2005; White, Matthey, Boyd, & Barnett, 2006). Recent studies suggest that anxiety disorders may be under-estimated in the post-natal period and may actually be more common than depression, with up to 16% of women suffering some type of anxiety disorder such as panic, phobia, acute adjustment disorder or post-traumatic stress disorder (PTSD; Matthey, Barnett, Howie, & Kavanagh, 2003; Wenzel et al., 2005). Notably, evidence suggests up to a third of women appraise their experience of birth as traumatic, and between 1 and 2% of women develop diagnostic PTSD following birth, with up to 30% showing sub-diagnostic symptoms (Ayers & Pickering, 2001; Czarnocka & Slade, 2000; Maggioni, Margola, & Filippi, 2006; Soderquist, Wijma, & Wijma, 2006; Soet, Brack, & Dilorio, 2003). Appraisal of birth as traumatic and PTSD do not only follow births in which complications threaten the mother or the baby. Two studies have found that the majority of women with subsequent PTSD had obstetrically normal vaginal deliveries (Ayers, 1999; Soderquist,

Wijma, & Wijma, 2002). Therefore actual life-threat does not appear to be a good predictor of who will develop anxiety disorders such as PTSD after the birth.

With psychological morbidity so prevalent following birth, it is important to identify factors that influence women's emotional reactions to birth. This is especially important for identifying risk factors for PTSD following childbirth as this disorder follows directly the experience of the birth as traumatic. To reduce the incidence of this disorder, more needs to be known about how to minimise psychological distress during birth and how to maximise women's positive emotions. Two likely contributors to women's emotional reactions following birth are the stress of events or complications during birth, and the level and type of support given by caregivers. Current evidence for each of these factors will be examined in turn.

Research evidence suggests the influence of obstetric factors on women's emotional reactions varies according to which type of response is examined. Surgical intervention during labour and delivery, particularly assisted vaginal delivery or emergency caesarean section, are related to appraisal of birth as traumatic (Ayers, 1999; Soet et al., 2003) and symptoms of PTSD in some studies (Creedy, Shochet, & Horsfall, 2000; MacLean, McDermott, & May, 2000; Soderquist et al., 2002). However, other studies find no influence of type of delivery on subjective distress (Skari, Skreden, Malt et al., 2002) or PTSD symptoms (Ayers, 1999; Czarnocka & Slade, 2000). Other factors such as pain in the first stage of labour, and higher levels of medical interventions have been associated with appraisal of birth as traumatic, although not with development of PTSD symptoms (Soet et al., 2003). Extensive use of interventions, such as electronic fetal monitors, episiotomies, perineal shaving and enemas, has been found to be negatively correlated with maternal satisfaction with birth (Kyman, 1991).

The influence of obstetric factors on women's emotional responses to birth is therefore not clear. This is probably due to a number of factors. Psychological research into traumatic stress responses has established that there is not a dose-response relationship between the medical severity of an event and emotional responses (Tedstone & Tarrier, 2003). It is also likely that the effect of obstetric events is moderated by psychological or interpersonal factors, such as support and perceived control during birth.

Support during birth has been found to have positive effects on physical outcomes of birth (Hodnett, Gates, Hofmeyr, & Sakala, 2003; Sauls, 2002; Scott, Klaus, & Klaus, 1999; Zhang, Bernasko, Leybovich, Fahs, & Hatch, 1996). Support during birth also appears to influence emotional responses and appraisals of birth. A review found that variables such as personal expectations, the amount of support from caregivers, the quality of the caregiver-patient relationship, and involvement in decision making were more important than the birth environment, pain, immobility, medical interventions, and continuity of care in determining women's evaluations of their birth experience (Hodnett, 2002). Limited evidence suggests support during birth is associated with less anxiety and depression in the postnatal period (Scott et al., 1999); and a perceived lack of support from healthcare professionals during birth has been associated with symptoms of PTSD following birth (Creedy et al., 2000; Czarnocka & Slade, 2000). These findings suggest that support from caregivers during birth may have a strong affect on women's emotional, anxiety and trauma reactions following childbirth.

The processes through which support from caregivers such as hospital staff influences physical and psychological birth outcomes are not clear. One possible explanation is that support buffers against the emotional consequences of obstetric events by reducing fear and anxiety, and increasing perceived control. Experiencing negative emotions during

labour has been hypothesised to increase pain (Dick-Read, 1933) and impede the birth process through a number of physiological pathways (Brownridge, 1995), possibly explaining why being unsupported in labour has been associated with more obstetric complications (Hodnett et al., 2003).

A further factor that may influence women's reactions to birth is that of personal control during the labour and delivery. High levels of personal control have been associated with increased satisfaction with birth (Goodman, Mackay, & Tavakoli, 2004; McCrea & Wright, 1999; Slade, MacPherson, Hume, & Maresh, 1993). Low levels of control have been associated with post-traumatic stress symptoms (Czarnocka & Slade, 2000), and feelings of powerlessness have been associated with perceiving birth as traumatic (Soet et al., 2003). Due to the often uncontrollable nature of labour and birth, perceptions of control are likely to be associated with caregiver support during labour. Green and Baston (2003) found that feeling in control during labour was related to interpersonal variables such as being treated with respect, and receiving considerate and supportive behaviour from staff. Several qualitative studies have also found that aspects of support from health-care professionals increase the perception of control (Lundgren, 2005; Melender, 2006; Nystedt, Hogberg, & Lundman, 2006). Lack of control, or helplessness has been linked theoretically with disorders such as depression (Seligman, 1975) and PTSD (APA, 1994), and therefore, it can be speculated that maximising perceptions of control may reinforce positive psychological outcomes.

In summary, women have a range of emotional responses to birth, from satisfaction and positive affect, to anxiety, depression, and trauma responses. Both a lack of support from hospital staff and obstetric intervention have been variously associated with negative psychological outcomes for women. Support has been associated with perceived control,

which in turn may be associated with positive outcomes. This study was designed to examine the effect of support from hospital staff during birth and stressful obstetric events on state anxiety and perceived control during birth, including any interactions. To date, no research has attempted to examine whether emotional responses to birth are affected more by stressful obstetric events or by low levels of support as it is not possible or ethical to manipulate these variables in the real life setting.

This study manipulated levels of support from hospital staff and stressful events during birth by using four birth scenarios. Birth vignettes were presented to women of childbearing age, who were asked to imagine their thoughts and feelings as if they were experiencing the scenario. Subsequently, participants' levels of perceived control, mood and anxiety were measured. PTSD symptoms were not measured as an outcome because it was not expected that reading the story would traumatise participants. Instead, as PTSD is classified as an anxiety disorder in DSM IV (1994), levels of state anxiety were measured. Following findings of Czarnocka and Slade (2000) and Hodnett (2002), it was hypothesised that both levels of support and obstetric events would influence anxiety and mood but that support would have the stronger effect. Furthermore perceptions of control were hypothesised to be more strongly influenced by support than by the stress of events.

Methods

Design

A between-subjects experimental design used four birth stories to manipulate levels of stressful obstetric intervention (high/low) and support from hospital staff (high/low) during birth. Women (n = 137) were randomly allocated to conditions of high stress/high support (n = 39); low stress/high support (n = 34); high stress/low support (n = 33); and low stress/low support (n = 30) and asked to imagine undergoing this birth experience.

Anxiety and mood were measured before and after reading the birth story and perceived control was measured after reading the story.

Sample

A convenience sample of 137 women of childbearing age was recruited via email and word of mouth from a university and from community postnatal groups. Sample size was calculated on an estimated effect size of intrapartum care on postnatal anxiety of $r = -.24$ (Ford, 2008), a power of 0.8 and an alpha error of 0.05 (one-tailed). A deliberate attempt was made to recruit women who had never given birth before (nulliparous women; $n = 76$) and women had given birth at least once before (parous; $n = 61$). Women who were currently pregnant were excluded from the study for ethical reasons. Parous women were more likely to be older ($t(133) = 13.0$, $p<.001$). Nulliparous women included more students and greater ethnic diversity. Participant characteristics are presented in

Table 11. Analyses of differences between women in the four experimental conditions found no significant differences in age, education or parity, or between baseline mood or anxiety scores indicating that women were randomised between birth stories successfully (anxiety: $F(3,131) = .53$, $p = .62$; Mood; $F(3,131) = 1.05$, $p = .37$).

- insert Table 1 about here -

Materials and Measures

Birth stories were carefully developed to be valid and discriminative. First, 60 examples of events during birth and 43 examples of support from hospital staff were generated from transcripts of 22 in-depth interviews with women about their perceived support and control during birth. Written accounts of birth in the media were also examined. These lists were checked by two independent researchers for exhaustiveness and

representativeness. The lists were then put online and postnatal women (n = 144) recruited through birth-related websites (e.g. www.babyworld.co.uk, www.nct.org.uk, www.babycentre.co.uk) rated the events as stressful, not stressful, or don't know; and examples of support as supportive, not supportive, or don't know. Women in the sample had a mean age of 34.2 years old (SD: 4.8 years); 46% had one baby, 38% had two babies, and 16% had three or more.

The frequency with which events were endorsed as stressful or supportive was measured on a scale of –100 to +100 by calculating the percentage of women who rated the event as stressful/supportive minus the percentage of women who rated the event as not stressful/unsupportive. Thus, a negative score indicated more women found it not stressful or supportive and a positive score indicated more women perceived it as stressful or unsupportive. From these ratings, 12 pairs of high/low stress events, and 15 pairs of high/low support were chosen (see Appendix 1). Statements were inserted into a skeleton birth story to create four stories with the same basic format, which manipulated stress (e.g. straightforward vaginal delivery versus ventouse delivery) and support (e.g. a caregiver who listens versus a caregiver who does not listen). The four birth stories were classified as: (1) Low stress/high support; (2) Low stress/low support; (3) High stress/high support; (4) High stress/low support. Birth stories are given in Appendix 2. Ten external raters categorised the birth stories correctly with 100% agreement.

In the current study, manipulation checks were carried out after presentation of the birth story by asking participants to rate the strength of their imagination on two 10cm visual analogue scales as follows: "How well did you imagine the story?" (very poorly – very well); "How well did you imagine yourself in the story?" (very poorly – very well). Ability of the stories to evoke affect was checked with two 10cm visual analogue scales

of: “How much were you able to empathise with the person in the story?” (very little – very much); and “How much did you feel any emotions about the story?” (very little – very much). Scores were averaged so strength of imagination and affect each had a possible range of 0 (not successful) to 10 (very successful).

To control for the possibility that previous birth or other experiences influence the strength response to the stories, participants were also asked if they had had any similar experiences, and to rate how much it affected their response.

Demographic characteristics were measured by asking participants to provide their age, educational status, occupation, ethnic origin and how many children they had.

State Anxiety was measured using the State form of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1983), a 20-item questionnaire which asks participants to rate how they feel now, at this moment, endorsing items on a scale of 1 (not at all) to 4 (very much so). Scores are summed with high scores indicating higher anxiety. Internal consistency ranges from .86-.95. Test-retest reliability is low (.35-.36) as would be expected for a state measure of anxiety.

Mood was measured using the UWIST Mood Adjective Checklist (UMACL) (Matthews, Jones, & Chamberlain, 1990). This questionnaire was made up of 24 mood adjectives, picked following factor analysis, as corresponding to a single factor of general arousal. The alpha coefficient for the scale was .75. Participants respond by indicating whether each adjective relates to their current mood on a 4-point scale (definitely – definitely not).

Perceived control in the birth scenario was assessed by 3 items with a 10cm visual analogue response scale as follows: (1) How much control would you imagine you had during those events? (2) Was the amount of control you would imagine you had during

the events more or less than you would expect? (3) Was the amount of control more or less than you would want in that situation? A fourth item measured whether support or stressful events were more important in influencing perceptions of control through asking "What affected this level of control more?" with a forced choice response of "the things that happened" or "the way you were treated".

Procedure

Ethical approval was obtained from the university ethics board and research governance committee. Participants were recruited through emails to university staff and students or attendance at community postnatal groups. Women who were eligible and agreed to take part were given an information sheet, the procedure was explained, written consent obtained, and women allocated to a condition by drawing a number (1 to 4) out of an envelope. The experiment was carried out in the following stages. In stage 1 participants completed measures of demographic characteristics, anxiety (Time 1 STAI), and mood (Time 1 UMACL). In stage 2 participants read one of the four birth stories with the following written instructions: "Please read the following story several times. Please try to imagine that it is you going through this experience, and how you might feel. Please imagine the emotions and thoughts you would have if you were going through this experience. You will be asked to rate how well you imagined yourself in the story after this part of the study". In Stage 3 they completed manipulation check items, time 2 STAI, time 2 UMACL, and perceived control questions. In the final stage participants were given a debriefing sheet explaining the purpose of the study.

Results

Data Screening

Data were screened for missing data and distributions. Missing data occurred for four participants. Two participants had the majority of data missing and were therefore excluded from analyses. Two further participants were missing scores for one of the post-manipulation affect measures so were excluded from analyses of these measures only. In a few cases where one or two items had been missed on affective measures they were replaced by the participant's series mean (Tabachnick & Fidell, 2001). There were no missing data for the control and manipulation scales.

A few variables were significantly skewed (T1 anxiety, T1 mood, T2 control, and T2 manipulation checks). These data were successfully transformed by using Log_{10} (anxiety), square root (control mean), and square root of reverse score (mood and manipulation check means). There were no significant differences in the results of analyses on transformed and raw data, therefore raw data are presented for ease of interpretation. Mean scores and standard deviations for each measure are shown in Table 2.

- insert Table 2 about here -

Manipulation checks

Four checks were carried out to examine the manipulation and possible confounding factors. These were: (i) how well participants imagined the stories; (ii) how well the stories evoked affect; (iii) whether having any similar experience confounded the effect of the birth stories; and (iv) whether previous experience of giving birth confounded the effect of the stories. The results of these manipulation checks are shown in Table 2.

- insert Table 3 about here -

It can be seen that participants reported imagining the story very well and that the stories evoked strong affective responses. Women who had given birth were more likely to say the birth story reminded them of a previous event and that this had a strong impact on how well they imagined the story. However, actual ratings of how well participants imagined the story did not differ significantly between women who had given birth and women who had not. In analyses of mood responses and perceived control, parity was added as a grouping variable to each ANCOVA in an exploratory fashion to check whether previous experience of birth had a significant effect on the way women responded to the stories. There was no significant effect of parity in each model so parity was dropped from the analyses. Similar non-significant effects were found for strength of imagination, whether the story reminded women of a previous experience, and how much they rated this previous experience as affecting them imagining the birth story.

Overall, these results indicate the manipulation was successful. Women found the stories easy to imagine, they evoked significant affect, were not confounded by previous similar experiences, or by having experience of giving birth.

The effect of stressful events and support on anxiety and mood

To ascertain the relative effect of stressful events and support from hospital staff during birth on anxiety and mood 2 x 2 ANCOVAs were performed. Support (high/low) and stress (high/low) were added as fixed factors, and T1 anxiety or mood added as a covariate, with T2 anxiety or mood as the dependent variable. Adding T1 measures of the dependent variable in this way reduces the variance in the dependent variable, effectively leaving only the change in levels of anxiety or mood from before to after the manipulation, thereby increasing the power of the test of grouping variables (Miller & Chapman, 2001).

Table 13 gives the results for each main effect including the effect size (partial eta-squared [η_p^2]). The interaction between stressful events and support was non-significant in both analyses.

- insert Table 4 about here -

It can be seen that both support and stressful events had a significant main effect on anxiety and mood, which is clearly shown in Figure 1. Based on the values of η_p^2, support had a large effect on anxiety and mood while stressful events had a small to medium effect.

Perception of control

Women were asked to rate how much control they thought they would have had during the birth they read. Results are shown in Table 3, which indicates there were significant main effects of support and stressful intervention on women's perception of control, and effect sizes were large. Support had a consistently larger effect on women's perception of control compared to stressful intervention, as was predicted by the second hypothesis. There was also a significant interaction between support and stressful intervention on perceived control, as shown in Figure 1.

- insert Figure 1 about here -

Women were asked what affected their perceived level of control, choosing between events ("the things that happened") and support ("the way you were treated"). Responses to this question showed that in most conditions the majority of women chose support as having the greater effect on control (82% to 97%). The exception was in the condition of high stress and high support, where frequencies were broadly equivalent (57% stress; 43% support).

Discussion

This study examined whether stressful events or support from hospital staff have a greater impact on emotional responses and perceptions of control during birth. As predicted, this study found that the level of support received during birth had a consistently large effect on anxiety, mood, and perceived control. In contrast, events during birth had a small to moderate effect on women's levels of anxiety, mood, and control. There was an interaction between support and events on perceived control during birth, with perception of control uniformly low if support was low. High levels of stressful events reduced the perception of control during the birth only if support was high.

This study adds to our understanding of women's emotional reactions to birth. The results suggest that support from staff during birth has more influence on women's anxiety and mood than the actual events of birth. Furthermore, support has a larger effect on perceptions of control during the birth. A lack of control during birth is associated with postnatal psychological outcomes such as PTSD (Czarnocka & Slade, 2000) and depression (Green & Baston, 2003). Therefore these results add to our understanding of how to maximise perceptions of control and possibly influence postnatal mental health outcomes.

The experimental approach of this study, using vignettes of birth, appeared to induce significant changes in emotions in participants. The majority of previous studies looking at factors affecting psychological and emotional outcomes of birth have used correlational designs (cf. Czarnocka & Slade, 2000; Green & Baston, 2003; White et al., 2006; Wijma, Soderquist, & Wijma, 1997), with some studies employing a prospective methodology so that baseline emotions can be measured in pregnancy (cf. Ayers & Pickering, 2001). In developed countries with accepted standards of obstetric care it is not

usually ethically possible to do real-life experimental studies involving randomisation to address research questions in this area. This type of experimental vignette study therefore offers an alternative method to manipulate variables in birth and, to the knowledge of the authors, has not been widely used in research pertaining to psychological outcomes of birth. This study may therefore provide a benchmark for the development of other studies exploring influences on psychological outcomes of birth.

However, a potential criticism of the experimental approach is that the mood changes induced may not be applicable to real life events and outcomes. It is not clear whether such mood changes can be extrapolated to predict disorders such as anxiety and depression. It is also possible that women's emotional reactions to stories may differ from reactions during real events. However, of note is that whether women had previous experience of giving birth or not did not affect changes in mood or anxiety, or perceived control. To address this criticism, a similar study confirming emotional responses to real life events would be possible if women were grouped according to their experience of stressful events and levels of support following childbirth. The drawback of a study in a real-life setting such as this is that grouping would be non-random, with many confounds, and groups would be of differing sizes. The power of such a study may be low, and the interpretation of results may therefore be difficult. The strength of an experimental study of the kind reported here is that women can be truly randomised into different types of experiences.

The conclusions drawn from this study may also be limited by the convenience sampling. The sample had a restricted range of ethnicity, with over 87% of the sample being of White British or other White origin. This is representative of the area where the sample was collected but means results cannot be generalised to populations with greater ethnic

diversity or of different ethnic origin. Further, the sample was biased towards highly educated women, 89% of whom were university educated or professionally qualified. This study should therefore be replicated in more diverse populations.

These results indicate that offering women more support during birth may reduce the effects of a stressful labour or birth, maximise perceptions of control, and potentially reduce levels of anxiety or trauma in the postnatal period. It may be that a difficult or complicated birth can still have a good psychological outcome with appropriate support, and the results of this study suggest further research is needed to confirm this. It is likely that increasing women's perception of control is also important during events such as birth to maximise positive psychological outcomes. As mentioned previously, helplessness reactions have been linked theoretically with both depression (Seligman, 1975) and PTSD (PTSD diagnostic criteria, DSM-IV, , 1994). The results of this study would suggest that high levels of support can increase perceptions of control during the birth even if it is complicated or stressful.

Furthermore, the results of this study may provide useful information about targeting after-birth trauma interventions (such as debriefing or counselling), at the right women. It is not currently clear who is most at risk of being traumatised by their experience of birth. This study suggests that a lack of support is more important in determining emotional responses than complications during delivery. The implication of this finding is that trauma services targeting women with emergency caesarean sections, for example, may be missing women who are potentially traumatised by their experience of lack of supportive care during birth.

In summary, this study shows that the level of support given to women during birth has a greater effect on women's emotional and anxiety reactions than does the level of

complications or interventions during the birth. Support also has a large effect on women's perception of control during birth. This study supports the notion that one-to-one supportive care during labour and birth is necessary for every woman to maximise positive psychological outcomes in the postnatal period.

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Table 1: Participant Characteristics

Characteristic		**N (%) (*n* = 135)**
Age: mean (SD)		29.02 years (8.3)
Occupation	Student	79 (58.3%)
	Teacher	15 (11.0%)
	Full time mum/housewife	13 (9.5%)
	Manager	4 (29%)
	Nurse	3 (2.2%)
	Other	23 (16.8%)
Educational level	No qualifications	1 (0.7%)
	GCSEs or equivalent	3 (2.2%)
	A levels or equivalent	9 (6.6%)
	Degree	54 (39.7%)
	Postgraduate degree	47(34.6%)
	Professional qualification	20 (14.7%)
Ethnic Origin	White British	106 (77.9%)
	White Other	13 (9.5%)
	Asian Origin	9 (6.6%)
	Black British or African	2 (1.5%)
	Black African	1 (0.7%)
	Middle Eastern	1 (0.7%)
	Mixed	3 (2.2%)
Parity	No previous birth	75 (55.1%)
	1 child	22(16.2%)
	2 children	28 (20.6%)
	3 or more	10 (7.4%)

Table 2: Descriptive statistics

Measure Mean score (SD)	**Whole sample**	**Nulliparas (N = 75)**	**Parous women (N= 60)**	**t-test (sig.)**
State Anxiety (STAI) time 1	33.38 (8.77)	35.27 (9.30)	31.01 (7.48)	2.88 (.005)
State Anxiety (STAI) time 2	40.19 (12.70)	42.45 (12.07)	37.32 (12.99)	2.36 (.02)
Mood Checklist (UMACL) time 1	74.58 (10.35)	72.13 (10.89)	77.64 (8.80)	-3.18 (.002)
Mood Checklist (UMACL) time 2	67.55 (13.06)	65.01(12.16)	70.78 (13.55)	-2.59 (.01)
Perception of control rating	3.05 (2.41)	2.87 (2.28)	3.26 (2.57)	-.94 (ns)

Table 3: Summary of manipulation check scores

Measure	Whole sample	Nulliparous women (n = 75)	Parous women (n = 60)
Strength of imagination (mean, SD)	7.39 (1.59)	7.24 (1.39)	7.57 (1.80)
Strength of affective response (mean, SD)	7.47 (1.71)	7.55 (1.34)	7.37 (2.09)
Reminded of personal event: Yes	69 (50.7%)	15 (20.0%)	54 (90%)
Birth	48 (35.3%)	-	48 (80%)
Miscarriage	2 (1.5%)	-	2 (3.3%)
Operation or hospital visit/stay	11 (8.1%)	9 (11.7%)	2 (3.3%)
Dentist	2 (1.5%)	2 (2.7%)	-
Working in hospital	1 (0.7%)	1 (1.3%)	-
How much previous event affected imagining story (mean, SD)	7.61 (2.21)	6.18 (2.91)*	8.02 (1.81) *

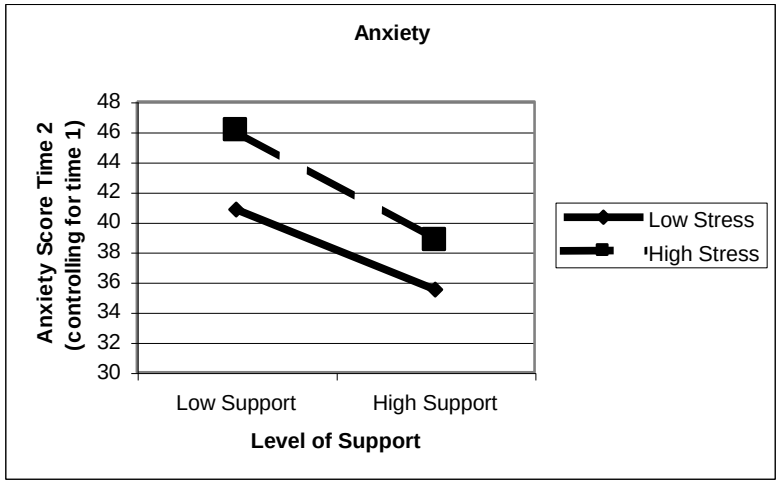
* $t(66) = 3.01$, $p = .004$

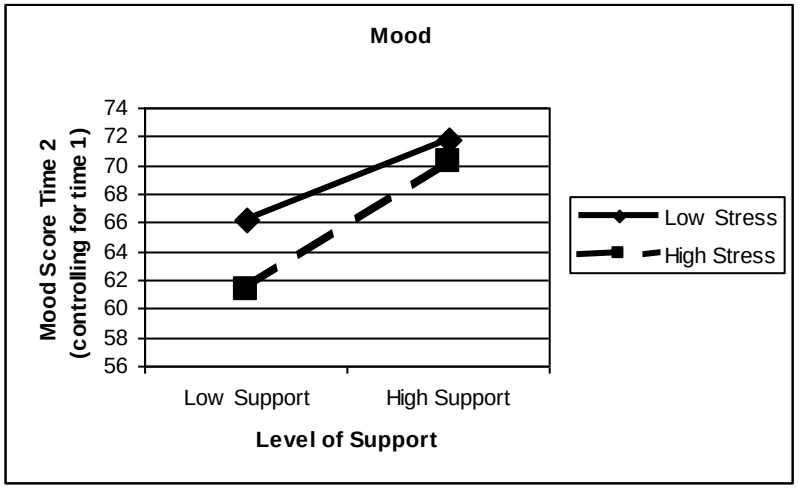
Table 4: Mean scores and ANCOVA for birth stories with high/low stressful events and high/low support

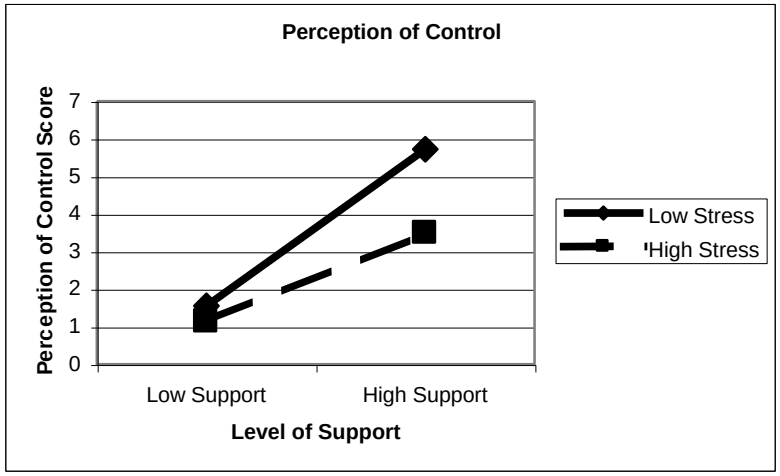
	Support		Stressful events				
	Low	**High**	**Low**	**High**	**Main effect**	**Main effect**	
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Support**	**Stressful Events**	**Interaction**
Anxiety*	43.63 (13.55)	37.23 (11.17)	37.95 (13.09)	42.17 (12.08)	$F(1,129) = 16.61$, $p<.001$, $\eta_p^2 = .11$	$F(1,129) = 7.00$, $p = .009$, $\eta_p^2 = .05$	$F(1,129) = 0.26$, $p = .61$, $\eta_p^2 = .002$
Mood*	63.66 (13.31)	71.00 (11.90)	69.17 (13.08)	66.07 (12.96)	$F(1,129) = 24.00$, $p<.001$ $\eta_p^2 = .16$	$F(1,129) = 3.91$, $p = .05$, $\eta_p^2 = .03$	$F(1,129) = .068$, $p = .80$, $\eta_p^2 = .001$
Control	1.33 (1.23)	4.54 (2.18)	3.77 (2.65)	2.39 (1.97)	$F(1,131) = 137.81$, $p<.001$ $\eta_p^2 = .51$	$F(1,131) = 22.75$, $p<.001$ $\eta_p^2 = .15$	$F(1,131) = 10.59$, $p = .001$ $\eta_p^2 = .08$

* Covariate of measure at time 1 was added into the model, both time 1 covariates had a significant effect.

Figure 1: Effect of stressful events and support on anxiety, mood, and perceived control during birth







Appendix 1: Paired items of support during birth and stressful intervention during birth

High support (+) Low Support (-)

1. Greeted by nice midwife (+88.5); made to wait, no intro from midwife (-79.9)
2. They gave me loads of information (+76.8); I didn't get any information, (-79.6)
3. They told me what was going on (+88.0); they weren't willing to talk to me (-91.4)
4. They showed me new ways of coping with the pain (+83.0); I was left to cope on my own (-76.1)
5. I had a midwife with me most of the time (+85.2); I was left on my own for a long time (-73.0)
6. They realised the pain I was in (+91.5); they contradicted me when I said I was in pain (–86.1)
7. They were supportive of what I wanted (+91.4); I wasn't given any choice (-88.3)
8. They said encouraging things (+93.7); they were quite business like (-41.6)
9. The new staff introduced themselves clearly (+88.5); strangers came into the room and started doing things (-79.9)
10. They gave me loads of information about what was happening (+76.8); I wasn't given much information (-79.6)
11. They accepted I would have individual needs (+92.3); I felt like I was on a conveyor belt (–91.3)
12. I had one midwife all the way through (+83.0); there were loads of people in the room (–78.8)
13. When I was worried, they reassured me (+95.8); they dismissed things I said to them (-89.9)
14. They were kind and reassuring (+95.8); they didn't really talk to me (–78.3)
15. They gave me a reason why things were happening (+87.3); they just got on with what they were doing (-29.5)

High Stress (+) Low Stress (-)

1. Painful contractions (+45.1); mild contractions (–81.8)
2. Continuous back pain/feel sick (+30.3); Contractions fast and regular (–17.4)
3. Epidural (+48.9); Walking around, TENS machine (–81.9)
4. Strapped to monitor, can't get heart beat (+64.9), so have internal monitor (+51.4); Midwife listening to heartbeat by hand (-78.1)
5. Told the baby is in distress (+72.0); Strong heart rate (not rated)
6. Being made to lie on back (+52.1); Choose own position (–74.4)
7. Pushing not achieving anything (not rated); Pushing baby out (+18.1)
8. Having episiotomy, (+43.3) and ventouse (+56.5); Baby's head crowning (-14.6)
9. Baby taken away to check (+37.3); Baby put straight on chest (–83.9)

10. Baby given oxygen before whimpering, (+65.7); Baby crying lustily (–71.8)
11. Placenta slow to come out, worried (+47.5); Placenta delivered quickly (–69.9)
12. Stitches (+19.7) with lost blood (+47.9); Stitches (+19.7) without much blood (not rated)

Appendix 2. Birth stories

A (High Stress + High Support)

My contractions started one morning when I was at home. My partner was very concerned and helpful. The contractions were mainly painful.

After 4 hours I decided it was time to go to hospital. When we got there, I was greeted by a nice midwife who took me to a delivery room. When I was there I lay on the bed and she examined my bump to feel the contractions, and checked me to find out what stage of labour I was at. She gave me loads of information and told me what was going on. The pain was increasing at this point. The midwife showed me new ways of coping with the pain. She stayed with me from this point on.

After another 4 hours I had continuous back pain and felt sick. The midwife realised how much pain I was in. I decided to have an epidural (to numb me from the waist down). The midwife was supportive of what I wanted. The midwife wanted to check how the baby's heart rate was doing. She strapped a monitor round my belly, but couldn't find a heartbeat, so a doctor attached an electrode to my baby's head inside me. They said my baby was in distress. The midwife was alongside me and saying encouraging, positive things.

At this point there was a shift change and my midwife left. The new midwife introduced herself clearly to me. I had reached the pushing stage, and I had to lie on my back. The midwife gave me loads of information about what was happening and she accepted I had individual needs. The pushing wasn't achieving anything so the doctor came back in, cut my vaginal opening, and used a ventouse (suction cap) to pull the baby out. My midwife was there with me all the way through.

Then my baby was born and was taken away to be checked. When I was worried about him, they reassured me. The baby was given oxygen before making some small sounds. It was time to deliver the placenta, and it was slow to come out. The midwife was kind and reassuring. After that I needed to be stitched up. The midwife kept telling me the reason why they needed to do things. I lost quite a bit of blood.

Then they left me and my partner to cuddle our new baby boy.

B (Low Stress + High Support)

My contractions started one morning when I was at home. My partner was very concerned and helpful. The contractions were mainly mild.

After 4 hours I decided it was time to go to hospital. When we got there, I was greeted by a nice midwife, who took me to a delivery room. When I was there I lay on the bed and she examined my bump to feel the contractions, and checked me to find out what stage of labour I was at. She gave me loads of information and told me what was going on. The pain was increasing at this point. The midwife showed me new ways of coping with the pain. She stayed with me from this point on.

After another 4 hours contractions were fast and regular. The midwife realised how much pain I was in. I decided to walk around more using the TENS machine,. The midwife was supportive of what I wanted. The midwife wanted to check how the baby's heart rate was doing. She listened to the heartbeat with a hand-held device. The heartbeat was loud and strong. The midwife was alongside me and saying encouraging, positive things.

At this point there was a shift change and my midwife left. The new midwife introduced herself clearly to me. I had reached the pushing stage, and I chose a position which was comfortable for me. The midwife gave me loads of information about what was happening and she accepted I had individual needs. The pushing was moving the baby down and then its head was crowning. My midwife was there with me all the way through.

Then my baby was born and was put straight on my chest. When I was worried about him, they reassured me. The baby cried loudly. It was time to deliver the placenta, and it came out quickly. The

midwife was kind and reassuring. After that I needed to be stitched up, the midwife kept telling me the reason why they needed to do things. I didn't lose much blood.

Then they left me and my partner to cuddle our new baby boy.

C (High Stress + Low Support)

My contractions started one morning when I was at home. My partner didn't seem interested and left me to get on with it. The contractions were mainly painful.

After 4 hours I decided it was time to go to hospital. When we got there, I was made to wait and a midwife, who didn't introduce herself, took me to a delivery room. When I was there I lay on the bed and she examined my bump to feel the contractions, and checked me to find out what stage of labour I was at. She wasn't willing to talk to me, and I didn't get much information about what was going on. The pain was increasing at this point. The midwife left me on my own to cope with the pain. She left me on my own for long periods of time.

After another 4 hours I had continuous back pain and felt sick. The midwife contradicted me when I said I was in pain. I decided to have an epidural (to numb me from the waist down). The midwife didn't really give me a choice about my options. The midwife wanted to check how the baby's heart rate was doing. She strapped a monitor round my belly, but couldn't find a heartbeat, so a doctor attached an electrode to my baby's head inside me. They said my baby was in distress. The midwife was quite business like about it.

At this point there was a shift change and my midwife left. Strangers came into the room and started doing things without introducing themselves. I had reached the pushing stage, and I had to lie on my back. They didn't give me much information and I felt like I was on a conveyor belt. The pushing wasn't achieving anything so the doctor came back in, cut my vaginal opening, and used a ventouse (suction cap) to pull the baby out. There were loads of people in the room.

Then my baby was born and was taken away to be checked. When I was worried about him, they dismissed the things I said to them. The baby was given oxygen before making some small sounds. It was time to deliver the placenta, and it was slow to come out. The midwife didn't really talk to me. After that I needed to be stitched up. The midwife just got on with it. I lost quite a bit of blood.

Then they left me and my partner to cuddle our new baby boy.

D (Low Stress + Low Support)

My contractions started one morning when I was at home. My partner didn't seem interested and left me to get on with it. The contractions were mainly mild.

After 4 hours I decided it was time to go to hospital. When we got there, I was made to wait and a midwife, who didn't introduce herself, took me to a delivery room. When I was there I lay on the bed and she examined my bump to feel the contractions, and checked me to find out what stage of labour I was at. She wasn't willing to talk to me, and I didn't get much information about what was going on. The pain was increasing at this point. The midwife left me on my own to cope with the pain. She left me on my own for long periods of time.

After another 4 hours contractions were fast and regular. The midwife contradicted me when I said I was in pain. I decided to walk around more using the TENS machine. The midwife didn't really give me a choice about my options. The midwife wanted to check how the baby's heart rate was doing. She listened to the heartbeat with a hand-held device. The heartbeat was loud and strong. The midwife was quite business like about it.

At this point there was a shift change and my midwife left. Strangers came into the room and started doing things without introducing themselves. I had reached the pushing stage, and I chose a position which was comfortable for me. They didn't give me much information and I felt like I was on a

conveyor belt. The pushing was moving the baby down and then its head was crowning. There were loads of people in the room.

Then my baby was born and was put straight on my chest. When I was worried about him, they dismissed the things I said to them. The baby cried loudly. It was time to deliver the placenta, and it came out quickly. The midwife didn't really talk to me.After that I needed to be stitched up. The midwife just got on with it. I didn't lose much blood.

Then they left me and my partner to cuddle our new baby boy.