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**Does childbirth experience affect infant behaviour? Exploring the perceptions of
maternity care providers**

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Abstract

Objective – High levels of childbirth interventions are known to increase risk of health complications for mother and infant, alongside having a negative impact upon maternal wellbeing. However less is understood about how childbirth experience may affect infant behaviour (e.g. how calm or unsettled an infant is). This study explores maternity care provider perceptions of how and why childbirth experience may affect infant behaviour.

Design – A qualitative semi-structured interview study

Setting – Bristol, Swansea and West Wales, UK

Participants – 18 maternity care providers

Measurements and findings – A semi-structured interview schedule was developed to explore maternity care providers' perceptions of how maternal experience of childbirth

could influence infant behaviour. Findings highlighted how maternity care providers perceived childbirth experience to sometimes impact positively or negatively on infant behaviour. A calmer birth and postnatal experience was believed to lead to a calmer infant, whilst physical and emotional stress was associated with more challenging infant behaviours such as crying and being unsettled. Pathways were perceived to be direct (pain and stress during birth might physiologically affect the infant) and indirect (birth was perceived to affect maternal wellbeing and subsequently her interactions with her baby). However, postnatal factors such as skin to skin, postnatal environment and emotional support were believed to mediate these impacts.

Key conclusions – Birth experience was considered to affect infant behaviour. Promoting as positive a birth experience as possible, including postnatal care, was viewed as significant in supporting positive infant behaviours. Maternity care providers believed this could help facilitate bonding, attachment, and mother-infant wellbeing in the postnatal period.

Implications for practice – The findings highlight maternity care providers' views concerning supporting normal birth and protecting emotional wellbeing during birth and postnatally. Where interventions are necessary, ensuring a calm environment, and enabling normal postnatal behaviours such as skin to skin and breastfeeding were perceived as important. Midwives, it was claimed, need time to nurture mothers alongside providing physical care.

Limitations – Participants were self-selecting and might therefore have been biased.

Key Words: Childbirth Perceptions; Childbirth Interventions; Infant Temperament; Baby Behaviour; Skin to Skin; Breastfeeding

Introduction

In the UK, the number of women experiencing 'normal' birth is debated, with quoted figures ranging from 19.9 to 40 per cent (Royal College of Midwives, 2016). Whilst sometimes lifesaving, procedures such as induction and caesarean sections are occurring at a higher rate than ten years ago (NHS Maternity Statistics Wales 2015-16; NHS England 2016-17; NMPA, 2017). These interventions entail risk, and normal birth is associated with better physical health outcomes for the mother-infant dyad (Lydon-Rochelle et al., 2000; Hansen et al., 2008; McIntyre et al. 2013; WHO, 2018). Furthermore, a complicated birth experience can increase risk of postnatal depression (Fisher et al., 2005), post-traumatic stress disorder (Ryding et al., 1997; Ayers et al., 2008), and may disrupt mother-infant bonding (Rowe-Murray and Fisher, 2001). Promoting normal birth wherever possible could therefore be central to supporting maternal and infant physiological and emotional wellbeing.

It has also been considered that birth experience may further impact the infant, and infant-mother relationship. Limited research has explored whether childbirth could influence infant behaviour, highlighting how obstetric complications are associated with unsettled behaviour in the days after birth (Lester and Brazelton, 1982; James-Roberts and Conroy, 2005; Douglas and Hill, 2013). There are several reasons why this may occur, including possible residual pain in the infant from procedures such as forceps, or medications used during labour (Taylor et al., 2000; Ransjo-Arvidson et al., 2001; Brown and Jordan, 2013). High cortisol levels circulating during labour might also overstimulate an infant's hypothalamic-pituitary-adrenocortical axis, leaving them in a state of arousal, and potentially altering their stress response (Douglas and Hill, 2013).

However, how maternal psychological experience of childbirth might indirectly affect her infant's behaviour has yet to be fully considered. We know more broadly that a difficult birth can affect maternal mood (Ford and Ayers, 2009), and maternal mood may alter perceptions of infant behaviour (McGrath et al., 2008); depressed mothers can struggle to bond with their infants (Figueiredo et al., 2008), and infants appear to sense negative maternal mood, becoming more unsettled (McMahon et al., 2001). Wider factors such as birthing environment and support (Hofemeyr et al., 1991) or the mother's personality (Johnston & Brown, 2012) might also play a role.

Nonetheless, research directly exploring the link between maternal childbirth experience and infant behaviour is sparse. Therefore, the purpose of this initial exploratory study was to investigate whether maternity care providers perceived birth experience to impact upon early infant behavior, and if so, the mechanisms they observed to be potentially influential.

Method

Participants

Eighteen maternity care providers were recruited from Bristol, Swansea and West Wales, UK. Three types of care provider were chosen based on the extensive time they spend with mothers before, during and post birth, and according to the range of infants they oversee. These included 11 Midwives, who care for women and infants during labour, birth and postnatally [6 hospital based and 5 community], 4 Health Visitors (who care for mothers and their infants after birth), and 3 Doulas (who provide emotional support to mother and baby during pregnancy, birth and beyond). Average years spent in professional practice were 14.94 (SD:8.56) [range 1-36]. Obstetricians and paediatricians were not included in this study as they are generally involved only in clinical births or births with complications.

Measures

A qualitative semi-structured interview schedule was designed to explore maternity care providers' perceptions of how birth experience may affect infant temperament (Table 1).

Table 1. Open-ended interview schedule

- | |
|--|
| <ol style="list-style-type: none"> 1. How long have you been a practising midwife / health visitor / doula? 2. In your opinion, how if at all do you think a baby's behaviour may be influenced by his or her experience of being born? 3. In your opinion, how if at all do you think the experience of childbirth affects the mother's feelings and behaviour towards her baby? |
|--|

Procedure

Ethical approval was obtained from the Department of Psychology Ethics Committee, College of Human and Health Sciences, Swansea University. The research was conducted according to the principles of the 1964 Declaration of Helsinki.

Maternity care providers were recruited via advertisements placed in health centres, a university, and mother and baby clinics or venues. Interested participants contacted the researcher for further information and a convenient time and location was arranged. On meeting, participants read a study information sheet and provided their informed consent.

Data analysis

Audio recordings were transcribed in full, and a thematic analysis was performed to identify themes and subthemes (Braun and Clarke, 2006). Qualitative description techniques were used to summarise the data, extracting facts and meaning where 'given clearly' by participants (Sandelowski, 2000; 2009). Data saturation was reached (Breakwell, 2006) and recruitment was halted once no new information was consistently being yielded by participants. Validity of themes and inter-rater reliability of the coding process was established through confirmation by a second coder. Confidentiality of participants was ensured by allocation of a number in place of their name.

Trustworthiness

The four measures of Lincoln and Guba's evaluative criteria (1986) were adhered to as closely as possible in a qualitative research study of this sample size, to help ensure the trustworthiness of the research findings. Credibility in the truth of the findings was established by using a meticulous and systematic approach to recording the data (Lorelli et al., 2017) and continuing the research until similar observations, beliefs and opinions began to appear. The results were considered dependable and insightful due a rigorous data analysis process using logical, clearly documented and validated methods of coding and description (Braun & Clarke, 2006; Sandelowski, 2009; Lorelli et al., 2017). They were confirmed as trustworthy by the involvement of a second analytic coder, and fully disclosed for readers to make their own judgement. This detailed analysis meets Lincoln and Guba's criteria of 'thick description' (1986), therefore transferability could apply to similar contexts. The results are therefore confirmed as being clearly derived directly from the data by strict adherence to Lincoln and Guba's definitions of credibility, transferability and dependability (1986), and by following the 'Means of Establishing Trustworthiness' by Lorelli et al. (2017).

Results

A total of six themes and seventeen subthemes were established (Table 2).

Table 2. Thematic analysis outline of maternity care providers' observations

a) Perceived Direct impact of birth upon infant behaviour

Themes	Sub-themes
Physical Birth Process	Normal birth
	Interventions
	Hormones
	Pain relief
Early Postnatal Moments	Baby behavior post birth: <i>baby mirrors mother</i>
	Environment
	Events: <i>skin-to-skin; separation</i>

b) Perceived impact of birth on maternal interactions with and perceptions of infant

Themes	Sub themes
Birth Experience	Physical experience of birth
	Emotional experience of birth
Expectations and Postnatal Perceptions	Birth process
	Breastfeeding
	Mothering
Relationships	Birth: partner/midwife
	Post birth: baby
	Perinatal: social support
Maternal Postnatal Wellbeing*	Impact on baby
	Opportunity to debrief

*defined here as the physical and emotional state of the mother post childbirth

The results are presented under two key questions:

Question one: Do maternity care providers believe infant behaviour to be directly affected by birth?

Almost all participants (94%, N = 17) believed that physical birth experience could influence infant behaviour. A straightforward birth was perceived to precede infants who were *'easy, predictable, settled and soothable'*, whilst a challenging birth was more often associated with infants who were *'difficult, irritable, tense, needy, fussy and unsettled'*.

This relationship was viewed as complex: Physical processes during the birth might affect the infant, whilst infant behaviour could influence how parents interacted with their baby.

"The birth does affect the baby and then of course it does have, you know, an effect on the physical and mental wellbeing and the stability of the family as well so that affects how the baby's being cared for and how, you know, they generally attach and bond with that newborn." (Health Visitor 4)

However, birth was considered one of several influential factors upon infant behaviour.

"I think it's easy to assume that the birth experience a baby goes through has a huge impact on its temperament or its behaviour after that point or its feelings when actually it's one of many elements I think." (Midwife 7)

Two broad themes were established relating to possible mechanisms by which it was considered birth might affect infant behaviour: the physical birth process and early postnatal experience.

A. Physical birth process

The physical experience of being born and the occurrence of complications and interventions were widely recognised as factors that may affect neonatal behaviour.

a) Normal birth

Overall, participants believed that normal birth promoted more settled infant behaviour.

“I think there’s something about the natural experience of the progression of labour I think which is somehow a bit more predictable for a baby.” (Health Visitor 1)

Waterbirths in particular were perceived as calming and gentle for the infant, with a positive effect on newborn behaviour.

“A lot of the time you do see babies that are born, particularly in water, they do seem very settled. It’s almost like they haven’t realised that they’ve been born.” (Midwife 11)

b) Interventions and other factors influencing infant behaviour

Conversely, interventions during labour, and particularly instrumental deliveries, were seen to adversely affect the infant.

“There are obvious cases where if the baby’s been pulled out by forceps and had a shoulder dystocia on the way, and come out with literally birth trauma, you know, a massive bruise on its face and a palsy and a broken clavicle, then clearly that baby is going to be uncomfortable and probably fractious and probably not feed well. In those cases, clearly the birth experience that a baby goes through affects what it then goes on to experience and how it then behaves.” (Midwife 7)

Some considered negative birth effects to diminish within a few days, whereas others thought it may take longer and could be facilitated by sensitive care.

“Some effects will continue for a long time afterwards, I think, in terms of trauma... Holding them, picking them up and touching them when they have a headache or they’ve been pulled out and they’ve got obvious bruising – they can find that very painful.” (Midwife 6)

Babies born by planned Caesarean section were regarded as calmer by some, with others arguing that the shock of being ‘whipped out’ could pose adjustment difficulties. Meanwhile, an emergency Caesarean occurring after a long and difficult labour was considered traumatic for both mother and infant.

“When you’re looking at complications, interventions such as ventouse delivery, forceps delivery, and Caesarean sections, heart dips and so forth, you know, trauma in the last couple of minutes of the delivery, obviously that is going to have some sort of impact on the way the baby is.” (Health Visitor 4)

The infant's positioning in the womb was also considered important as malpositioned babies could sometimes experience a longer labour or assisted birth.

"... So, whether, you know, even if the baby's not had an instrumental delivery it can perhaps, you know, it can be in a slightly awkward position in pregnancy or birth. It means it comes out and has a bit of a neck ache and a bit of a headache..." (Midwife 7)

Long, complicated labours were widely assumed to produce more 'difficult' infant behaviour, although the concept of shorter births being problematic was also raised.

"It seems to be more of the quick delivery ones that seem to sort of arrive in a state of shock... because they sometimes perhaps are a little bit more fretful, and sometimes perhaps a little bit more difficult to feed." (Health Visitor 3)

c) Hormones

Birthing hormones such as oxytocin were believed to play a positive role, whilst stress hormones such as cortisol were considered to disrupt newborn infant behaviour.

"We know that that cortisol is passed through into the bloodstream of the baby, because obviously the baby's still inside, and whatever the birth experience if there's been a trauma of sorts then the adults will be experiencing stress, and babies are very much in tune with stress and stressors." (Health Visitor 4)

The perceived missed opportunity to 'build up' positive birthing hormones during a complicated or fast birth was also raised.

"It's like a dance between the mums and babies, both of them, but if the baby hasn't had any of that, you know the hormones or any of the adrenaline, any of the head moulding or anything else that happens in the process of birth and it's just whipped out, then I think it could affect them." (Midwife 6)

d) Pain relief

Medications used during labour were felt to affect the infant. Pethidine in particular was perceived to increase the likelihood of a newborn being sleepy, fretful, and difficult to feed.

“Things like pethidine for pain control, you know, they’re quite strong opiates... those babies can be quite difficult to attach onto the breast for instance, they’re quite sluggish, you know, because of the effects of the drugs, so there are definite physical effects that can affect a baby’s attachment and behaviour.” (Health Visitor 4)

This was thought to have a negative psychological impact on the mother, potentially causing distress to mother and infant if breastfeeding then proved problematic.

“The baby’s sleepy and uninterested or just irritable after the birth... Nowadays everyone ends up expressing and syringe feeding the babies which is disempowering for the mothers and their ability to breastfeed... The mothers may get really distressed if they feel they can’t feed their baby, and the baby picks up on their distress and so the baby gets distressed.” (Midwife 10)

These responses were fairly consistent and showed a general consensus of opinion among participants that birth might have a direct physiological impact on early infant behaviour.

B. Early postnatal moments

The second theme identified events immediately after childbirth such as maternal reaction, skin to skin and the postnatal environment as potentially also affecting infant behaviour.

a) Baby mirrors mother

Participants discussed how infant awareness of maternal emotions appeared to affect their behaviour. If mothers were stressed, the infant may become unsettled, possibly further affecting bonding and attachment between mother and baby.

“You can see the baby mirroring how the mother’s feeling, and we see it often, so there’s this baby that’s basically living on his nerves – very twitched, very insecure, hates being put down, very rarely settles, almost on alert, you know, not quite sure what’s gonna come next. And even in the mums who haven’t had a hugely traumatic birth, if their anxiety levels are high after, and they’ve just got general worries, concerns, anxieties, even that you can see in a baby’s behaviour.” (Health Visitor 3)

Newborn infants were considered social creatures, seeking out contact and interaction with their mother. If mothers struggled to engage and respond to this, some participants believed that infants could also become withdrawn, mirroring their mother's behaviour.

"Mums who are, you know, postnatally depressed, and not able to give the non-verbal contact to the baby, we know that those babies shut down quite quickly... A lot of people are oblivious to the fact that babies are very attentive to communication and stimulation in the early months. People can be very naïve as regards to the fact that, you know, they kind of think that the baby just eats and sleeps..." (Health Visitor 4)

b) *Environment*

Many also believed the infant to respond to its birthing environment: If the atmosphere was tense, they observed the infant to react accordingly.

"I think we underestimate how much they pick up on atmosphere, you know, and how raised voices and the environment generally raised, bright lights and, you know, stressful environment; I think they clearly, very clearly respond incredibly to a calmer environment, dimmed lights, not too much noise..." (Midwife 7)

c) *Events: skin-to-skin and separation*

'Skin to skin' contact between mother and infant was perceived as a calming, soothing influence, supporting both infant and maternal wellbeing after a difficult birth. This was thought to extend through the postnatal period, helping mothers to process their birth.

"The mothers who are battling with postnatal depression, with detachment, distance from babies, I always make sure with them, you know, I'm saying, 'You do skin to skin as often as you can' because in my head I think if I can get some oxytocin going somewhere, you know, maybe that mothering instinct to want to hold, to nurture, love, care for, protect, will kick in and override all of that cortisol and whatever else is swimming around her brain..." (Health Visitor 3)

However, mothers and infants were said to be frequently separated in the early hours due to maternal exhaustion or the hospital environment.

“The idea is that babies always stay in the same place as the mothers while they’re in hospital, but again if, maybe not because of the trauma, maybe not because of the birth itself, I think because of the hospital environment which is quite a sort of noisy, disruptive environment, you find a lot of mums do end up having babies taken away at night. So sometimes babies will come out and stay with the midwives over night for one or two hours which does give the mother time to sleep but it’s still a separation.” (Midwife 3)

Question two: Do maternity care providers believe that a mother’s experience of birth might indirectly impact her infant?

Here, the concept of maternal birth experience as affecting her behaviour towards her baby, and subsequent observations regarding infant reaction and behaviour, were explored.

A. Birth experience

Every participant believed that maternal experience of childbirth could influence her perceptions of, and interactions with, her infant. Within this, 72% (N = 13) considered the physical impact of a difficult birth to be significant and 83% (N = 15) discussed potential emotional consequences.

a) Physical experience of birth

Maternal feelings and behaviour towards the infant were thought to depend in part on the physiological nature of the birth experience. Maternal pain and exhaustion, often increased by physical interventions, were felt to affect her interactions with her baby, including her feeding decisions.

“If birth does involve a lot of intervention or has been a very long or exhausting process, I think women will often find themselves too physically exhausted to interact with the baby as much as they would have liked to and I witness that a lot, especially after a Caesarean section: the physical exhaustion can be quite sort of detrimental and they can be much more likely to want the midwife to take the baby, or more likely to bottle-feed as well rather than breastfeed.” (Midwife 3)

The hormonal impact of oxytocin was considered particularly important in supporting a mother to bond and care sensitively for her infant.

“Oxytocin is probably far more important than we really think... It’s actually extremely important for the fourth trimester (after birth) where oxytocin is needed for mother and child bonding, promoting breastfeeding, promoting motherly love, which is ultimately a survival mechanism for the baby.” (Doula 3)

b) Emotional experience of birth

Participants believed that maternal emotional experience could also affect her baby. When participants described how they perceived a traumatic birth to affect the mother, they tended to use emotive words such as ‘*resentment, grief, battling, trying to cope, isolation, desperation, sadness, and self-blame*’, which were thought to adversely affect mother-infant interactions. Participants also felt that complications might reduce maternal confidence in her body and herself, consequently affecting her feeding and care behaviours.

“I think if they’ve had a difficult birth then it might knock their confidence, inevitably, so their faith in their body, their ability to maybe breastfeed, and their ability to care for the baby.” (Midwife 6)

In contrast, a positive birth experience was felt to empower the mother, increasing her confidence in caretaking.

“I think if women have a positive birth experience then they’re more likely to feel really good and empowered so I think they’ll probably feel more confident about their ability as a mother to start with.” (Midwife 6)

However, some participants emphasised that the birth experience did not always affect maternal behaviours. Maternal resilience was believed to override complications in some instances, with mothers able to birth and care for their infant regardless.

“I always think that women who seem to do really well, and carry on doing really well, are just like the ones who just accept everything they have to do. They have to give birth to their child and so they feel confident in their ability and they just do it, and it just seems to flow. They seem to deal with everything quite well really.” (Midwife 5)

B. Maternal expectations of birth and her baby

An important element of a mother's interactions with her baby was felt to be her expectations of the birth and postnatal experience. Participants spoke of the frequent disparity between maternal expectations and experiences, which they believed could cause a mother to feel *'disappointment, guilt, grief'* or even *'traumatised'*, possibly then impacting negatively on the new mother-infant relationship.

"There are times when women can be quite taken by surprise by the trauma of birth and can find themselves in a bit of a place they didn't expect to be" (Midwife 3)

These expectations were linked to the birth and feeding, and more widely to motherhood.

a) Birth process expectations

Maternal expectations of birth were considered to strongly affect how she felt post birth. Whilst a positive experience matching her expectations could be empowering, a mismatch could leave her feeling demoralised, which may then affect her ability to care for her infant.

"I often think the preconceived ideas about how birth will go ... heavily influence the experience ... that also then has a huge influence on the parenting journey – how that is shaped and formed at the very early stages." (Health Visitor 3)

b) Breastfeeding expectations

Expectations around infant feeding also mattered. One participant highlighted how mothers could sometimes feel like a failure if they struggled with breastfeeding, particularly when following their own or others' high expectations. This might influence how a mother felt about her infant.

"If the baby's drugged up for the first 6 hours and not interested there's pressure on the mum to feed and then she gets upset with her baby." (Midwife 10)

c) Mothering expectations

Maternal expectations of being a mother were said to include a belief that she will feel instant love for her newborn. Participants felt this internal pressure could also lead to

feelings of failure when it did not occur immediately, particularly after a difficult birth where mother or infant may be experiencing pain or medication effects.

“In the real world having a baby can be one of the most traumatic experiences. I think, you know with modern life, people expect it to be happy and, you know, the most fantastic thing that’s ever going to happen to them, and the reality sometimes can be very very far from that.” (Health Visitor 4)

C. The impact of relationships

Maternal relationships were perceived to affect her feelings about herself and her infant. If she felt supported, informed, and cared for by those around her including her partner, family and healthcare professionals, she would be empowered to care for her baby. Conversely a lack of this support could leave her feeling detached and disempowered.

“She will be more traumatised by her experience if she feels unsupported or ill-informed.” (Midwife 10)

a) During the birth

One key time point for such support was felt to be during the birth, from her partner and midwife. Support could enable a better birth experience, which in turn would benefit the infant.

“Without the support, it’s very hard for women to have a really good experience. I do think it’s a really pivotal thing to feeling confident as a parent... A birth isn’t just creating a baby but creating a mother as well.” (Midwife 5)

b) Postnatally

Social and emotional support of the mother from healthcare professionals and family during the postnatal period was believed to be as crucial to the mother’s emotional state as the birthing experience itself.

“Support that she gets postnatally from her partner, from her family, can all have a massive influence.” (Midwife 1)

Support on the postnatal ward was defined as a protected space, practical guidance, or simply being present.

“If there was some way that women were, I don’t know, allowed to have more peace on the ward, or there were more midwives at the bedside to make sure babies are feeding and settling properly.” (Midwife 3)

c) Relationship with her baby

Participants also discussed the importance of a mother’s relationship with her infant. The birth was believed to sometimes affect how a mother felt about her baby – consciously or subconsciously. A positive experience was felt to promote bonding and attachment, whilst pain and complications could potentially damage this.

“Birth experience is vital, absolutely vital, pivotal, to that transition then into parenthood, you know getting that secure attachment early on.” (Midwife 6)

“How can you feel connected to a baby that’s caused you lots of pain and that’s brought up issues for you... if you just feel disempowered, abused, mistreated?” (Midwife 5)

However, one midwife considered the possibility of a difficult birth aiding rather than deterring the bonding process. When mothers had felt scared for the wellbeing of their infant, the relief of them being here could possibly promote bonding behaviour.

“I’m just wondering maybe does a traumatic birth sometimes make the mother ... sort of more keen to bond with the baby, more tactile and more attentive.” (Midwife 3)

D. Impact of postnatal maternal wellbeing on infant

Overall maternal physical and emotional wellbeing during the postnatal period was felt to affect how well she coped with her new role as mother.

a) Impact on baby

Many participants debated the potential direct and indirect consequences of childbirth affecting a mother’s ability to care intuitively for her infant.

“I do worry about this idea that... her pain, her discomfort, her thoughts, her feelings about this whole process that’s just gone on, and (she) is then handed this little baby who’s completely dependent on her, and can just struggle with tuning in to what that baby needs because all of her wants and needs are all consuming almost. So, I do feel that it does impact hugely on that early days’ relationship.” (Health Visitor 3)

b) Opportunity to talk

The chance to debrief was considered vital to postnatal maternal wellbeing and a mother’s ability to cope with her newborn. One health visitor spoke regretfully about an abolished debriefing service in her area.

“It was a way of getting rid of all this negative emotion.” (Health Visitor 2)

Another mentioned the usefulness of debriefing to mitigate future problems.

“I do worry about how we diagnose postnatal depression as the answer is, ‘Let’s use some pills to sort you out’ whereas sometimes I think almost debriefing, and allowing mothers to just talk about the experience, and allow them to grieve the experience they didn’t have...” (Health Visitor 3)

Discussion

This study explored maternity care providers’ perceptions of how birth experience might impact infant behaviour. The qualitative nature of the study allowed a full and rich exploration of the observations, beliefs and experiences of those who work closely with women and their babies during the perinatal period. Building on previous findings that physical interventions can increase unsettled infant behaviour (Taylor et al., 2000; Gitau et al., 2001; Miller et al., 2005; Bergqvist et al., 2008), it highlighted a fairly consistent view that different elements of the birth experience including the physical process, social support and the postnatal environment may interact to influence infant behaviour. It was a widely held belief that this process may happen directly through physiological impact on the infant, and also through subsequent maternal interactions affected by her subjective birth

experience. Overall, childbirth was considered to have a complex effect on mother and infant and their mutual interactions.

A major finding was that participants perceived a calm, normal birth to promote calm infant behaviour whilst, consistent with previous research, interventions and complications were associated with more unsettled behaviour (Ransjo-Arvidson et al., 2001) and reduced ability to breastfeed (Brown and Jordan, 2013). However, the birth environment, and notably stress, was thought to affect this. If a Caesarean section was calm, or the birthing room relaxed, mother and infant were considered to be less affected by their experience.

This relationship was perceived as multifaceted. It was suggested that infants could be hormonally affected by a stressful birth. We know that oxytocin has a positive influence on developing infant temperament from birth (Carter, 2014; Feldman, 2015), yet endogenous levels are lower during interventions such as induction or epidural analgesia (Jonas et al., 2009; Jordan, 2010). Conversely, its natural antagonist, the stress hormone cortisol, may disrupt endogenous oxytocin, subsequently interfering with the infant's future response to stressors (Gitau et al., 2001). Participants therefore discussed the importance of trying to create a calm, quiet birthing and postnatal haven: a significant challenge in a busy hospital.

However, maternal physiological and emotional responses to childbirth were also perceived to influence a mother's interactions with her infant, who might subsequently respond to this in addition to their own physical birth experience. Birth trauma may increase the risk of postnatal depression (Alcorn et al, 2010) which can affect maternal interactions with her infant (Edhborg et al., 2005), in turn increasing infant stress reactivity (Feldman et al., 2009; Feldman, 2015). Our findings explored participant beliefs around this process, including their observations of how birth experience might indirectly impact the infant by affecting maternal mood and subsequently mother-infant bonding.

Participants also emphasised how postnatal experience matters and, dependent on experience, can be restorative for a mother after a difficult birth, enabling her to be more responsive to her infant. 'Skin to skin' was highlighted as a potential soother for both infants and mothers who had been distressed by birth, and as an aid to bonding and breastfeeding. Skin to skin care is associated with numerous positive outcomes for the infant, including increased cardio-respiratory stability, reduced infant crying, and enhanced ability to

breastfeed (Erlandsson et al., 2007; Feldman et al., 2014; Moore et al., 2016). Early contact also improves maternal mood and mother-infant interactions (Rowe-Murray and Fisher, 2001); and improved maternal mood may benefit infant temperament (Britton, 2011).

However, although 'skin to skin' has been widely adopted in approximately 80% of UK hospitals (NHS Maternity Statistics England, 2016-2017), some participants regretted that not all women are granted the opportunity for extended skin to skin contact, especially after birth complications, or if they had chosen to bottle feed. Some also spoke about the importance of having time and peace on the ward to enable mothers to successfully breastfeed their babies. However, typically due to a lack of staffing and investment, midwives often have little time to sit with and nurture women after birth (Hunter et al., 2015). Our findings may help to justify the importance of investing in more extensive support of positive early mother- infant interactions.

Other more complex factors were also felt to affect postnatal maternal mood and subsequent interactions with her infant, such as whether maternal expectations of her birth and postnatal experience were met. Although positive birth expectations can be associated with positive outcomes (Ayers and Pickering, 2005), often there is disparity between a mother's expectations and actual experience (Ayers et al., 2008; Lally et al., 2008). Brown (2016) highlights how mothers recognise this postnatally, particularly in relation to infant feeding. This study may therefore further emphasise the importance of antenatal education, and postnatal support that helps mothers adjust to their birthing experience.

The significance of social support and relationships was also raised. Participants perceived professional and social support to affect both the birth process and maternal perceptions of her infant. We know that support during childbirth matters, and continuous emotional support during labour is associated with decreased maternal anxiety (Ford and Ayers, 2009), fewer interventions (Scott et al., 1999), and normal birth (Hodnett et al., 2012). Mothers are more receptive to their infant if they have received good emotional care themselves (Olde et al., 2006; O'Hara, 2009). It follows that, if mothers feel well supported by professionals, their perceptions are more positive, potentially benefitting the mother-infant relationship.

Support from her partner was also considered vital by participants, and enabling the partner to give this support is thought to be important (Johansson et al, 2015). In light of findings

that fathers can suffer from postnatal depression too (Philpott & Corcoran, 2018), perhaps partners could be further supported in their role. However, in the current climate, finding the extra resources needed to additionally support fathers may prove difficult.

Finally, the interacting factor of maternal personality was felt to play a role, particularly around concepts of resilience. Participants noted that some mothers appeared less affected by the birth, were able to engage positively with their infants regardless of their experience, and tended to have easier babies. This may reflect findings that maternal personality, particularly anxiety, can affect birth outcomes (Johnston and Brown, 2013) and is associated with 'difficult' infant temperament (Austin et al., 2005). Understanding more about how resilience might affect childbirth experience could be valuable in further supporting women.

The findings may help to emphasise the importance of investing in supporting maternal birth experience. If an infant is adversely affected by their birth, or a distressed mother feels inadequately supported, in turn affecting infant behaviour, participants were concerned that this could have long term consequences for them both. The quality of aftercare which a distressed or traumatised mother receives was felt to influence her ability to care for and feed her infant. It has been suggested that positive breastfeeding support and experiences may also aid the building of a strong mother-baby bond, whereas a lack of support or negative experiences of breastfeeding could exacerbate a mother's symptoms (Ayers et al., 2008; Brown et al., 2016). We know a responsive parenting approach is associated with a whole range of positive social and emotional outcomes for a child (Murray and Andrews, 2005; Landry et al., 2006). Meanwhile, postnatal depression is associated with more difficult infant temperament, and this is speculated to be bi-directional (Britton, 2011). Therefore, difficult infant behaviour may also adversely affect mothers. Early intervention to support positive birth and postnatal experiences might therefore improve longer term outcomes for mother-infant interactions.

Many participants felt that, particularly after a traumatic birth, a widely accessible debriefing service to support maternal emotional wellbeing could potentially benefit the mother-infant dyad. Although the evidence for debriefing and other interventions is mixed (e.g. Lavender and Walkinshaw, 1998; MacArthur et al., 2002), it has been suggested that providing improved emotional care during obstetric interventions could help prevent

perceptions of trauma (Bastos et al., 2015). Conceivably, this might also benefit infant behaviour.

Limitations

This study has several limitations. First, participants were self-selecting and may have been biased towards the subject matter. However, many maternity care providers emphasised the multiple factors influencing infant behaviour from genetics to intrauterine and extrauterine environments before offering their perceptions regarding the potential implications of childbirth. Consequently, their views overall appeared balanced and consistent. Second, although the number and type of maternity care providers recruited was largely reflective of the workplace, inclusion of paediatricians and obstetricians might have been beneficial to ensure representative views were gathered. Nevertheless, as these medical health professionals tend to manage only clinical births, or infants who are in distress or unwell, the decision was taken to explore the perceptions of those healthcare providers who oversee the entire perinatal period for every type of mother and baby.

Third, the current study simply offers original qualitative insight concerning the opinions and beliefs of maternity care providers regarding childbirth experiences and infant behaviour. Whilst their discerning perceptions add an important element to this issue, a qualitative study exploring mothers' perceptions of childbirth and their infants' early behaviour could potentially further elucidate the topic, as would a larger scale, more detailed quantitative study. Further research in this field is therefore required.

Conclusion

This study explored the perceptions of maternity care providers concerning potential effects of birth experience upon infant behaviour. Most participants believed that birth experience may directly affect infant behaviour, and notably, many highlighted how subjective maternal experience of birth might affect her interactions with her baby, in turn influencing the infant's behaviour. These findings may be significant for funding and further training for more extensive support of mothers and infants. The study highlights the valuable insights of maternity care providers, concerning the promotion of a calm birth environment, reducing stress and offering emotional support, which they believed might help to counterbalance the possible negative impact of a difficult birth upon neonatal behaviour.

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- 2) Ethical Approval - A University Department of Psychology Ethics Committee granted ethical approval. This research was conducted in accordance with the Declaration of Helsinki.
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