THE UK BIRTH CENTRE POSTNATAL EXPERIENCE: ROOM FOR IMPROVEMENT?

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ABSTRACT

Introduction: Postnatal care is one of the most neglected areas of maternity care and inadequate postnatal care has consequences for maternal recovery, breastfeeding initiation and continuation, and parent-infant relationships. Little is known about the experience of in-patient postnatal care for those giving birth within an alongside midwife-led unit in the UK. Evolutionary medicine has been used in the past to develop interventions to support evolved maternal-infant biology within clinical postnatal settings. This research aimed to trial an evolutionary-informed intervention (an in-bed bassinet), to improve parent-infant closeness, to facilitate responsive parent-infant care and to understand the experiences of families receiving postnatal care within a UK alongside midwife-led unit.

Methods: Families (n=33) who gave birth to their first infant in an alongside birth centre in the North East of England were randomly allocated either an in-bed bassinet or a standalone bassinet for their in-patient postnatal stay. Video was used to observe caregiver-infant interactions throughout the postnatal stay and assess the influence of bassinet allocation on breastfeeding, parent-infant contact, maternal sleep, and staff presence. Of those who participated, analysable data for 31 participants was collected. Following participation semi-structured interviews were conducted with a subsample of participants (n=25) to understand the acceptability of the bassinet and gather feedback on their postnatal experiences.

Results: There was no statistically significant differences between those allocated an in-bed bassinet versus a standalone bassinet for breastfeeding duration, frequency, or rate per hour. Mothers who were allocated an in-bed bassinet touched their infants significantly more than those allocated a standalone bassinet ($p = 0.04$), there was no significant difference in maternal or other caregiver holding, maternal sleep or staff presence. Regression analyses indicated that breastfeeding duration throughout the analysed period was associated with time spent in any bassinet (b=-0.213 (95%CI -0.40, -0.03)), prenatal intention to breastfeed (b=39.185 (95% CI 3.158, 75.213)) and maternal education (b=49.757 (95%CI 2.158, 97.357)).

Reponses to the intervention were influenced by families need for rest, recovery, responsiveness, and safety throughout the postnatal period. Both bassinets influenced these themes in different ways, depending on maternal condition following birth and parental values. Overall families appreciated that the in-bed bassinet facilitated responsiveness and allowed them to closely observe their infants. The bassinets did present difficulties with parental rest and unique safety concerns.

Conclusion: The results of this research indicate that the postnatal environment at the study site was hindering maternal postpartum recovery and breastfeeding initiation. Based on the results of the present study this thesis proposes the concept of 'midwife-led postnatal care' that upholds the philosophy of midwife-led care throughout the entire peripartum period.

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DECLARATIONS

I declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due acknowledgement had been made in the text. I confirm that no part of the material presented in this thesis has previously been submitted by me or any other person for a degree in their or any other institution.

Statement of Copyright

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GLOSSARY AND ABBREVIATIONS

AMU	Alongside midwifery unit
EM	Evolutionary medicine
FMU	Freestanding midwifery unit
MLU	Midwifery led unit
NBC	Newcastle Birthing Centre
NICE	National Institute for Health and Care Excellence
NHS	National Health Service
OU	Obstetric unit
PInC	Postnatal Infant Care Trial (the present study)
UK	United Kingdom
UNICEF	United Nations Children's Fund
WHO	World Health Organisation

1 INTRODUCTION

For women experiencing low-risk pregnancies giving birth in a UK midwifery-led unit (MLU or birth centre) is associated with the reduced use of pain relief during labour, fewer interventions during birth and a higher reported satisfaction with care provided (Shields et al., 1998; Tumbull et al., 1996). Care within midwifery-led units is shaped by the philosophy of midwife-led care, which focuses on the biopsychosocial health of the families giving birth there. Although MLUs have been shown to provide the safest and most cost-effective care for low-risk pregnant women in England (Rayment et al., 2015), little is known about how these units are used by families in the immediate postnatal period and whether they effectively support the initiation of breastfeeding and responsive parent-infant care.

Breastfeeding has been shown to have significant positive health effects for mothers and infants. Infants who are breastfed have a reduced risk of death from infectious diseases (Sankar et al., 2015), hospitalisations for diarrhoea, respiratory (Duitjts et al., 2009) and ear infections (Bowatte et al., 2015). There is also an indication that breastfeeding results in a reduction in asthma, eczema and allergic rhinitis (Lodge et al., 2015) as well as positive long-term consequences for obesity, and type 2 diabetes (Horta et al., 2015; Victora et al., 2016). For mothers, breastfeeding can reduce the risk of breast (Islami et al., 2015) and ovarian cancer (Chowdhury et al., 2015), cardiovascular disease (Rajaei et al., 2019), and diabetes (Aune et al., 2014; Jäger et al., 2014). As well as physiological and nutritional benefits, breastfeeding has also been shown to have positive psychological effects on mothers and their children; children who were breastfed demonstrate improved cognitive performance and heightened socio-affective responses (Krol & Grossmann, 2018). For mothers, breastfeeding reduces psychological and subjective stress, and improves maternal sensitivity and care (Krol & Grossmann, 2018). Breastfeeding has been described as a 'smart investment' (Hansen, 2016) and interventions to promote the initiation and continuation of breastfeeding can provide significant cost savings for healthcare services (Riordan, 1997).

Current World Health Organisation (WHO) guidance recommends on-demand exclusive breastfeeding in the first six months, then in combination with solid food and other liquids for two years (WHO 2018). The UK National Health Service (NHS) guidance recommends breastfeeding infants exclusively for 6 months after birth, however 75% of babies in the UK are receiving no breastmilk at all by 5 months of age, some of the lowest figures in the world (UNICEF, 2012). For infants born in the North East of England only 43% are given breast milk as a first feed and 23% are still being exclusively breastfed 6-8 weeks after birth (Public Health England, 2017). Although breastfeeding initiation rates in the UK appear to be slowly rising (McAndrew et al., 2010), many women stop breastfeeding in the first few days following birth and breastfeeding continuation rates continue to be low (Brown et al., 2016; UNICEF, 2012). The last national infant feeding survey indicated that 80% percent of mothers who cease breastfeeding before 6 weeks report that they do so before they are ready (McAndrew et al., 2010). Reasons given for early cessation of breastfeeding include; physical difficulties, pain and lack of support (Brown et al., 2016; Oakley et al., 2014).

The immediate postnatal period, defined as the first 24-hours following birth (World Health Organization, 2010), has been described as a 'sensitive period', that has consequences for future physiology and behaviour (Moore et al., 2012). Previous research has emphasised the importance of establishing close physical contact, responsive cue-based care, a synchronous parent-infant relationship, and the initiation of breastfeeding in the immediate postnatal period (Bystrova et al., 2009; Feldman, 2007). Although hospital policies have reflected recognition of the importance of keeping mothers and babies together after birth through promoting skin-to-skin contact in the hour following birth and 'rooming in' (infants sleeping in the same room as their mothers) throughout the postnatal stay (National Institute for Health and Care Excellence, 2017), there is evidence that the practicalities of rooming in, such as the use of standalone bassinets for infant care are not conducive to responsive parent-infant caregiving and may create barriers to breastfeeding initiation (Ball et al., 2006; Taylor et al., 2015; Tully & Ball, 2012). Previous trials have looked at the experiences of families receiving care on the obstetric postnatal ward (Ball et al., 2006) and mothers who had a caesarean section delivery (Tully & Ball, 2012), however no current research exists examining the influence of these issues within a birth centre setting.

Safe sleep enablers, were developed in New Zealand (Cowan et al., 2013) and subsequently adapted for use in Australia (Young, Kearney, Rutherford, & Hoey, 2019) and the UK (Ball et al., 2021) as interventions to support close parental-infant sleep whilst keeping babies safe and their effects have been evaluated in a number of studies (eg. Ball et al., 2021; Keegan, 2017). First Days Pēpi-Pods, smaller versions of the original Pēpi-Pod have been trialled for use on postnatal wards to provide alternative sleep spaces for infants. First Days Pēpi-Pods are cheap to produce, portable, adaptable, and easy to clean, which make them ideal alternative sleep spaces for clinical use. First Days Pēpi-Pods provide a potential solution to facilitating close maternal-infant care within 'alternative' postnatal environments, such as midwife-led units which are not set up like traditional hospital postnatal wards. Research on the effectiveness of First Days Pēpi-Pods for in-patient care is just emerging, and this research will contribute to the growing understanding of the use of safe sleep enablers for clinical use.

1.1 Theoretical and methodological approach

Medicine and anthropology have long been perceived as having an asymmetrical power relationship, with medics seeming to hold considerably more power than anthropological observers (Ecks 2008). Medics, who prioritise evidence-based research informed by large, randomised control trials have been known to "shrug off" (Ecks 2008: 82) anthropological findings which tend to be gathered through smaller, more case specific methods. In order to balance this relationship, Ecks (2008) proposes that medical anthropologists face two alternatives; either to "subscribe to biomedical notions of good evidence" (Pg. 83) or insist that their methods are just as robust as those employed in the medical sciences.

Anthropological studies of parent-infant care have successfully incorporated both biomedical and anthropological methods in a field of enquiry described as 'Evolutionary Paediatrics' which involves using cross-species, cross-cultural, historical and paleoanthropological evidence to critically evaluate biomedical

models of care (Ball, 2008). Key studies informing the field of evolutionary paediatrics employ an ethological approach to studying parent-infant care (Ball, 2003a; Ball et al., 2006; Klingaman & Ball, 2009) with much of the data produced by laboratory and field studies having considerable influence over medical discourse and public policy (Trevathan, Smith, McKenna 2008; pg. 226). Human Ethology involves observing human behaviour in naturalistic settings in order to understand to what extent human behaviours are a result of evolved biology (Eibl-Eibesfeldt, 1979). Human ethology adapts observational methods and techniques commonly used in studies of animal behaviour, methods frequently used by biological anthropologists and primatologists. Studies understanding parent-infant caregiving behaviours have been conducted in laboratory, home and clinical settings and have primarily used video to record overnight caregiver-infant interactions (McKenna et al., 2007). Video recording allows for observation without interference from researcher presence and data generated from video observations may produce more accurate and holistic results than parental reports of behaviour. For instance, Batra and colleagues (2016) conducted at home overnight video recordings at ages 1, 3 and 6 months in an attempt to assess frequency of environmental risk factors. Although parents were aware of being recorded, most parents placed their infants to sleep in environments with established risk factors. By using observational data, the authors noted a higher proportion of sleep environment risk factors, such as bed-sharing and loose bedding in the infant sleep environment, than previously found in studies that relied on parental reports.

Ethological studies of parent-infant caregiving behaviours in clinical settings have been limited to the work of Ball and colleagues (2006), Tully (2012) and Cadwell, Brimdyr and collaborators (2019; 2018). The work by Cadwell, Brimdyr and their collaborators uses video to examine the process of skin-to-skin contact and early breastfeeding in the first hour after birth, mapping the nine stages of skin-to-skin. This work has been influential in developing a video-ethnographic intervention to educate physicians and improve skin-to-skin care and encourage spontaneous neonatal suckling in the immediate postnatal period (Crenshaw et al., 2012). Ball and colleagues (2006) examined the influence of three sleep spaces; infant in the bed, infant in a side-car bassinet attached to the bed and infant adjacent to the bed in a standalone cot, on early skin contact and the establishment of breastfeeding. Tully & Ball (2012) observed the effect of providing a side-car bassinet versus a standalone bassinet on night-time caregiving for parents who had undergone caesarean births. The results of these studies had considerable influence over hospital policy and resulted in the adoption of side-car cribs on some postnatal wards as well as prompting the development of the First Days Pēpi-Pod.

This research will use theory derived from evolutionary-informed maternal-infant health, which emphasises the importance of unrestricted physical contact in the postnatal period to trial an intervention to improve parental caregiving in a UK birth centre. The primary aim is to test the hypothesis that the provision of an in-bed bassinet can improve breastfeeding duration throughout the in-patient postnatal stay. Secondary aims of this research include evaluating the acceptability of an in-bed bassinet for postnatal caregiving, understanding how close parent-infant contact in the postnatal period influences breastfeeding

continuation to 6-8 weeks, evaluating the safety of providing an in-bed bassinet for postnatal caregiving and ultimately understanding the postnatal experiences of families who are caring for their infants in an alongside birth centre.

1.2 Thesis organisation

This thesis is organised into the following six chapters:

Chapter two presents an evolutionary perspective on maternal-infant care and breastfeeding initiation. It then reviews the available literature relating to the importance of closeness in the immediate postnatal period, a discussion of the current UK postnatal provision and reviews the literature on safe sleep enablers.

Chapter three describes the study design, protocol and conduct of the Postnatal Infant Care (PInC) Trial. Methods of analysis and ethical considerations of this research are also discussed.

Chapter four presents quantitative results pertaining to the randomised trial of infant location throughout the birth centre postnatal stay (PInC trial) and discusses these results within the context of published literature.

Chapter five presents a thematic analysis of semi-structured feedback and evaluation interviews conducted with families who participated in the randomised trial. The outcomes from this analysis are followed by a discussion of the acceptability of bassinet considered within relevant published literature.

Chapter six discusses the implications of these results within the context of the overall patient experience of families receiving in-patient postnatal care in a birth centre setting.

Chapter seven concludes the thesis with a discussion of the overall results and discussion chapters. This is followed by a presentation of the implications of the findings for future policy, practice, and research and proposes the concept of 'midwife-led postnatal care'.

2 Literature Review

This chapter will discuss the role of evolutionary medicine in helping us to understand health and disease, in particular reference to mother-infant biology and breastfeeding. This approach contextualises provision of infant care as a life history strategy that incurs trade-offs. I then review literature relating to antecedents to breastfeeding and how they can be supported through effective postnatal care. This is followed by a discussion of the historical and current provision of UK perinatal care, with reference to the midwife-led model of care. I discuss literature relating to interventions which have used an evolutionary approach in an attempt to improve breastfeeding outcomes by promoting maternal-infant closeness. Followed by a review of the literature relating to safer co-sleeping enablers and their efficacy as devices to encourage close and safe infant sleep.

2.1 Evolutionary Medicine

Evolutionary medicine (EM) (sometimes called 'Darwinian medicine') is the application of evolutionary theory to understanding health and disease. Originally proposed by Williams and Nesse (1991), the field of evolutionary medicine has been key in understanding how human biology, which has evolved over many millions of years may not be optimised for the modern environments that we live in, which have rapidly changed over the past 150 years. Biomedical agents tend to focus on the proximate, mechanistic basis of disease (the 'how'), however an evolutionary approach reframes disease based on the ultimate, evolutionary reasons (the 'why') (Gluckman et al., 2011). Evolutionary medicine has been shaped by a range of disciplines; however, anthropology has made a significant contribution to the field, most significantly in three key areas; nutrition, early life effects on chronic disease and reproductive health (Trevathan, 2007). Anthropology provides conceptual contributions to understanding EM by highlighting variability within and between groups and questioning biomedical understandings of 'normality' which are predominantly based on the health characteristics of people who are born, grow up and live in industrialised, affluent conditions (Trevathan, 2007).

Evolutionary paediatrics has emerged as a subfield of EM which conflates the fields of evolutionary medicine and ethno-paediatrics. Evolutionary paediatrics is defined by Ball (2008) as '*an approach to infant and child health that draws upon cross-species, cross-cultural, historical, and paleoanthropological evidence to inform critical examination of Western post-industrial and biomedical models of infant care'* (pg. 128). Gluckman (2011) presents three core principles of evolutionary medicine; first that selection works to maximise fitness (morbidity and mortality up to reproductive age), not to promote health or longevity, second our history does not cause disease itself but influences our susceptibility to disease and third humans now live in very different ways and in different environments from those where a majority of selective processes occurred. Evolutionary paediatrics is thus concerned most notably with the third principle; positing that mismatches exist between the cultural environments we live in and the biological needs of the mother-infant dyad (Trevathan & McKenna, 1994a). Evolutionary paediatrics challenges prevailing biomedical assumptions about common

infant care practices by considering infant care in the light of evolutionary perspectives on maternal-infant behaviour and physiology. Klingaman and Ball (2009) argue that interventions surrounding childbirth, such as mother-infant separation and routine caesarean section delivery that have been motivated through infection control, risk management and convenience unwittingly harm health and well-being by undermining evolved human biology. This understanding has led to the development of interventions and clinical trials focused on ameliorating the iatrogenic effects of the mismatch between evolved mother-infant biology and biomedical infant care practices (Ball, 2008; Ball et al., 2011; Tully & Ball, 2012).

This applied approach can be considered as part of 'evolutionary public health' a subfield of EM that uses to principles of evolutionary theory to shape more effective interventions. Evolutionary public health allows for a holistic understanding of physical and behavioural decisions that people make by understanding that they can be influenced by energy allocation and maximising reproductive success rather than promoting health or longevity (Wells et al., 2017). This thesis will use the principles outlined in evolutionary paediatrics and evolutionary public health to frame postnatal care within a UK birth centre. As outlined below, human infants have a biological need for close and almost constant contact with a caregiver following birth which facilitates the initiation of the parent-infant relationship and breastfeeding. Inherent trade-offs exist within the mother-infant relationship that shape the caregiving decisions that parents make, the postnatal environment has the potential to exacerbate or minimise these trade-offs.

2.1.1 Evolutionary informed maternal-infant health

Life history theory explains the timing of certain stages of life; fertility, growth, developmental rates and death within and between species (Hill, 1993). Life history theory is concerned with energy allocation; proposing that energy used for one purpose cannot be used for another, resulting in decisions about how to invest energy in certain functions. Because energy is limited, trade-offs occur, most notably between current and future reproduction and the number and fitness of offspring (Hill, 1993). Delaying reproduction within contexts where there is a likelihood that the individual will not survive to reproduce at a later stage is not advantageous, however within contexts where immediate survival is expected, future reproductive potential may be increased by allocating energy to other functions such as growth. Trade-offs between the number and fitness of offspring occur as with the same reproductive effort, many 'cheap' offspring can be produced with a low chance of survival, or few 'higher quality' offspring with a high chance of survival (Hill, 1993). Optimal energy allocations depend on the individual and their environment; what is optimal for someone in a stable circumstance will be different from that of an individual in an unpredictable environment (Kaplan & Gangestad, 2015). Life history theory proposes that these trade-offs underlie reproduction and infant care decisions and may explain why people ignore the long-term consequences of behaviours that produce short-term gain (Hill, 1993).

The way in which humans care for their infants is a life history feature that is distinct from other mammals (Small, 1999). Placental mammals are generally distinguished into two primary categories: altricial and precocial. Altricial mammals produce large litters of poorly developed offspring following a short gestation

period, these infants tend to be born without hair, unable to locomote, regulate their own body temperature or find food without support of a caregiver (Trevathan & Rosenberg, 2016). In contrast, precocial mammals tend to give birth to small litters of one or two infants, which are well developed, after a long period of gestation (Martin & MacLarnon, 1985). Precocial infants are usually born covered in hair and have well developed sensory organs and are physiologically independent from a caregiver; able to locomote, thermoregulate and find food on their own (Trevathan & Rosenberg, 2016). Primate species generally follow the precocial pattern of reproduction, with many non-human primate species born with their eyes open, covered in hair and the ability to cling to a caregiver (Trevathan & McKenna, 1994b). Human infants, however are unique from our closest primate relatives and can be described as precocial babies born at a relatively early stage in their development (Trevathan & Rosenberg, 2016). Humans primarily follow the pattern of precocial mammals; they produce small litters after a relatively long gestation period, however they also exhibit characteristics that are commonly found in altricial mammals with neurological developmental immaturity at birth. The helpless state of human infants at birth requires them to undergo a period of external gestation (also known as exterogestation) where they behave more like a foetus than an infant (Montagu, 1961). Alternatively this period, in which the infant and primary caregivers are a mutually dependent unit that are physiologically and behaviourally entwined has been described as 'the fourth trimester' (Tully et al., 2017) encompassing the experiences of both the infant and their primary caregivers throughout the first 12 weeks of life.

The cause of infant immaturity at birth has been debated, it has long been argued that developmental immaturity at birth emerged through the evolutionary conflict between the development of large brains and the necessity of narrow pelvises to facilitate efficient bipedal locomotion, known as the 'Obstetrical Dilemma' (Washburn, 1960). Humans are unique from other non-human primate species in their ability to habitually walk on two legs. Bipedalism invariably changed pelvic morphology; human pelvises have short iliac blades that curve around the body and flare outwardly creating a bowl shape, as opposed to non-human primate/quadruped pelvises that are tall flat plates oriented vertically in the coronal plane (Gruss & Schmitt, 2015). Primates as an order are distinguished by their high brain size relative to body size (encephalization quotient), resulting in head sizes that are close to the size of the birth canal (Rosenberg & Trevathan, 1995). Humans, of all living primates have the greatest encephalization quotient (Williams, 2002), however humans are born with the smallest relative brain size, with human infants born with 30% of their adult brain size (Dunsworth, 2018). The obstetrical dilemma thus proposes that there were conflicting selection pressures during human evolution, that of a narrow pelvis with a short distance between the hip joints and a large enough birth canal that allowed for the passage of an increasing large-brained human infant (Nowell & Kurki, 2019). These trade-offs resulted in infants being born at an earlier stage in their development than would have been optimal, causing developmental immaturity at birth. Recent research, however has indicated that the metabolic strain of gestation rather than restrictions of pelvic morphology may limit infant growth in utero, resulting in the birth of immature infants (Dunsworth et al., 2012). Dunsworth (2012) and colleagues argue that biomechanical evidence fails to support the obstetrical dilemma hypothesis

by modelling that the pelvis could facilitate widening, whilst still retaining the ability to efficiently locomote. Regardless of the evolutionary mechanism that resulted in extreme newborn helplessness, it remains an undeniable and distinct feature of human infants.

Infant immaturity requires significant parental investment throughout the first months of life to ensure that infants survive and thrive. Given that human infants are born without the ability to maintain proximity to a caregiver themselves, it is the responsibility of the parent or caregiver to ensure that infants remain close and that their physiological needs are met. Understanding the composition of human milk helps to contextualise the biological needs of human infants; human milk is high in sugar and low in fat (Hinde & Milligan, 2011), providing energy for brain growth but not satiating infants for long, indicating that human infants are 'on-demand' feeders, requiring frequent nursing and more or less constant contact at all times (Trevathan, 1987). Frequent suckling encourages the production of the hormone prolactin in the mother, which is key for breastmilk production (Kent, 2007; Tay et al., 1996), thus the relationship between closeness and feeding is biologically determined for both mother and baby. Moore and colleagues (2012) note that in our ancestral evolutionary environment neonatal survival during this crucial period would have been wholly dependent on maternal contact, thus the separation of mother and infant following birth is considered an evolutionary novelty that the human neonate is not adapted for.

Ethnographic, cross-cultural studies of human populations living within non-industrialised contexts indicate that mother-infant contact in the first year of life is a common, if not near universal feature. Lozoff and Brittenham (1978) analysed data from all ten-surviving tropical hunter gatherer populations to ascertain whether there was a single infant care pattern that was likely to have prevailed during the earliest phases of human evolution. As hunter gathering in the tropics sustained humans for more than 99% of their species history, they were considered an adequate sample to demonstrate the prevalence of an evolved infant care strategy. All but one of the populations engaged in near constant mother-infant contact with infants held or carried for most of the day by their mothers, indicating that the desire to 'cache' or nest infants is a cultural adaptation that may alter infant development and maternal involvement.

Laboratory studies observing the effects of non-human primate mother-infant separation have been foundational in demonstrating the psychological consequences of parent-infant separation and the importance of bodily comfort for newborns. Harlow (1958) separated macaque infants from their mothers 6 to 12 hours following birth and raised them on 'surrogate mothers' – either a cloth covered or wire mother, one which provided only nutrition and one which provided only comfort. Infants showed a consistent preference for cloth covered surrogate mothers over wire mothers, indicating the value of 'contact comfort' for the development of macaque infants (Harlow, 1958). Similar studies of non-human primate mother-infant separation have indicated that separation is physiologically stressful: Coe and colleagues (1985) observed that following just 30 minutes of separation from a caregiver squirrel monkeys exhibited significant increases in cortisol levels. Great ape mothers observed in the wild, spend at least the first 6 months almost in constant contact with their infants and infants are rarely observed interacting with

other group members (Fletcher, 2001; Fossey, 1979; Lawick-Goodall, 1967). Comparative perspectives therefore demonstrate that human infants have evolved to receive almost contact close caregiver contact to ensure survival and to facilitate the demands of rapid brain growth following birth.

2.1.2 An evolutionary perspective on breastfeeding

Lactation, or the production of species specific milk, is proposed to have originated over 200 million years ago, predating the origin of mammals (Capuco & Akers, 2009). Lactation is a defining mammalian characteristic which not only provides offspring with nutrients but can provide immunological and endocrine support (Sellen, 2007). Lactation biology can be indicative of life history strategies, with observable trends linking variation in lactation biology to life history, such as milk yield, milk composition and suckling frequency (Sellen, 2007). Sellen (2007) outlines four basic functions of lactation within all species: to transfer immunological support across generations, to optimise litter size and spread maternal investment across offspring, to facilitate efficient reproduction in unpredictable environments that may lack specialised food for young and to increase behavioural flexibility and learning. Primates have slow-growing offspring that are dependent on their caregiver for long periods (J. H. Jones, 2011). This results in comparatively low nutrient transfer between mothers to offspring, spreading the energy cost of investment over a long period, whilst extending the period during which conflicts of interest between the mother and offspring can occur (Fewtrell et al., 2020).

Contemporary breastfeeding appears to be '*evolutionary puzzle'* (Emmott, 2022); it offers survival and fitness advantages for both the infant and the mother, however breastfeeding initiation and continuation rates in the UK and most of the industrialised world are low. For most mammals, excluding primates, breastfeeding is an automatic behaviour which requires little effort and learning by the mother or the offspring. Primates, however appear to require a period of learning to successfully nurse their offspring (Smith, 2009), studies of isolated primates indicate that without observing kin nursing, many unexperienced primates fail to nurse successfully (Harlow & Harlow, 1962). Humans, in particular require a period of learning and perseverance to establish nursing behaviours. The presence of wet nurses throughout history (Hrdy, 1992) and the development of infant formula demonstrates cultural adaptions to overcome difficulties establishing breastfeeding (Stevens et al., 2009). Volk (2009) presents three theories to explain why human breastfeeding is so challenging for mothers to learn: first, a high level of human intelligence means that humans have an increased reliance on learned behaviour; second, human breast shape, which emerged out of conflict between sexual signalling and feeding functionality is more complex than other mammals and requires a more intricate technique to empty the breast; third, human infant poor neuromuscular control means that infants lack motor ability and require assistance from mothers in order to breastfeed.

There is evidence, however that, under the right conditions human infants can instinctively nurse. Widstsöm (1987) recorded nine distinct phases that the neonate goes through if placed on the maternal chest immediately following an uncomplicated vaginal birth, culminating in 'self-attaching' to the nipple and suckling unassisted. Further research demonstrated that these phases can be consistently observed across a

number of countries, indicating that these might be innate human behaviours that facilitate the process of learning to breastfeed (Brimdyr et al., 2020). Descriptive research into 'biological nurturing', otherwise known as 'laid-back breastfeeding', has shown that certain breastfeeding conditions, primarily allowing infants to feed whilst lying prone on their mother's stomach can activate primitive neonatal reflexes facilitating infants to feed instinctively (Colson et al., 2008). These studies demonstrate that infants are born with the ability to instinctively breastfeed, however maternal behaviour that does not allow infants to feed unaided and clinical protocols that interrupt skin-to-skin can interfere with this process. Therefore, human breastfeeding is a multifaceted behaviour which requires social learning and maternal investment in order to be established effectively.

An evolutionary perspective reframes breastfeeding as a bidirectional interaction between mother and infant, in contrast to traditional models which see breastfeeding as a process where the mother provides whatever the infant needs (Fewtrell et al., 2020). This enables us to conceptualise breastfeeding as a maternal investment behaviour, which considers the fitness costs of investing in breastfeeding, acknowledging that trade-offs occur. Parental trade-offs exist within the mother-infant relationship from the time of conception. These conflicts serve to ensure that both the mother and the infant maximise their fitness through a 'tug-of-war' for resources (Haig, 1993). This tug of war is otherwise known as parent-offspring conflict theory, and it has been used to explain various aspects of the parent-infant relationship, such as nausea and vomiting in pregnancy, gestational diabetes, and miscarriage (Haig, 1993; Profet, 1992; Vitzthum, 2008). The theory considers that offspring and parent have different biological interests over the length and intensity of parental investment as increased investment incurs fitness costs which impact future reproductive potential for the mother (Trivers 1974). Offspring strive to acquire more parental resources than it is in their parents' interest to provide; with offspring trying to extract maximum resources from a parent and a parent attempting to produce a healthy offspring with reproductive potential at minimal cost to them or any other future offspring they may have (Trivers, 1974). Breastfeeding may serve as a method of physiological 'signalling' between the mother and the newborn, with the mother communicating messages about her investment and the infant responding through crying, begging and suckling (Fewtrell et al., 2020). These signals are key for negotiating investment, creating and resolving maternal-infant conflict around feeding.

Parent-offspring conflict theory has been used to understand parental decision making around infant feeding (Tully & Ball, 2013). Breastfeeding is an energetically costly behaviour for mothers, especially resource poor mothers and has consequences for future fecundity. Tracer (2009, p. 636) describes breastfeeding as '*among the costliest forms of parent investment…during the first one to four years postpartum'* , feeding decisions involve physiological, psychological and social trade-offs for mothers and is a profoundly beneficial practice for infants. Because, under most circumstances newborn infants are physically incapable of independently initiating breastfeeding (taking the breast into the mouth at will) or maintaining contact with their mother without her assistance for the first year of life, breastfeeding investment is determined by

the mother (Tracer 2009). Tracer (2009) collected quantitative data of nursing frequency and duration and responses to infant cue and demands from 110 Papua New Guinean mother-infant pairs, with ages ranging from birth to 2 years old, in order to 'test' parental investment theory within a non-industrialised context. She found that mothers were active players in making decisions around breastfeeding, with mothers only responding to their offspring's feeding cues with breastfeeding around 30% of the time, indicating that they were selective about responding to their offspring's needs with feeding. Tully and Ball (2013) propose a model of investment in breastfeeding that considers maternal investment and infant benefit to better understand the multi-directional influences that contribute to breastfeeding decisions (see Fig 1).

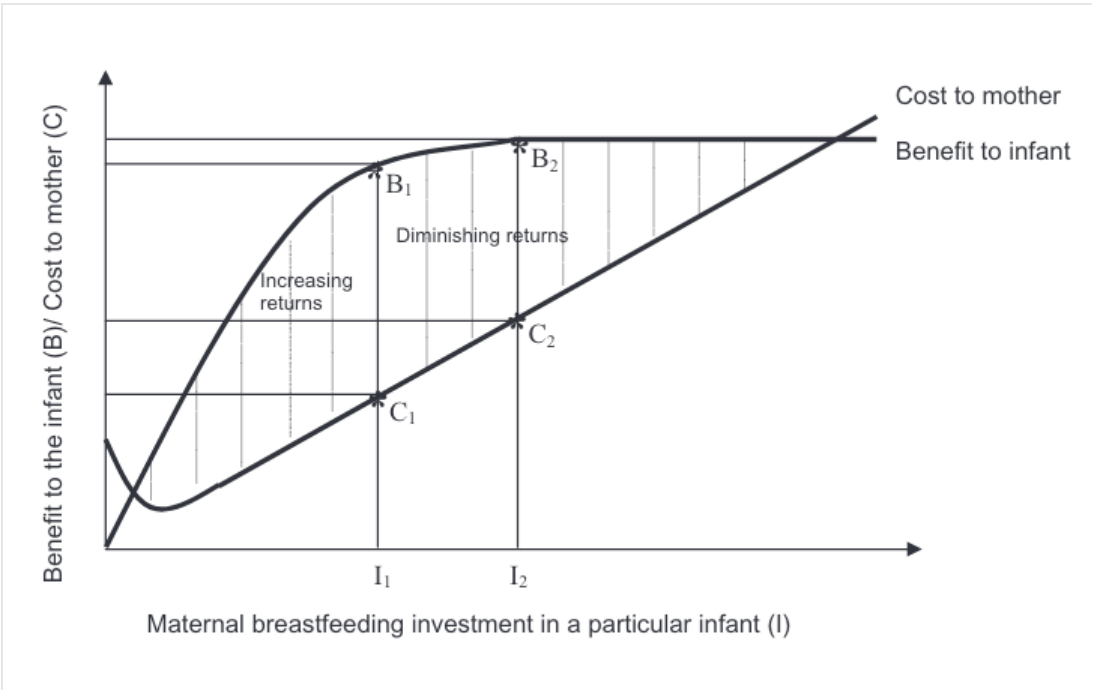

Figure 2.1 Taken from Tully & Ball (2013) displaying a model for investment in breastfeeding, expanded from Trivers (1974)

The model considers that there is a maximum amount of investment that mothers are willing to put into breastfeeding any particular infant and emphasises that trade-offs underlie infant feeding decisions. The X-axis demonstrates the degree of time and effort (investment) a mother could devote to breastfeeding their infant. The Y-axis depicts the benefits to the infant and the costs to the mother of various degrees of breastfeeding. I_1 represents the level of maternal investment that provides the greatest benefit to the infant at the lowest cost to herself, breastfeeding for longer than C_1 would incur a greater cost to the mother with little benefit to the infant, therefore theoretically this would be the point that a mother would choose to cease breastfeeding. The model can be applied and modified to individual feeding contexts to understand maternal feeding decisions and come up with interventions which aim to decrease maternal costs and increase infant benefits. Interventions that result in real or perceived reduction in maternal cost and increase in infant benefit will be most effective in promoting breastfeeding (Tully & Ball, 2013).

Mothers in industrialised, economically developed contexts, such as the UK experience different trade-offs than would have been experienced in an ancestral evolutionary environment and within non-industrialised populations, with novel costs and benefits surrounding feeding (Emmott & Mace, 2015). For all mothers breastfeeding is energetically costly, it can require 400 to 750 kcal/day (Butte & King, 2005) and it disrupts opportunities to engage in other labour activities (Hawkins et al., 2007a, 2007b). However, families in the UK have abundant access to clean water, sterilising equipment, and infant formula milk which means that breastfeeding is no longer necessary for infant survival. All feeding decisions have associated trade-offs, for example substituting breastfeeding with formula milk allows mothers to share infant feeding and associated costs with other primary caregivers (alloparents) (Emmott & Mace, 2015), however there are financial costs associated with acquiring formula milk (Riordan, 1997) and infant formula does not confer the same health benefits as breastfeeding. Parent-offspring conflict theory can therefore be used to understand trade-offs in infant feeding decisions, which may be influenced by biological, social, cultural, and environmental factors. In the context of the present research study this perspective can be used to understand how aspects of the postnatal environment experienced by the mother-baby dyad can support or hinder the mother's ability to invest in their infant, with the hope that by creating environments that make feeding as easy as possible, trade-offs can be minimised.

2.1.3 Evolutionary importance of closeness

As previously discussed, human biology has evolved within the context of close parent-infant proximity. Closeness between mother and infant is a well-documented antecedent to breastfeeding (Bomer-Norton, 2014). Closeness facilitates the hormonal exchanges that enable breastfeeding, and the concept of 'breastsleeping' was proposed by McKenna and Gettler (2016) to emphasise the intertwined relationship between breastfeeding and prolonged parent-infant contact, especially at night. Mother-infant proximity in the immediate and early postnatal period has been associated with successful breastfeeding initiation and continuation (Ball, 2003b; Hooker et al., 2001). Close proximity allows mothers to be aware of and respond to feeding cues, increasing the number of successful feeds thus maintaining lactation. The production and delivery of breastmilk is controlled by a number of continuous sensory maternal-infant exchanges, McKenna and colleagues (2007) argue that those exchanges function as the only physiological and behavioural microenvironment to which infants are adapted.

Breastmilk production is controlled by two essential hormones; prolactin and oxytocin. Prolactin is produced when an infant suckles, stimulating production of milk by the alveoli. Prolactin levels have been shown to peak 30 minutes after the start of a feed, playing an important role in producing milk for the next feed and the secretion of prolactin is key in the establishment of lactation (World Health Organization, 2009). During pregnancy, the hormone progesterone blocks the effects of prolactin production, following birth the levels of progesterone fall and prolactin is activated. Increased prolactin levels encourage the onset of Lactogenesis II (copious milk production) which can occur up to 2 to 3 days after birth (Neville & Morton, 2001). The frequency of infant suckling in the days immediately following birth has been associated

with consequently increased milk production (Chen et al., 1998) and mothers whose infants were observed to suckle infrequently had lower prolactin levels and were more likely to experience late onset of Lactogenesis II (Chapman & Pérez-Escamilla, 1999), demonstrating the importance of encouraging increased suckling in the postnatal period for prolactin production. An earlier onset of Lactogenesis II may increase maternal breastfeeding self-efficacy as mothers may feel more confident that their infants are getting adequate nutrition and thus reduce the need for formula supplementation (Brownell et al., 2012; Oliva-Pérez & Oliver-Roig, 2022).

Oxytocin is produced more quickly than prolactin and is essential for letting the milk flow out of the breast. Oxytocin starts working when the mother expects a feed and when the infant suckles. A mechanism called the 'oxytocin reflex' becomes conditioned to the mother's sensations and feelings such as touching, smelling or seeing her baby (World Health Organization, 2009). Skin-to-skin contact immediately after birth has been shown to increase oxytocin, contributing to breastfeeding success. Chiu and colleagues (2008) used skin to skin contact between 12 and 24 hours after birth as an intervention for mother-infant dyads who were experiencing breastfeeding problems. The results indicated that 81% of the dyads were exclusively breastfeeding on discharge and 52% continued to one month after birth. This research indicates that the benefits of skin-to-skin contact are significant throughout the postnatal stay, even beyond the first hour after birth. In recent years, the increased understanding of lactation physiology has been effective in encouraging the implementation of hospital policies that support breastfeeding initiation. The importance of skin-to-skin contact immediately after birth is recognised in the UK healthcare system and the Baby-Friendly Initiative[1] recommends immediate skin-to-skin contact after birth, with continuing close mother-infant proximity through the process of 'rooming-in' for the duration of the hospital stay to facilitate breastfeeding initiation (World Health Organisation (WHO) & United Nations Children's Fund (UNICEF), 2018).

Evidence of the influence of rooming-in and close parent-infant contact in the postnatal period on breastfeeding continuation has been predominantly observational; Wright and colleagues (1996) interviewed postpartum women before and after *Ten steps to successful breastfeeding*[2] guidance was implemented and they found that women who roomed-in more than 60% of the time breastfed for longer than those using hospital nursery care. Another study which compared nursery care, rooming-in and rooming-in with breastfeeding guidance found that among first-time mothers, rooming-in with breastfeeding guidance was positively associated with long term exclusive breastfeeding, and rooming-in was associated only with short-term exclusive breastfeeding compared with nursery care (Perez-Escamilla et al., 1992). These findings

[1] The Baby-Friendly Initiative is a partnership between UNICEF and the World Health Organisation which provides accreditation to health services of quality care for babies and mothers

[2] In 1989 WHO and UNICEF issued a joint statement including ten recommendations that should be implemented by all maternity wards to promote breastfeeding which includes "enabling mothers and their infants to remain together and to practice rooming-in 24 hours a day"

however have not been replicated in larger, randomised trials. A randomised trial of side-car crib use compared to standalone cot use on breastfeeding to 25 weeks found that there was no significant difference in breastfeeding duration between the two conditions (Ball et al., 2011). However when these data were analysed by subgroup, women who had an unmedicated vaginal delivery and showed moderate prenatal attitudes to breastfeeding, breastfed for significantly longer when allocated a side-car crib compared to a standalone cot (Robinson, 2014). This suggests that in the birth centre context, where all deliveries are unmedicated vaginal deliveries it may be possible to observe an increase in breastfeeding continuation by improving parent-infant contact in the postnatal period.

A Cochrane review assessing the effect of mother-infant rooming-in versus separation on the duration of breastfeeding (exclusive and total duration of breastfeeding) concluded that there was no difference between rooming-in and separate care on infants receiving any breastmilk at 6 months (Jaafar et al., 2016). The reviewers note that the one study reviewed provided low quality evidence and thus did not provide sufficient evidence to draw any conclusions on the effect of rooming-in on breastfeeding duration up to 6 months. The authors emphasised the need for properly designed randomised controlled trials to refute or support the practice of rooming-in on increasing the duration of breastfeeding. The paper also found that the rate of exclusively breastfed infants on day four postpartum was almost twice as high in the rooming-in group (86%) than the separate care group (45%), indicating that rooming-in at least provided a better chance that infants would be exclusively breastfed for longer than those in nursery care (Jaafar et al., 2016).

Close maternal-infant contact in the immediate post-natal period has also been shown to be crucial for establishing mother-infant synchrony, cue-based caregiving practices (Whittingham & Douglas, 2014) and reducing parent-infant conflict. Previous research has found that mothers and infants who have prolonged early contact subsequently interact in a more reciprocal and mutual way, with less infant irritability at 1-year, than those separated following delivery (Bystrova et al., 2009). Furthermore, infants placed in cots immediately after birth cried significantly more than those kept skin-to-skin for 90-minutes following birth (Christensson et al., 1992, 1995). In psychological literature parent-infant synchrony is defined as the "*overarching process that coordinates the ongoing exchanges of sensory hormonal and physiological stimuli between parent and child during social interactions*" (Feldman, 2007, p. 340). Research has indicated that there may be species specific maternal behaviours after birth, including gazing at the infant's face, high-pitched vocalisations, positive expressions and affectionate touch, and newborn infants have been observed to engage in 'alter-scanning behaviours' in which mothers target their stimulation (Feldman & Eidelman, 2007). The amount of postpartum maternal behaviour (gaze, vocalisations, expressions, touch) has been shown to predict mother-infant synchrony at 3 months indicating that increased maternal-infant interaction in the postnatal period has positive implications on parent-child relationships over a number of months.

Alongside fostering positive mother-infant relationships, close night-time proximity between fathers and their offspring has been associated with positive parenting outcomes. Co-sleeping fathers exhibit greater decreases in testosterone than fathers who sleep separately from their infants (Gettler et al., 2012). Fathers

with lower testosterone levels have been found to engage in more hands-on caregiving (Storey et al., 2011) whereas men with greater testosterone levels reported reduced sympathy or need to respond to infant cries (Fleming et al., 2002). Men's testosterone levels have also been shown to decrease in conjunction with providing a nurturing response to infant cries, reinforcing paternal caregiving behaviours and encouraging the establishment of cue based caregiving (van Anders et al., 2012). Providing fathers with the opportunity to be involved in immediate postnatal infant care should facilitate paternal responsiveness to infant needs, foster a positive relationship with their infants and provide more effective support of the mother-infant breastfeeding relationship (Tohotoa et al., 2009), reducing infant-feeding trade-offs.

2.2 Supporting successful breastfeeding

2.2.1 Antecedents to breastfeeding

Breastfeeding 'success'[3] is based on a number of determinants, some that are modifiable, others that are inherent or systematic (eg. Sociodemographic factors). Antecedents to breastfeeding exist before and whilst breastfeeding is established and lay a foundation for successful breastfeeding relationships. Bomer-Norton (2014) describes antecedents to breastfeeding that can be supported by nurses and health care professionals (see Fig 2). These antecedents include maternal and child anatomy and physiology (the physiological process of breastfeeding), closeness (skin-to-skin, co-sleeping), maternal internal resources (self-efficacy and maternal mental health) and maternal external resources (culture, family/peer/healthcare support). Each of these antecedents can be facilitated in the immediate postnatal period to maximise breastfeeding success and support maternal infant trade-offs.

[3] This thesis defines breastfeeding success as the mother being able to initiate breastfeeding and continue breastfeeding for as long as she wishes.

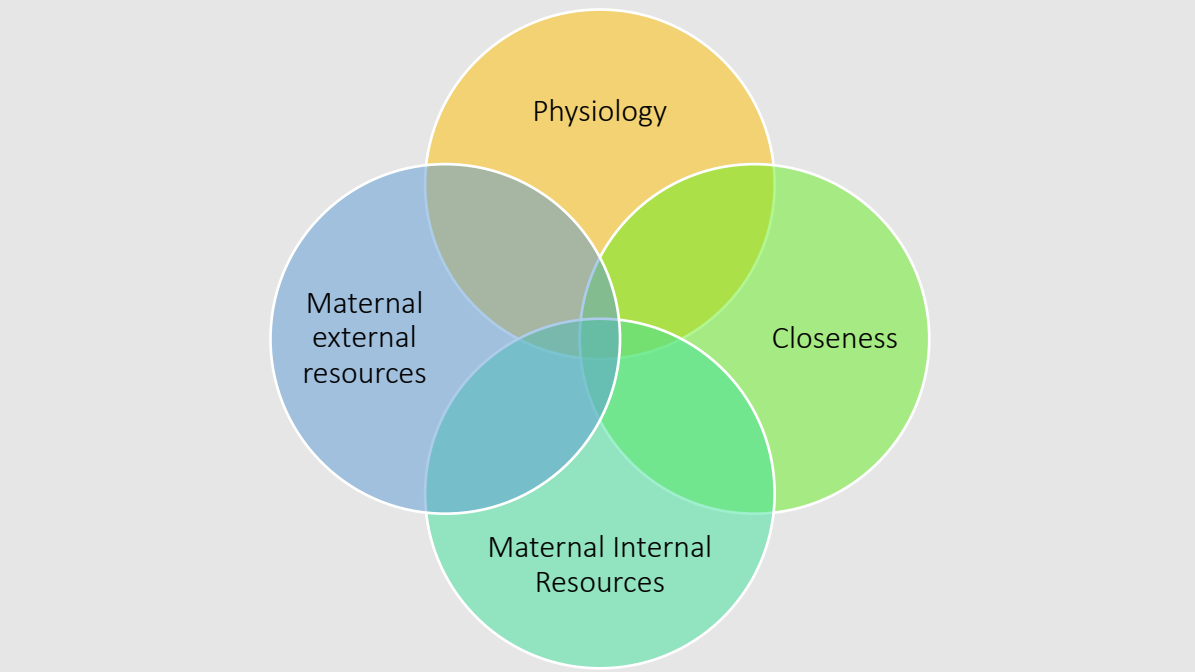

Figure 2.2 Antecedents to breastfeeding as defined by Bomer-Norton (2014), each can be encouraged or hindered by the in-patient postnatal environment

2.2.2 Maternal internal resources

Maternal internal resources, such as confidence, self-efficacy and positive mental health all contribute to the establishment and duration of breastfeeding. Successful breastfeeding requires tenacity with many women having to overcome issues such as nipple soreness, breast infections, and issues with latch, persistence through these difficulties is key to maintaining breastfeeding (Gianni et al., 2019; Page et al., 2022).

Self-efficacy (also known as perceived parental efficacy) is defined as *'beliefs or judgements a parent holds of their capability to organise and execute a set of tasks related to parenting a child'* (de Montigny & Lacharité, 2005, p. 394). Self-efficacy has also been used interchangeably in the literature to mean 'confidence' (Blyth 2002), and many references to self-efficacy or perceived parental efficacy also include breastfeeding or parenting confidence. Although self-efficacy includes parental confidence it also encompasses wider self-beliefs and psychological coping strategies used to overcome difficult tasks. Constructing parental self-efficacy is a key goal of the immediate postnatal period for new parents, especially after the birth of their first child. Self-efficacy determines resilience to adversity, the amount of investment that individuals are willing to put into certain activities and the amount of time that efforts will be maintained despite obstacles and failures (do Montigny & Lacharite, Strecher et al 1986). Low self-efficacy can result in self-blame, depression and poor persistence (Bandura, 1982), therefore it is particularly important that parents who are learning to breastfeed develop self-efficacy.

Self-efficacy is particularly important in the establishment of breastfeeding and has been demonstrated to influence breastfeeding success. Blyth and colleagues (2002) conducted telephone interviews with 300

women from Brisbane at 1 week and 4 weeks postnatally and recorded breastfeeding self-efficacy scores and infant feeding method. Those with higher breastfeeding self-efficacy scores at 1-week were significantly more likely to continue exclusively breastfeeding at 4 months than those with lower scores. They also noted that mothers with previous breastfeeding experience had significantly higher breastfeeding self-efficacy scores than primiparous women, highlighting the importance of developing self-efficacy early and supporting those who have never breastfeed before to develop self-efficacy (Blyth et al., 2002). Self-efficacy influences psychological responses to breastfeeding and the ability to cope with and overcome difficulties. Those with high self-efficacy will display greater persistence, ability to overcome setbacks and to increase their efforts in the face of failure. High self-efficacy thought patterns can enhance performance by allowing individuals to visualise success, rather than failure and self-defeat (Dennis, 1999). An individual's emotional reaction to a behaviour can influence whether they perceive tasks to be overwhelming or a challenge to be overcome. These mindsets have been shown to correlate with breastfeeding success. Page, Emmott and Myers (2021) conducted a retrospective online survey of mothers exploring the relationship between breastfeeding problems, social support and breastfeeding cessation. Almost all respondents to their online survey reported experiencing breastfeeding problems, however many still continued to breastfeed, indicating that successful feeding does not occur in the absence of problems but in the mother's ability to overcome the problems.

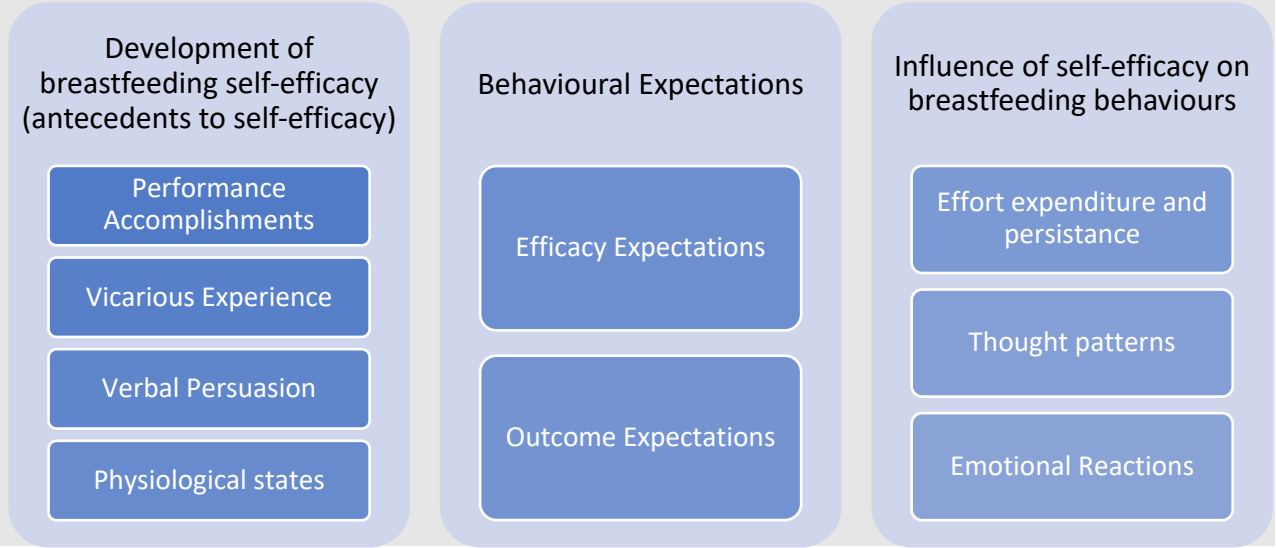

Figure 2.3 Elements of self-efficacy theory as they relate to breastfeeding. Image recreated from Dennis (1999).

Dennis (1999) describes the elements of self-efficacy theory and how they relate to breastfeeding, which have been displayed in Figure 2.3. The development of breastfeeding self-efficacy relies on individuals experiencing performance accomplishments, vicarious experiences, verbal persuasion, and positive physiological states. Performance accomplishments can be built through consistent and prolonged opportunities to practice breastfeeding and to build up a sense of accomplishment through successful nursing, on the contrary repeated failures can diminish self-efficacy (Bandura, 1977). The in-patient postnatal period provides an opportunity for mothers to build up performance accomplishments with

support and encouragement from trained professionals. Vicarious experiences relate to observational learning (Bandura, 1977), or the ability to observe others engaging in breastfeeding can normalise the behaviour and create a sense that it is achievable. Verbal persuasion, particularly from trusted and credible individuals (eg. Midwives, lactation consultants, peer-supporters) helps to build self-efficacy around feeding and bolster confidence (Locklin, 1995). The physiological and affective response to engaging in breastfeeding can considerably influence breastfeeding self-efficacy (Bandura, 1977), with positive feelings of excitement and satisfaction enhancing self-efficacy and negative feelings, such as pain, tiredness and anxiety decreasing efficacy. As well as experiencing negative emotional reactions to feeding, affective states such as anxiety and stress can inhibit oxytocin production, directly impacting let down and milk production (Doulougeri et al., 2013). Behavioural expectations, split into outcome and efficacy expectations relate to one's sense that engaging in breastfeeding will lead to positive outcomes and that it is within one's ability to successfully engage or master the behaviour (Dennis, 1999). Building outcome expectations around breastfeeding involve providing education around the benefits of breastfeeding for infant and maternal health. Efficacy expectations can be built through exposure to relatable individuals (seeing 'people like them') who have successfully mastered breastfeeding (Thomson et al., 2011). These elements of self-efficacy theory can be used a framework for considering how to create postnatal environments that encourage breastfeeding and parental self-efficacy to ensure that families are starting their journey with sufficient resources to overcome forthcoming challenges.

2.2.3 Maternal external resources

Alongside internal resources, external resources that support and promote breastfeeding have been demonstrated to be key antecedents to breastfeeding. These include providing social, healthcare and family support, creating a culture that encourages breastfeeding and establishing environments that facilitate breastfeeding.

Alloparenting or allomothering, refers to care provided from individuals other than parents (Kenkel et al., 2017) and can describe the support of a partner, the infant's father, older female relatives or specialist supporters (e.g. nurses, and midwives). It is a universal feature of human behaviour and Hrdy (2005) argues that allomothering evolved as a human trait to enable survival within Pleistocene conditions, which allowed human mothers to reduce their inter-birth interval and increase their reproductive potential by receiving support from alloparents. Within mammals, maternal commitment is the best predictor of infant survival and this commitment can be influenced by perception of the amount of pre and post-partum support they are likely to receive (Hrdy, 2007). Hrdy (1999) describes examples from the ethnographic and historical record which demonstrate mothers abandoning their infants following birth due to the absence of adequate allomaternal support.

Family, partner and allomother support can also be key throughout the establishment and duration of breastfeeding. Previous research has indicated that the role of the father can be a significant influence on the initiation and duration of breastfeeding in the UK and around the world (Cohen et al., 2002; Sherriff et

al., 2014) however it has also been noted that the role of the father in breastfeeding support has been overlooked (Sherriff et al., 2014). Partners can be key in influencing decisions around how an infant is fed and providing practical and emotional support to their partners. Partners can be significant in helping mothers manage breastfeeding difficulties as well as supporting mothers practically and emotionally (Ingram et al., 2002). Interventions that aimed to educate fathers in breastfeeding support have been shown to be effective in encouraging mothers to breastfeed for longer. An intervention that taught fathers in Italy how to prevent and manage common lactation difficulties resulted in higher rates of full breastfeeding at 6 months than those who did not receive the intervention (Pisacane et al., 2005). Tohota and colleagues (2009) explored parent's perceptions of what constitutes support for breastfeeding with families in Western Australia. Mothers identified that 'Dads do make a difference', with mothers appreciating their partners encouragement, determination and anticipation of their support needs.

Although partner and family support can have an important impact on breastfeeding success, insufficient or inappropriate support can also have significant influence on the early cessation of breastfeeding. Results from the UK Millennium Cohort Study suggest that increased grandmother contact and father's parenting involvement was associated with lower levels of breastfeeding (Emmott & Mace, 2015). When compared to single mothers, mothers in father-present households were 34% more likely to initiate breastfeeding, however receiving practical parenting support from a partner was associated with shorter breastfeeding duration. Frequent contact with grandmothers is associated with a lower likelihood of initiating breastfeeding and a higher risk of premature breastfeeding termination. Page, Emmott and Myers (2021) explored the validity of the 'buffering hypothesis', which proposes that support from family with breastfeeding experience buffers mothers form the adverse effects of breastfeeding challenges. They conducted a retrospective online survey about infant feeding and social support and concluded that social support from a broad range of supporters had buffering effects on the relationship between breastfeeding problems and breastfeeding termination. These results highlight that receiving partner and family support is not always conducive to breastfeeding success, however receiving the right kind of support is.

Cultural factors play a key role in influencing breastfeeding, with mothers less likely to initiate or continue breastfeeding within cultures that view breastfeeding as abnormal or culturally inappropriate. Dykes and Griffiths (1998) describe a number of social and cultural factors that influence the decision to initiate and continue breastfeeding in the UK; these include the sexualisation of female breasts, employment, the influence of significant others (e.g. partners and family members), expectations of the breastfeeding experience, the marketing of infant formula milk, social coercion to wean and the influence of health professionals. The UK has been described as a having a '*bottle-feeding culture'* (Scott & Mostyn, 2003), leading many to go to great lengths to avoid breastfeeding in public (Scott & Mostyn, 2003). Some of the UK's lowest breastfeeding figures were reported in the 1970s with breastfeeding initiation rates of 51% in 1975 (J. Martin, 1978), this means that within many communities generational knowledge of breastfeeding has been lost, resulting in families not able to adequately support those who are trying to breastfeed. Lavender

(2006) found that families were unconsciously undermining breastfeeding by providing unhelpful support and projecting their own sense of failure around breastfeeding on new mothers. Although the influence of social and cultural factors on attitudes to breastfeeding extend beyond the hospital, the in-patient hospital environment can be key in establishing a supportive breastfeeding culture.

Traditionally hospital environments have been arranged around artificial feeding, with many healthcare professionals knowing little about the science of breastfeeding until the 1990s (Mulford, 1995). The 'medicalisation' of infant feeding was a consequence of the medicalisation of birth. The early 20th century saw developments in labour analgesia which resulted in the separation of mothers and infants after birth. This separation was justified by the long periods of recovery required which incapacitated mothers and left them unable to care for their infants (Ball & Russell, 2012). The medicalisation of childbirth thus became commonplace, and nurseries became a near universal part of early infant care in hospitals. The routine separation of mothers and infants continued as a normative practice even beyond the use of heavy anaesthetics justified by infection control (Ball & Russell, 2012). The separation of mother and baby after birth has been shown to have serious unintended consequences, for example infants placed into nursery care compared to rooming in with their mothers are shown to have experienced less sleep, cry more (Keefe, 1987) and breastfeed less (Yamauchi & Yamanouchi, 1990). Alongside normative mother-infant separation at birth, the increasingly popular ideology of 'scientific motherhood' (Apple, 1995) resulted in a reliance on scientifically formulated infant food and ultimately a dramatic decline in the uptake of breastfeeding (Ball & Russell, 2012). The practice of separating mothers and their infants following birth has mostly been eradicated in UK hospitals, following recognition of the importance of keeping mothers and babies in close proximity after birth. Establishing hospital environments that support and normalise breastfeeding is key to ensuring that opportunities to breastfeed are maximised. One way that this has been done is through the development of the UNICEF Baby Friendly Hospital Initiative (BFI) and their ten steps for successful breastfeeding (World Health Organisation (WHO) & United Nations Children's Fund (UNICEF), 2018) (see figure 2.4). The ten steps have been implemented in hospitals all over the world and have shown to provide positive outcomes. Wright and colleagues (1996) reviewed breastfeeding prior to and following implementation of the Ten Steps To Successful Breastfeeding in a US hospital and reported that more than twice as many newborns were put to the breast in the first hour of life, as well as fewer infants fed foods other than breastmilk and more mothers received breastfeeding guidance from hospital staff. Mothers who delivered in a BFI fully accredited hospital in the UK were 10% more likely to initiate breastfeeding than those who delivered in a unit that was not fully accredited, however there was no difference in breastfeeding prevalence at 1 month (Bartington et al., 2006), indicating that BFI accreditation influenced breastfeeding initiation but not duration.

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.

4. Help mothers initiate breastfeeding within one hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming in (allow mothers and infants to remain together) 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Figure 2.4 The Baby Friendly Initiative Ten Steps to Successful breastfeeding

It has so far been established that close mother-infant contact is biologically determined and the successful initiation and duration of breastfeeding can be influenced by a number of modifiable factors including; closeness, maternal self-efficacy, family support and social and cultural attitudes to breastfeeding. Each of these antecedents can be supported throughout the in-patient postnatal stay with the appropriate accommodations. The following section will consider the arrangements of UK in-patient postnatal care, in particular reference to birth centres and consider the practical applications of the previous literature.

2.3 UK Intrapartum care

In the UK, as in most high- and moderate-income countries, 95% of births occur within medical institutions, with only 2% of births occurring outside of hospital settings (Government Statistical Service, 2021). Of those 95% births that occur within healthcare settings, 9% of those occur within alongside midwifery units and 1% within freestanding midwifery units (Government Statistical Service, 2021). Maternity care is a universal service and pregnant women have a right to choose their place of birth, for many the choice is between a hospital obstetric unit, midwife-led unit (MLU or birth centre) or at home. Midwives provide the majority of maternity care for healthy pregnant women with additional involvement from obstetric or medical teams for women with more complex complications or risk factors (Bowers & Cheyne, 2016). Although midwives provide much of the antenatal, intrapartum, in-patient and at home postnatal care (up to the first 10 days following birth), midwife-led units are distinct as places of birth in their philosophy, which allows women with low-risk pregnancies, anticipating a normal birth to give birth in 'home-like environments' which support physiological birth (Walsh et al., 2018) without routine labour involvement of medical staff or facilities for epidural analgesia and caesarean section deliveries. Midwife-led care is provided to women through birth centres, distinguished into alongside midwife units (AMUs) or freestanding midwifery units (FMUs). AMUs are embedded in hospital complexes that have a pre-existing consultant led units, allowing labouring women to be transferred to obstetric units via walking, wheelchair or bed if complications occur (McCourt et al., 2014). FMUs differ in the fact that they are geographically separate from their host obstetric units, which means that labouring women must transfer by ambulance if complications occur (Hermus et al., 2017).

Midwifery-led units emerged out of a desire to provide a better birth environment for women, curtail rising intervention rates and to create a space where midwives could practice a social model of care (McCourt et al., 2014). Walsh (2010, p. 3) describes the emergence of birthing centres as a "*backlash against the discourse of medicalisation*" which has gained dominance in the birthing experiences of Western women. The core philosophy of birthing centres has been described as "*restoring and supporting birth as a normal physiological process and a major life transition*" (McCourt et al., 2016, p. 20), by reconceptualising birth as biopsychosocial event (Jordan & Davis-Floyd, 1993). Newburn (2012, p. 65) describes birth centres as offering *"both biopsychosocial safety and obstetric safety"*, they provide labouring women with the opportunity to receive care in a supporting and nurturing environment with all individual needs addressed alongside obstetric safety and the ability to promptly receive medical care if it is required (Newburn, 2012). The biopsychosocial model, as proposed by Engel (1977) considers the biological, social, psychological and cultural dimensions of health and disease. When applied to birth settings, a biopsychosocial perspective considers that the experience of labour and birth can be affected by socioemotional and environmental factors, for example the hormones cortisol and oxytocin are important in the physiology of birth and can be influenced by social and environmental settings. This approach contrasts to the medical model of birth which considers that childbirth is physiological and that objective measurement of symptoms and clinical observation are key to managing complications that may occur (van Teijlingen, 2017).

There is a growing body of evidence that explores the impact of the immediate environment in shaping women's experience of labour and birth. Referred to as 'birth space', the discipline considers the environment in which labour and birth occur and studies how the environment affects the experience and behaviour of people (primarily labouring women, midwives, doctors, partners, family) during the intrapartum period. The relationship between environment, relationships, experiences, and health outcomes has been discussed by anthropologists and health scholars for many years. Foucault described the way in which institutionalised spaces define human relationships through the panopticon (Foucault, 1979). Jordan (1993), describes and compares the intrapartum experiences of women giving birth within four cultures: Yucatan, Holland, Sweden and the United States. She refers to the birth space as the 'birth territory' and notes how the territories where birth occur (e.g. within a hospital, at home, familiar and unfamiliar spaces) influence the power and agency felt by birthing people, which in turn influences their emotional and physiological responses to birth. Mondy et al. (2016) conducted video ethnography of women labouring in an obstetric unit, birth centre and at home and analysed how the domesticity of the space influenced maternal behaviour during labour. Those who birthed in traditional hospital environments quickly became 'passive patients' with themselves and their families trying to take up as little space as possible. Those who gave birth in more domestic environments (birth centre and home), demonstrated claiming space and having more agency in their birth experiences. Domestic environments enabled women to engage with the "*cultural context of birth"* (Mondy et al., 2016, p. 43) which was unavailable in medicalised birthing environments.

Discussions about birth space focus primarily on labour and birth with little mention of the impact of the environment on postnatal well-being of parents. Drglin (2019) discusses how the 'production line' process of technocratic birth encourages parents to move through the hospital; from assessment room, to labouring room, to birthing room, to postnatal room. This concept of the production line results in the dehumanisation of families which overlooks the dyadic nature of the parent-infant relationship, often leading to the separation of mother and newborn following birth as well as isolating the birthing parent from their partner and extended family. In their proposal of 'salutogenic birth space', Drglin rejects the pathologizing of birth as a risky or dangerous experience. Within a salutogenic birth space, the space must prioritise the needs of the mother and the baby[4], which involves creating rooms that have sufficient space for the baby to room in with the mother and surfaces for baby care, as well as providing space for the partner to stay with the family unit. Changes in space influence relationships between healthcare staff and mothers, when infants room-in with their mothers, nurses and healthcare staff 'take care' of the infant in front of the mother, teaching her infant-care and being available to provide breastfeeding support (Drglin, 2019).

Research into birth space provides a foundation in which to consider to entire continuum of peripartum care, including the in-patient postnatal period. The following section will discuss current UK postnatal care provision and assess previous studies which have attempted to understand the influence of postnatal environment on maternal-infant outcomes.

2.3.1 Postnatal Care

Those who give birth in healthcare institutions commonly receive postnatal care within the institution that they delivered their baby in. Many families receive in-patient postnatal care for a relatively short period of time, the average hospital stay in the UK is less than two days (Government Statistical Service, 2021). The length of postnatal stay has steadily decreased over the last 30 years; in 1990 56% of women in England remained in hospital for three or more days following birth (Government Statistical Service, 2002) compared to 2021, with 91% of those who had a spontaneous vaginal birth in the UK staying in hospital for 2 days or less (Government Statistical Service, 2021). It has been reported that this decrease is driven by the need to reduce costs and improve service efficiency, rather than individual desires to return home soon after birth (Bowers & Cheyne, 2016). Postnatal care is described as the 'Cinderella service' of perinatal support (Barker, 2013); it receives limited funding and resources in relation to other aspects of perinatal services such as antenatal and birth, even though it is vital to the wellbeing of parents and their infants. The Quality Care Commission 2021 maternity survey reported poorer experiences of care for women postnatally compared to other aspects of maternity care (2022). Fewer than half of the respondents described being

[4] As opposed to medical models which organise space around the needs of the physician, for example, beds with stirrups dominating the space which allow easy monitoring of the birth canal by healthcare staff but disempower birthing people.

given information about their own physical recovery after birth and women reported receiving less support with breastfeeding than previous surveys (Quality Care Commission, 2022).

Research concerning postnatal care within UK birth centres is currently sparse, Malouf and colleagues (2019) conducted a systematic review of qualitative studies which looked into women's expectations and experiences of hospital postnatal care in the UK and found that there were no publications reporting the expectation and experiences of postnatal care in birth centres. Quantitative research has indicated that women express higher levels of satisfaction with birthing centre postnatal care than obstetric-led care. Tumbull and colleagues (1996) found that women allocated midwife managed care expressed significantly greater satisfaction with overall care provided than women receiving standard care. In their findings antenatal and hospital based postnatal care showed the greatest differences between the groups. Similarly, Bhavnani and Newburn (2010) found that women delivering in obstetric-led labour wards reported a greater level of unmet needs in the postnatal period than those delivering in birth centres. There is however little evidence to indicate that birth centre care leads to better health outcomes, primarily breastfeeding initiation, and continuation. Waldenström and Nilsson (1994) conducted a randomised controlled trial comparing the duration and experience of breastfeeding for women receiving birth centre or standard obstetric care in Sweden. The study showed no difference in breastfeeding duration or experience between the two groups, however the birth centre group experienced more complications, such as sore nipples and milk stasis. Interventions involved in obstetric care, for example the use of epidurals and analgesics have been associated with negative breastfeeding outcomes (Bai et al., 2013), therefore it would be expected that breastfeeding success would be improved with birth centre intrapartum care. It is worth noting that both groups in the study had high breastfeeding rates (93% exclusive breastfeeding at 2 months after birth), which may be due to the location of the study. There is currently no research relating to breastfeeding initiation and continuation for women who receive birth centre care in the UK.

2.3.2 Birth centre mapping exercise

Due to the scarcity of literature relating to postnatal arrangements in UK birth centres, a mapping exercise was conducted to understand the variety of birth centre in-patient postnatal provision in England. Information about postnatal care provision was collected via birth centre websites, if available, and direct contact with the units via the telephone. 168 Birth Centres were identified using a list compiled by babycentre.co.uk[5]. Of the 168 birth centres identified, 64 (38%) were freestanding and 104 (62%) alongside midwifery units. Descriptive statistics of the mapping exercise are presented in Table 2.1.

Table 2.1 Results of the Birth Centre mapping exercise

	AMU	AMU %	FMU	FMU %	Grand Total
Length of postnatal stay					
< 4 hours	3	3%	7	11%	10
< 8 hours	19	18%	10	16%	27

[5] https://www.babycentre.co.uk/a548694/birth-centres-in-england-by-region (accessed 12/10/2018)

< 12 hours	9	9%	4	6%	13
< 24 hours	70	67%	38	59%	107
< 48 hours	1	1%	2	3%	3
Unknown	2	2%	3	5%	5
Partners allowed to stay overnight					
Yes	86	83%	44	69%	127
No	15	14%	15	23%	29
Unknown	3	3%	5	8%	9
Mother's sleeping arrangement					
Double bed	28	27%	16	25%	44
Single, hospital style bed	56	54%	26	41%	80
Sofa bed	2	2%	0	0%	2
Unknown	18	17%	19	30%	36
n/a	0	0%	3	5%	3
Partner's sleeping arrangement					
Camp bed	4	4%	5	8%	7
Chair	55	53%	20	31%	73
Double bed	24	23%	16	25%	40
Unknown	6	6%	8	13%	15
n/a	15	14%	15	23%	30
Infant sleeping arrangement					
Hospital standalone bassinet	60	58%	23	36%	82
Moses basket	1	1%	0	0%	1
Three-sided wooden bassinet	3	3%	7	11%	10
n/a	0	0%	1	2%	1
Unknown	40	38%	33	52%	71
Transfer to postnatal ward for postnatal stay					
Yes	18	17%	6	9%	24
n/a	0	0%	1	2%	1
No/Unknown	86	83%	57	89%	140
Option to purchase an amenity room for a fee					
Yes	27	26%	0	0%	27
No/Unknown	77	74%	64	100%	138
Stay in same room for birth and postnatal stay					
Yes	6	6%	4	6%	10
No/Unknown	98	94%	60	94%	155
Grand Total	**104**	**62%**	**64**	**38%**	**168**

The exercise highlighted the diversity of postnatal arrangements in birth centres across the UK. Postnatal stays were short with almost 67% of AMU and 59% of FMU units reporting stays of under 24 hours. Shorter stays were more common in FMUs, with 27% of units discharging patients in 8 hours or less. Partners were more likely to be allowed to stay overnight at AMUs than FMUs, with 69% of FMUs allowing partners to stay overnight. The Midwifery Unit Standards define that MLUs should provide a double bed for postnatal rest, allow partners or companions to stay overnight and allow women to stay in the same room for birth and postnatal rest (Midwifery Unit Network, 2020). The results of this exercise indicated mixed observance to the midwifery unit standards in relation to postnatal care provision. AMUs had a higher proportion of units that allowed partners to stay overnight, 83% compared to 69% of FMUs. Only 6% of AMUs and 6% of FMUs had arrangements that allowed families to stay in the same room for birth and postnatal rest. Double beds were also reported as available in approximately a quarter of AMUs and FMUs, with mothers most likely to stay in a single, hospital bed. The most common infant sleeping

arrangements were standalone hospital bassinets, with 11% of FMUs described using three-sided wooden side-car cribs for the postnatal stay. Over 50% of FMUs did not provide any information about the infants sleeping arrangements so estimations of provision are limited. Given the lack of consistency across birth centre postnatal environments it is vital to understand and to establish what provisions are necessary to ensure that families are receiving the optimal patient experience whilst receiving postnatal care in a midwife-led environment.

2.4 Using closeness to improve breastfeeding outcomes

An evolutionary perspective has been previously utilised to develop and trial interventions to promote maternal infant closeness with the aim of influencing breastfeeding outcomes in UK hospitals. These interventions involved adapting the in-patient environment to make it easier to have the baby close and to support the physiological relationship between mother and infant that facilities breastfeeding initiation and continuation. Ball and colleagues (2006) conducted a randomized video trial in a UK postnatal ward to explore the effects of maternal-infant sleep location on breastfeeding initiation. They found that when mothers had unhindered access to their infants (by being allocated a three-sided crib attached to the bed, or bedding-in the mother's bed) they exhibited greater feeding attempts and successful feeds than those physically separated from their infants placed in a standalone cot, out of reach of the bed. A preliminary follow-up of this intervention found that 21% of mothers who initiated breastfeeding and received a standalone cot were still breastfeeding at 16 weeks compared with 53% of those who received the side-car crib intervention (Ball, 2008).

Tully and Ball (2012) assessed the influence of randomly providing either a side-car crib or a standalone bassinet in the in-patient period for mothers who underwent a scheduled caesarean delivery. Mother-infant interactions were filmed over the second postpartum night and infant location, bassinet acceptability and breastfeeding frequency were measured. Interviews were also conducted with participants to understand maternal attitudes to the allocated bassinet. No differences in breastfeeding frequency between those allocated a standalone bassinet or side-car crib were found, however women reported a preference for the side-car crib and infants were observed being exposed to more risks when allocated a standalone bassinet. Observed risks included infants lifted without support for their heads, tipping the bassinet when attempting to return the infant and dropping the infant into the bassinet.

The NECOT trial, conducted by Ball and colleagues (2011) aimed to understand the influence of allocating a side-car crib on breastfeeding duration. The randomised trial involved randomly providing either a side-car crib or a standalone bassinet to 870 mothers receiving postnatal care on an obstetric postnatal ward in the North East of England and following up families for 26 weeks in order to understand associated feeding and sleeping practices. The study found no significant differences in duration of exclusive, any breastfeeding or mother-infant at home bed-sharing for those who were allocated to receive a standalone bassinet or a side-car crib for their in-patient postnatal stay. A subgroup analysis of this study indicated that being allocated a three-sided crib on the postnatal ward significantly increased the proportion of breastfeeding at

26 weeks than receiving a standalone bassinet for those with a 'moderate' prenatal intention to breastfeed (Robinson, 2014), so the influence of bassinet allocation may have had a greater influence on those whose intention to breastfeed is weaker.

Qualitative analysis of interviews conducted with women who participated in the NECOT trial and video observations conducted by Klingaman (2009), highlighted difficulties faced by mothers in a conventional, post-natal 'rooming-in' environment, for example mothers' inability to access their infants when sleeping in stand-alone bassinets whilst rooming-in at night and reluctance to ask for assistance from ward staff. Infants sleeping in standalone bassinets escalated their cue-giving behaviours, such as crying, in order to get their mothers attention and mothers were observed missing feeding cues from infants. Mothers were also frequently observed bringing infants into their beds to feed and sleep in order to mitigate the difficulties caused by the standalone bassinets and to ease caregiving (Taylor et al., 2015). These findings indicate that although rooming-in can be a significant contributor in facilitating breastfeeding initiation in the postnatal period, the current set-up is not practical or conducive to encouraging a responsive or safe parent-infant caregiving environment. This study aims to develop the current understandings of in-patient postnatal rooming in environments, by exploring the experiences of those receiving care within a birth centre environment and trial an alternative infant space, the First Days Pēpi-pod.

2.4.1 Safer co-sleeping enablers

Safer co-sleeping enablers have gained prominence as devices to help parents avoid unsafe bed-sharing and to provide a portable sleep space for infants at need. Co-sleeping enablers take various forms, primarily the Wahakura (woven flax bassinet), the Pēpi-Pod and the First Days Pēpi-pod (custom designed plastic bassinets), all originated in New Zealand as a response to elevated Sudden Unexplained Death in Infancy (SUDI) rates among vulnerable communities. The Wahakura was developed as a culturally specific device for Māori families who were contraindicated to co-sleeping but had culturally embedded co-sleeping practices. Pēpi-pods are small plastic boxes with fitted mattresses that can be positioned in the parental bed, allowing close parent-infant contact without potential risks associated with bed-sharing. Recent research using infrared video to observe parents using safer co-sleeping enablers in the home indicated that providing a safer co-sleeping enabler compared to a standalone bassinet for home sleep resulted in an increase in sustained breastfeeding and was a safe alternative to bed sharing (Baddock et al., 2017b).

Safe co-sleeping enabler programmes have been trialled in New Zealand (Cowan et al., 2013; Mitchell et al., 2016), Australia (Young et al., 2013) and the UK (Ball et al., 2021). These programmes often include the provision of a safe sleep enabler device and associated safe sleep education programme. The provision of the enabler device is intended to overcome practical challenges to safe sleep implementation, whilst also using the device as an engagement tool for education (Ball et al., 2021). The Let's Talk About Sleep feasibility study assessed the influence of providing an polypropylene infant sleep box and associated safe sleep education to families in two UK areas with high socioeconomic deprivation (Ball et al., 2021). The box was a locally sourced facsimile of the Pēpi-Pod and was intended for home use. Participants who were

provided with an infant sleep box were positive about the concept of the box and found it useful as a place to park or 'store' the baby whilst they were engaging with other activities. Response to the intervention differed by participant characteristics with younger, single primiparous mothers responding more positively than older parents. Pēpi-Pod programmes in Australia have focused on reducing the rate of SUDI for Aboriginal and Torres Strait Islander infants whose risk of SUDI is three times that of non-Indigenous infants (Young et al., 2015). Evaluative studies have demonstrated that the Pēpi-Pod programme may be a practical safer sleep solution for Aboriginal families, however the cultural appropriateness of the design was questioned (Grant et al., 2021).

For my MSc by research I conducted a randomised crossover study comparing frequency of mother-infant interactions, breast-feeding, maternal-infant proximity and safety of infants under 5 months of age sleeping in 'baby bed boxes' (a device of our own making, based on the Pēpi-pod design) compared to a standalone cot in the same room in the Durham University Parent-Infant Sleep Lab (Keegan, 2017). The study found that mothers spent the night in significantly closer proximity to their infants when using a baby bed box and showed a significant increase in the frequency of responsiveness and interaction events. The boxes were not associated with any compromises in infant safety. These results suggest that baby bed boxes could be a feasible intervention to support and encourage parental-infant closeness and responsiveness in a birth centre setting as well as promoting safe co-sleeping.

Following the success of in-home safe sleep enabler interventions (Abel & Tipene-Leach, 2013), First Days' Pēpi-pods were developed for use within postnatal settings. These devices are smaller than the original Pēpi-pods which make them a better fit for hospital beds and new-born infants. First Days Pēpi-pods are currently being trialled on maternity wards in New Zealand and Australia to promote maternal-infant closeness and safe sleep in hospital beds (Cowan, 2016). A qualitative evaluation of First Days Pēpi-pod use within postnatal wards across New Zealand, concluded that the pods offered both closeness and safety on the postnatal ward and were particularly appreciated by mothers who had undergone caesarean deliveries who found it difficult to access infants in standalone hospital bassinets. Nine positive themes were identified by users of the pods, including usefulness, settling ease, closeness, improved sleep, responsiveness, and peace of mind. Negative feedback related to the size of the pods, which took up space in the hospital beds and the design which was overly utilitarian (Cowan, 2016). Initial results from the ESCCaPE trial, a mixed methods study which trialled two neonatal safe sleep devices, the First Days Pēpi-pod and MaBim side-car bassinet in a Queensland hospital indicate that parents appreciated increased choices in the postnatal environment which facilitated close contact and ease of access. Those allocated a Pēpi-Pod reported that it reduced the amount of pain they were in by decreasing movement following birth, it made them feel closer to their baby and made it easier to settle their babies (Young, Kearney, Rutherford, Cowan, et al., 2019). Full results assessing the influence of bassinet allocation on breastfeeding rates and maternal-infant attachment are yet to be published, however feedback indicates that 49% of staff working with families

participating in the ESCCaPE trial agreed that the Pēpi-Pod supported mothers to breastfeed whilst staying in hospital (Young, Kearney, Rutherford, Cowan, et al., 2019).

The First-Days Pēpi-Pod thus has the potential to facilitate an evolutionary-informed, salutogenic in-patient postnatal environment; it is designed to allow infants to stay close and safe to their mothers. This study aims to develop knowledge around the efficacy of First Days Pēpi-pods as neonatal sleep spaces within in-patient birth centre postnatal environments. So far there have been no observational ethological studies assessing the influence of pod use on breastfeeding and infant care, and the birth centre is a novel environment in which to trial the First Days Pēpi-pod.

The pod also has the potential to overcome issues unique to the study context which are described below.

2.5 The present study

This research aims to trial an intervention to improve the practicalities of rooming in within Newcastle Birthing Centre, an alongside midwifery-led unit in the Royal Victoria Infirmary, Newcastle Upon Tyne. To encourage active births, hospital beds are absent from the birthing rooms; however, each room is equipped with a double sofa bed that is assembled for the post-natal stay. As indicated by the mapping exercise, this arrangement is novel and little is known about the influence of these arrangements for families in the in-patient postnatal period. Standalone hospital bassinets are provided as standard for families to use throughout their stay which are inappropriately high for use with the sofa beds, making it difficult for parents to see or reach their infants whilst lying on the bed (see Image 2.1). Side car cribs which are designed to attach to hospital beds and have been previously shown to be successful on the post-natal ward (Ball et al., 2006) are not compatible with the sofa beds used in the Birthing Centre. The sofa-beds are also not considered an appropriate space for parents to directly bed-share with their infants due to the entrapment risk posed by the open hinges at the side of the bed leaving parents with little option but to use the standalone bassinets provided.

Image 2.1 A postnatal room in Newcastle Birthing Centre

This study therefore sets out to understand the in-patient postnatal experiences of families giving birth within the unit and to trial an intervention to improve parental-infant proximity and contact during the birth centre postnatal stay, with the aims of, improving breastfeeding outcomes (initiation and continuation), promoting infant safety and encouraging responsive cue-based care making it easier for parents to care for their babies in the birth centre.

2.5.1 Outcome Measures

Primary objective:

- To compare the effect of providing an in-bed bassinet versus a standalone bassinet on the duration of breastfeeding (defined as minutes of observed breastfeeding) in the in-patient postnatal period.

Secondary objectives:

1. To compare the effect of providing an in-bed bassinet versus a standalone bassinet on:
    a. Frequency and rate per hour of breastfeeding, assessed on the basis of observed behaviour.
    b. Breastfeeding outcomes (infant receiving exclusively breastmilk, mixed feeding or infant formula) at 6-8 weeks after birth using data extracted from child health records.
    c. Infant safety, defined as the frequency of potential risk incidents where infant safety is compromised or potentially compromised, assessed on the basis of observed behaviour.
    d. The amount of time that infants spent being touched and held by their parent or primary caregiver (minutes and frequency of touching and holding), assessed on the basis of observed behaviour.

e. The amount of time that mothers spent asleep (minutes of maternal sleep), defined on the basis of observed behaviour.
f. The amount of support received from midwifery staff (minutes of staff presence), defined on the basis of observed behaviour.

2. To evaluate the acceptability of providing an in-bed bassinet for the postnatal stay, defined on the basis of observed behaviour and feedback from postnatal debrief interviews.

3 METHODS

3.1 Study Location

This research was conducted in the Royal Victoria Infirmary (RVI) a large tertiary hospital in Newcastle-Upon-Tyne. Around 6000 births occur in the RVI per year[9]. The RVI has two birthing units; Delivery Suite which provides obstetric care to women experiencing high risk pregnancies, receiving consultant-led care or medical interventions during labour and Newcastle Birthing Centre, an along-side midwifery-unit which provides midwifery-led care to women who are experiencing a low-risk pregnancy and expecting a normal delivery. Data collection for this research was based in the birth centre, where around 800 women give birth each year, 35% of these are primigravidae (people giving birth for the first time)[6].

Breastfeeding initiation rates for the Newcastle Upon Tyne NHS Trust are lower than the national average with 43% of babies received maternal or donor breast milk compared to 75% UK average[7].

Table 3.1 Descriptive characteristics of the study site and associated local authority district

Study site	Royal Victoria Infirmary (RVI)
Location	Newcastle Upon Tyne
Number of births per year (estimated)[9]	6,255
Index of Multiple Deprivation for local authority district (where 1 is most deprived and 317 is least)[8]	74
City population (estimated 2018)[9]	300,196

3.2 Study Design

3.2.1 The trial

A randomised trial was conducted to compare the effect of two infant care devices: a standard bassinet (control condition) and an in-bed portable bassinet (experimental condition) on breastfeeding outcomes (initiation and continuation), infant safety, and responsive cue-based care. Video recordings were used to observe participants throughout their postnatal stay to understand the implications of each infant sleep location on parental caregiving in the post-natal period. Participants were interviewed following their stay

6 Based on births from Aug 2021-July 2022. Data retrieved through personal communication with C. Saunders (28/10/22)

7 Data retrieved from NHS Maternity services data set https://digital.nhs.uk/data-and-information/publications/statistical/nhs-maternity-statistics/2017-18 (accessed 28/10/22)

8 Data retrieved from https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019 (accessed 28/10/22)

9 Date retrieved from Office of National Statistics, Mid 2018 population estimate, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland (accessed 28/10/22)

in the birth centre to evaluate the acceptability of providing an in-bed or standalone bassinet. The recruitment and research process is demonstrated in fig 3.1.

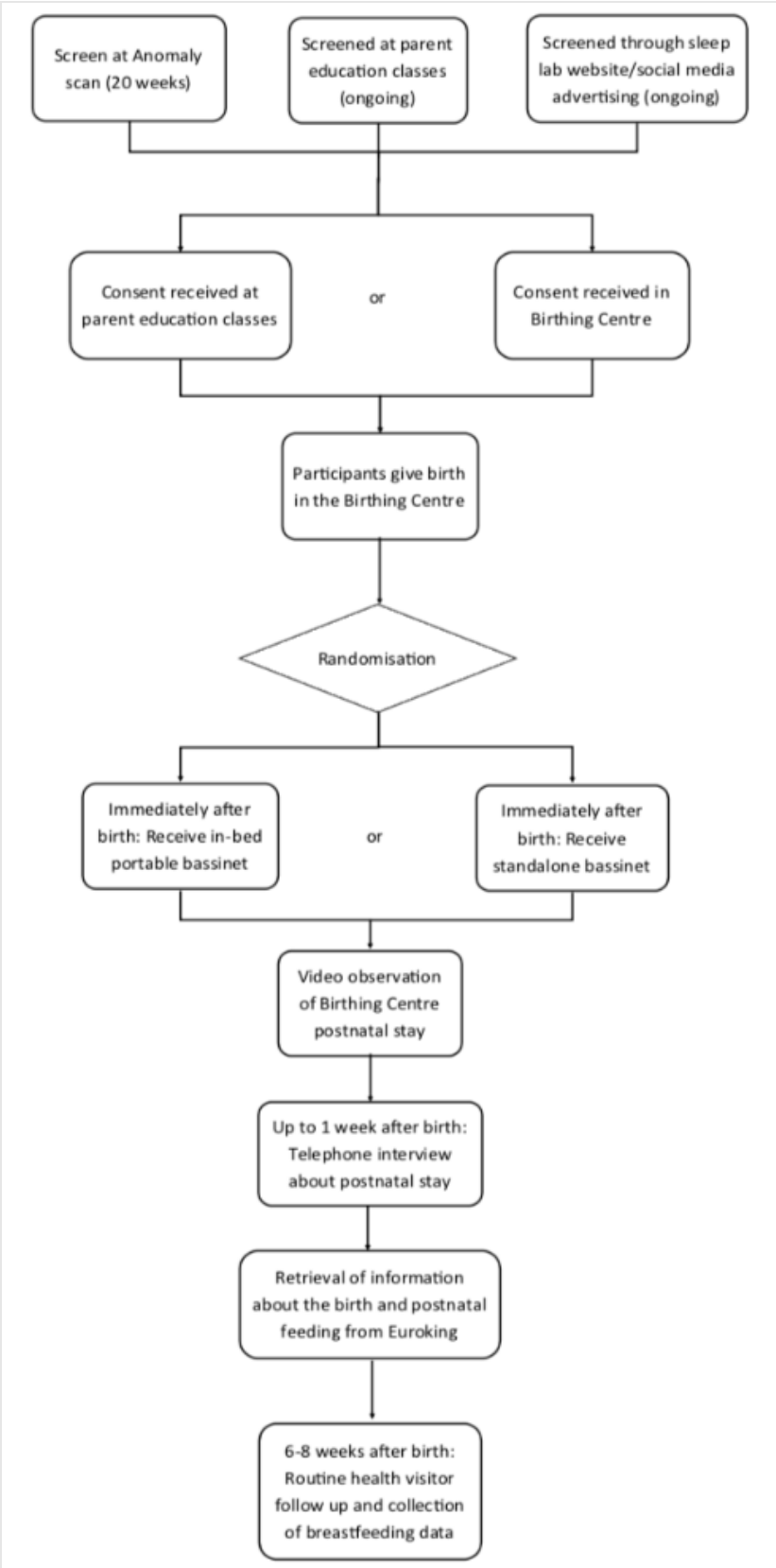

Figure 3.1. Flow chart indicating the recruitment and research process for the Postnatal Infant Care (PInC) Trial

3.2.2 The conditions

The trial assessed two infant care devices, a standalone bassinet and an in-bed bassinet (displayed in image 3.1). Current practice in Newcastle Birthing Centre is to place infants in a standalone bassinet after birth and throughout the postnatal stay. Participants who were randomised to the standalone bassinet condition were provided with a hospital issue standalone bassinet, which was the control condition.

The experimental condition, henceforth referred to as the 'in-bed bassinet' was a First Days Pēpi-Pod donated to the project by Change for Children New Zealand. The in-bed bassinet is 33cm x 53cm x 18cm and came with a fitted mattress which is 52cmx32cmx35cm (lxwxh). The mattress was made of 23-130 eco foam, had a bi-elastic, waterproof cover with heat-sealed seams and invisible zip and was suitable for hospital-grade cleaning products.

Image 3.1 Standalone bassinet (left), in-bed portable bassinet (right)

3.2.3 Blinding

Blinding of participants and/or trial investigators is commonly used to reduce bias in clinical trials (Schulz & Grimes, 2002). Blinding is defined as when knowledge of the intervention assignments are hidden from participants and/or trial investigators. Due to the nature of this research, participants were able to see which group they had been assigned upon receipt of the intervention, therefore full blinding of intervention assignment was not possible. In order to minimise the impact of this, participants were provided with minimal information about the trial hypotheses within the participant information sheet (PIS). There was minimal mention of breastfeeding as an outcome of interest in the PIS and participants were not explicitly told that we were examining observed breastfeeding duration as the primary outcome. Additionally, information about feeding status at 6-8 weeks was extracted from the child health records of participating infants, upon full consent from parents. This data was extracted rather than collected through participant follow-up for two reasons. Firstly, 6-8 week feeding data is routinely collected from all individuals who give birth in the UK as part of the Healthy Child Programme, by accessing this data we could ensure that we got data from all enrolled participants. Secondly, it meant that we did not follow up participants asking them about their infant's feeding status. This was justified by the results of a previous study (Ball et al. 2011)

which indicated a higher-than-average breastfeeding rate at 26 weeks in the study population, suggesting that an explicit focus on continued breastfeeding as part of a trial produces a Hawthorne Effect[10].

3.2.4 Randomisation

In a randomised trial, participants are randomly assigned one of two (or more) groups, one group receives standard care/treatment (control group) and the other group(s) are provided with the treatment/intervention (intervention group) that is of interest. Apart from the treatments allocated, the two groups should receive identical care and should be observed in the same manner. Randomisation occurs to ensure that confounding factors that may affect the results are equally distributed between the groups (Akobeng, 2005), thus reducing any systematic bias that could be attributable to the difference in outcome between the groups studied.

An online randomiser (Sealed Envelope[11] Ltd, Simple Randomisation Service) was used to randomly allocate a condition to each participant. Randomisation was performed following birth of infants in NBC immediately prior to cot provision. Participants' study ID numbers were entered into the randomiser and the allocated condition was provided. This randomisation process ensured that cot allocation was concealed from all members of the research team until cot allocation was requested. This method of concealing cot allocation was previously considered effective as it allowed the researcher to have more open and unbiased discussions with potential participants throughout the recruitment process and was intended to prevent them from being pressured by participants to be allocated to their preferred condition (Klingaman 2009).

3.2.5 Sample Size

In order to ensure that the study had external validity and would be appropriately powered, sample size calculations were used to determine the number of participants required to arrive at a statistically robust conclusion. In order to observe a difference between the two groups (standalone bassinet or in-bed bassinet), breastfeeding rate per hour was used as a basis for power calculations. Rate per hour was used as a basis for the sample size calculations as it was the only available published data of its type that could be used determine effect sizes. To predict the effect size of breastfeeding rate per hour, data was taken from existing literature which used similar methods (Ball et al., 2006). Sample size calculations were done using G*Power 2. To achieve 80% power with an alpha level of 0.05 and an effect size of 0.46, using a one-tailed test, 60 participants were required in each group, with a total of 120. Using a two-tailed test, 76 participants are required in each group or 152 participants overall. Given this calculation and anticipating a high post-randomisation dropout rate as transfer to the consultant-led unit had been reported at 41% (C. Saunders, personal communication, 8th March 2018), it would be necessary to recruit 300 participants. This projected

10 The Hawthorne Effect occurs when participants alter their behaviour as a result of participating in an experiment or study.

11 Sealed Envelope Ltd. 2020. Simple randomisation service. [Online] Available from: https://www.sealedenvelope.com/simple-randomiser/v1/ [Accessed 16 Jun 2020].

sample size exceeded what could be accomplished by a single researcher[12] within the time-frame available as so the study was reframed as an exploratory randomised trial with a smaller sample.

3.2.6 Inclusion and exclusion criteria

To be eligible to participate in the study respondents had to be nulliparas (never given birth before) who were identified as having a 'low risk' pregnancy and therefore eligible to give birth in the birth centre. Low risk pregnancies are defined as between 37 and 42 weeks pregnant at the time of delivery, expecting only one baby in the head down position and women with a BMI less than 35. This study looked specifically at the experiences of first-time parents in order to avoid contamination from previously established parenting strategies or caregiving practices.

Potential participants were also required to indicate that they had some intention to breastfeed their infants. On enrolment participants were asked 'How likely do you think you are to breastfeed your baby?' and were provided with the following six options; (1) I definitely will not breastfeed, (2) I probably will not but may try it, (3) I have no decided about it yet, (4) I will try and see what happens, (5) I would like to breastfeed, (6) I will definitely breastfeed (Robinson, 2014). Respondents who answered that they definitely would not breastfeed were not eligible to participate in the study, all other respondents were able to take part.

Finally, all potential participants had to be capable of giving informed consent which required them to be fluent in English in order to understand written and verbal participant information. The study budget was not extensive enough to cover the cost of translators.

3.2.7 Recruitment

A multi-faceted recruitment process was undertaken to ensure that recruitment reached as many potential participants as possible. There were difficulties in identifying potential participants who may have been eligible to give birth in the Birthing Centre as eligibility fluctuates through pregnancy and it is difficult to define who would end up giving birth in the Birthing Centre before they gave birth. All potential participants, regardless of recruitment method (described below) were provided with a Participant Information Sheet (PIS) (Appendix A) outlining the purpose and nature of the research, the involvement required from participants (including the benefits, risks and burdens of participation) and the alternatives to taking part. All of these recruitment methods complied with the NHS requirement that potential participants are given sufficient time[13] to consider whether they wish to participate in research. I also considered the unpredictability of labour and factored in enough time should participants commence labour early (at 37 weeks).

Recruitment occurred in the following ways:

[12] This study was eligible for 'portfolio adoption' and received support from NIHR clinical trials assistants, who provided limited assistance with recruitment and administrative support for the study.

13 Health Research Authority guidelines do not define a minimum statutory time for consent to be applicable, it should be proportionate to the duties required from potential research participants (HRA Consent and Participant Information Guidance 2022)

1. Recruitment at anomaly scan (20 weeks) – Potential participants were approached by myself or a clinical trials assistant in the waiting room of the antenatal clinic at the RVI between the hours of 8:30am and 4:30pm, Monday, Tuesday, Thursday and Friday. The appointment list was used to identify patients who were having their anomaly scans and these patients were then screened for eligibility by the sonographer conducting the scan. The sonographer highlighted if individuals were eligible to receive study information and if they were they were approached by a member of the research team in the waiting room. A member of the research team then discussed what the study involved with the patient and asked them if they were interested in taking a participant information sheet (PIS). If patients were happy to take a PIS they were asked to fill out a 'Register your interest form' providing their name, contact details and due date. If they registered their interest these individuals were then followed up when their pregnancy reached 36 weeks to confirm if they were interested in participating. Individuals who expressed enthusiasm to participate at 36 weeks had a card stuck to the front of their hospital notes indicating to clinical staff that they were willing to take part. A similar recruitment strategy was used in the NECOT trial and was shown to be successful in recruiting expectant parents (Ball et al., 2011).
2. Recruitment at Parent Education classes – A short 5-minute 'presentation' was made at parent education classes. Eligibility criteria was discussed in the presentation and individuals in attendance were asked if they wished to take a PIS if they were eligible and interested. Interested individuals were encouraged to get in touch or register their interest via an online form if they were interested in participating. Although very few participants ended up signing up in this way, this method ensured that some potential participants were aware of the study before they were admitted in labour.
3. Recruitment in labour/following birth – Eligible individuals were approached when they were admitted to Newcastle Birthing Centre for assessment, labour (if appropriate) or were provided with study information shortly after the birth of their baby. Midwifery staff were asked to phone the study team to notify them that they had an eligible patient who could be approached. A member of the study team would attend the birth centre and the staff caring for the patient would ask for the patient's consent to be approached. Those who consented were given a verbal explanation of the study and were provided with a PIS to read. They were given time, (at least thirty minutes) to discuss participation with their partner and consent to participate was not received until after birth. Many patients were hesitant to consent until after they had given birth as they were unsure of how they would feel. It was made clear that if consent to participate was received they were able to change their mind at any time.

3.2.8 Postnatal protocol

It was standard practice in the birth centre to move patients into a clean 'postnatal room' (a room without a birth pool) for their postnatal stay. Video cameras were fitted into two of these postnatal rooms (see image 3.2) and if patients agreed to take part in the trial, they were moved into one of these rooms when

they were ready. Participants were provided with the cot that they had been allocated by a member of the research team once they had been transferred into their postnatal room. Participants were then shown how to turn the camera on/off and with participant's verbal consent the camera was switched on. A sign indicating that the camera was recording was placed on the door of the room to ensure that visitors and staff were aware. Most infants were placed in a standalone cot in order to be transferred into the postnatal room and for participants allocated an in-bed bassinet, this was removed upon provision of the in-bed bassinet. Other than the allocated cot condition standard midwifery care was not altered by participation in the trial.

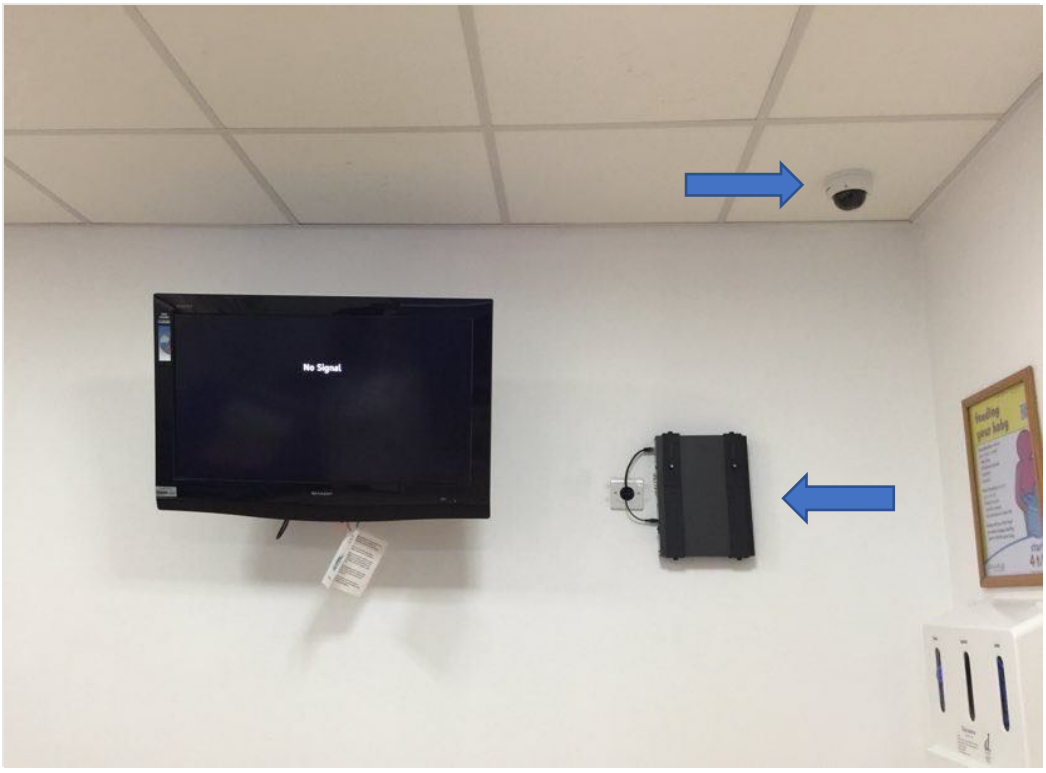

Image 3.2 Camera and recording device installed in Newcastle Birthing Centre

3.2.9 Equipment

The filming equipment comprised a small 2MP fixed lens dome camera[14] and Network Video Recorder (NVR) Unit[15] fitted with a 2TB hard drive. These were connected to the television screen that was already in the room using a VGA cable in order to check the field of view. The camera was fitted into the ceiling of the room and the NVR was suspended on the wall in a bracket, both of which were installed by NHS electrical contractors. When switched on the NVR began continuously recording until it was switched off and recordings were saved on the hard drive under the date they were made. The recording devices could be turned on/off by a small switch on the side of the device and prior to participation participants were

[14] HikVision camera DS 2CD2135FWD IS4 3MP 4mm Internal D/N Dome

[15] HikVision DS 7604 NI E1/4/P/A 4ch NVR

briefed on how to turn the cameras on/off should they wish to throughout their stay. Staff were also briefed on how to operate the cameras in case they needed to turn the cameras on/off. Following participation, the NVR was removed from the room to ensure that the videos could not be accessed or removed by other patients.

3.2.10 Video processing

The recording device saved the recordings in 2 hours chunks, this was to ensure that if there were any issues with recording the resulting data loss would be minimal. Recordings were required to be 'stitched' together to create a single video file that could be coded and analysed in Noldus Observer XT. Due to the format that the recordings were saved in, they needed to be converted to an editable format prior to editing, this was done using HikVision Format Converter[16]. Following conversion, the recordings were stitched together in Adobe Premiere Pro ready for coding.

3.2.11 Baseline data

Previous research has indicated that a number of demographic factors influence an individual's likelihood to initiate and continue breastfeeding (Agboado et al., 2010; Avery et al., 1998; Dennis, 2002; Kelly et al., 2006; Skafida, 2009). Upon enrolment, participants provided information about their demographic characteristics in order to ensure that these potentially confounding factors were equally distributed amongst both groups. Participants were asked to provide information on their age, breastfeeding intent, ethnicity, marital status, income and educational background.

Alongside demographic information, baseline data, collected via a data collection form completed by the midwife attending to the participant was completed. This included information about the birth, whether the baby was delivered in water (yes/no) if the baby received skin-to-skin contact within one hour (Moore et al., 2012), baby's first feed status, baby's discharge feeding status (maternal breast milk/donor breast milk/not breast milk). These data were used to assess if participant characteristics varied between trial arms, and also included as predictor variables for regression analysis.

3.2.12 6-8 week breastfeeding status

Breastfeeding status at 6-8 weeks was collected to understand whether cot allocation influenced likelihood to be breastfeeding a 6-8 weeks. This time point was decided because this information is routinely recorded at the 6-8 weeks health visitor checks and this data could be easily retrieved from the child health records with consent from participants. Breastfeeding to 8 weeks has also been shown to have a protective effect on the risk of Sudden Infant Death Syndrome (SIDS) (Cole et al., 2020).

3.3 Ethics and funding

[16] https://www.hikvision.com/en/support/tools/hitools/TS20200928124/ (accessed 12/11/2020)

Figure 3.2. Timeline of approvals

3.3.1 Ethical Approval

I was Principal Investigator for the research, with Professor Nicholas Embleton (Consultant Neonatal Paediatrician) acting as a clinical supervisor. Durham University sponsored the research with Newcastle Upon Tyne Hospitals Trust (NUTH) hosting the research. A timeline of approvals is presented in figure 3.2. Ethical approval was obtained by Durham University Anthropology Department Ethics Committee on 02/02/2018 and Yorkshire and Humberside NHS Research Ethics Committee (REC) on 04/09/2018 (IRAS ID: 237597) NHS REC approval was required as recruitment and study activities were taking place within NHS premises. Health Research Authority (HRA) approval was granted on 04/09/2018. Local Research and Development offices gave final approval of capacity on 17/10/2018, allowing study set up and recruitment to begin.

3.3.2 Caldicott Approval

I was required to obtain Caldicott Approval in order to procure, use and transfer patient identifiable data. Caldicott approval was obtained from NUTH Information Governance on 16/08/2018.

3.3.3 Research Passport

I held an honorary research contract (Research Passport) at the Royal Victoria Infirmary, which required clearance from the NUTH Occupational Health Department, DBS check, competition of Good Clinical Practice (GCP) training and personal and professional references.

3.3.4 Portfolio Adoption

This project was adopted into the National Institute for Health Research Clinical Research Network Portfolio within the NHS on the 06/09/2018 (CPMS ID: 08819). Adoption into the portfolio provided access to NHS research staff (eg. Research midwives, clinical trials assistants, and research midwives' office secretaries) at the study site. The research staff provided support with identifying eligible patients, approaching eligible patients with study information, accessing medical records/patient notes, recruitment and enrolment, randomisation, turning on cameras and ensuring that participants were provided with the appropriate bassinet. As I was in receipt of UK Research Council funding the research was automatically eligible for Portfolio Adoption.

3.3.5 Ethical issues

There were a number of ethical issues concerned with the research which are outlined below:

The study was designed to ensure that minimal disruption was incurred to participants in the postnatal period. There was a risk that some participants felt the use of video was intrusive, if this was the case participants were fully briefed on how to turn the cameras on/off should they wish to have some privacy and/or terminate involvement. Participants were informed of the nature of the study and the relevant data collection methods and were required to formally consent to the use of video recording equipment prior to any involvement in the study. Participants were also able to terminate video recording at any point throughout the study and view the entire video before it was to be used for research if they wished. If participants were required to undergo intimate examinations by healthcare staff, video recording was paused while this took place. However, staff were captured providing routine care to patients, such as baby health checks, breastfeeding support and verbal check ins. Participants were free to opt-out of the study at any point without having to provide a reason. Information was provided and consent obtained according to the ethical guidelines relating to taking and using visual and audio recordings of patients, outlined by the British Medical Association Ethics Department (BMA Ethics 2011).

Video recordings were taken via a fixed camera in a birthing/postnatal room in the birth centre, this meant that anyone who entered the room was captured on video. This included healthcare staff and visitors. All healthcare staff working within Newcastle Birthing Centre were briefed about the study at a team meeting before the first video observation took place. The briefing discussed what the trial involved, how it will be run, and the healthcare staff were able to ask any questions they had about the study. This was intended to ensure that all members of staff working within Newcastle Birthing Centre were provided with information about the study and understood that they may be captured on video. There was also a 'notice of recording' placed on the door of any individuals participating in the trial, this outlined that there is recording going on and that by entering the room individuals were consenting to be captured on film. It also notified individuals that if they wished to enter the room but did not want to be captured on film then they could request for the video to be turned off before they entered the room. In cases of emergency, video recording was terminated immediately.

In order to protect the anonymity of staff working within the Birth Centre, any video clips provided to participants were edited to remove any sections with staff present. As this research was concerned with parent-infant behaviour, the behaviour of midwives and hospital staff were not analysed from the video recordings. If staff appeared in the video their identities were not specified and their presence was coded as 'staff present' in order to understand if certain parental behaviours are dependent on the presence of staff members.

As this research involved new-born infants, the research team were under a duty of care to ensure that any observed behaviour that was considered to put the infant at harm was disclosed to the appropriate safeguarding team. The research team were also obliged to report any practices of concern by hospital staff to the safeguarding team and Newcastle Birthing Centre manager. The research team were fully briefed about the disclosure and safeguarding procedure within Newcastle Birthing Centre and followed the

guidelines outlined in The Newcastle upon Tyne Hospitals NHS Foundation Trust Child Protection and Safeguarding Children Policies and Procedures document and with additional reference to the Royal College of Paediatrics and Child Health Guidance on clinical research involving infants, children and young people: an update for researchers and research ethics committees (2014).

Whilst conducting the semi-structured interviews, care was taken to ensure that participants were comfortable and if it appeared that embarrassment or upset was being caused participants were given the opportunity to skip the question, abandon or rearrange the interview. All interviews were conducted in sensitive and respectful manner and questions were avoided that may have caused upset or embarrassment.

3.3.6 Data protection and Confidentiality

In order to ensure that any identifiable data collected was handled appropriately and securely a thorough data management plan was put into place. Hard and electronic copies of the mother and baby record were accessed through Euroking maternity information systems to collect information about the birth and postnatal period. This was done by NIHR research staff who had access to hospital systems. Data retrieved from these systems was: delivered in water indicator, baby first feed breast milk status, feeding method on discharge and if the baby received skin-to-skin contact within one hour of birth. In order to retrieve this information we were required to collect the mother's NHS number on enrolment, and the baby's NHS number when born. Consent to access these records was obtained from participants.

In order to retrieve 6-8 week breastfeeding data collected routinely by Health Visitors, medical care records were accessed using the infant's NHS number. Consent to access these records was provided by participants. The Child Health Record's team were contacted and asked to retrieve the relevant data. Data retrieved was immediately put into an anonymized encrypted database.

Audio and visual recording devices were used to observe the postnatal period of each participant. Consent to use these devices was gained from participants in writing before they were used.

I was provided with access to the NHS computer systems and was provided with my own username and password, this meant that I could save any identifiable patient data on the NHS computer systems and minimised the need to remove any identifiable patient data from the hospital. Any identifying information that needed to be accessed away from hospital premises was kept securely in password encrypted files on password protected university computers and servers.

Identifiable information provided on enrolment forms (name and address) were stored in a locked cabinet in the Reproductive Health Research Team office located within the hospital. This office was only accessible by verified research staff. Any information provided on paper forms was immediately input into an anonymised electronic database and the forms were archived.

All data was stored in two password-protected encrypted files, one which contained personally identifying information and a study ID number and another which contains study ID number and research data, ensuring that research data could not be personally identified.

3.3.7 Video files

It was essential to ensure that video files could not be easily accessed by staff or patients within the birth centre. The NVR recording devices were encrypted and required a code in order to be accessed. When not being used, the recording devices were stored in a locked cabinet inside the birth centre. Following recording video files were transferred from the recording device onto an encrypted USB drive. Video files were saved separately from any identifiable participant information and were identified by the participant study ID number. These files were transferred to Durham University Parent-Infant Sleep Lab by the PI and the files were transferred onto a secure server accessible by a university desktop computer. The video files were then deleted off the data storage device. There was a sign-out sheet in the project file at Newcastle Birthing Centre and a sign-in sheet at Durham University Parent-Infant Sleep Lab to ensure that the transfer of video files could be monitored.

3.3.8 Audio files

Postnatal debrief interviews were recorded using a Dictaphone. Audio recordings were immediately transferred to secure university servers and deleted from the Dictaphone. These files were saved using the participant ID number so that they did not contain any identifiable information. Audio recordings were transcribed using a private transcription company, and anonymised audio files were transferred to the company using the company's secure data transfer software. Any names quoted in the interviews were anonymised in the transcriptions.

3.3.9 Patient public involvement

Public involvement in the design and conduct of research comprises asking patients or people with relevant experience to contribute to how research is designed conducted and disseminated. The Health Research Authority encourages researchers to involve the public in research and the involvement of public in projects can provide assurances to NHS Research Ethics Committees when reviewing ethics applications (Health Research Authority, 2016).

The public were involved in the design and management of this research. The study protocol and design of the participant information sheet was discussed with mothers who had recently given birth attending breastfeeding groups in Newcastle and Newcastle Breastfeeding Festival. The feedback was used to redesign the participant information sheet and refine elements of the protocol that were unclear. I also set up a study steering committee, which met every 6 months. This committee comprised my primary PhD supervisor (Prof Helen Ball), an obstetric consultant (Prof Nick Embleton), the birth centre manager, the infant feeding coordinator, and a patient representative (a parent who had recently given birth).

3.3.10 Amendments

Throughout the running of the study we were required to submit a number of substantial amendments to the study protocol. These are outlined below:

Table 3.2. Amendments to the study protocol

Date submitted	Details of amendment	Date approved
November 2019	Changes to the study protocol to include individuals who had given birth on D/S but may be transferred to NBC for postnatal care. This was due to changes in room allocations in NBC.	22nd November 2019
13th February 2020	Addition of study evaluation procedures, the collection of feedback from staff working at the study site (Newcastle Birthing Centre) using anonymous feedback forms and unstructured ethnographic interviews.[17]	27th February 2020

3.3.11 Participant Compensation

Participants were not compensated for participating in the research as it was considered that the research did not deviate significantly from standard care and we were hesitant to incentivise participation. However, participants who completed the video section of the study were offered a copy of their video which would be mailed to them on a USB flash drive if they so wished.

3.3.12 Funding

This research was funded by a number of different sources. I received a studentship from the Northern Ireland and North East Doctoral Training Partnership (NINE DTP[18]) which covered my tuition fees and provided a living stipend for 3.5 years. I was also awarded the Van Mildert College Postgraduate Award (£2000) which contributed to my costs associated with travelling to the study site. I was also awarded funding from The International Society of Human Ethology Owen F. Aldis Fund ($7740.50) which contributed to the study running costs, including equipment, software, research support and conference attendance.

3.4 Behavioural data

3.4.1 Sampling

In order to control for differing video lengths and to reduce the amount of video to be coded to manageable levels, videos were sampled for specified time periods. In order to ensure that bias was not introduced from sampling whenever something obvious or interesting is happening (Martin & Bateson, 1993), sampling sessions were determined based on a specified sampling period for all videos. Other studies that have used video to observe parent-infant interaction have primarily focused on night-time behaviour, defining the

[17] Due to COVID-19 this feedback and evaluation phase was unable to go ahead

[18] Economic and Social Research Council

sampling period as either between when the mother/parent falls asleep and wakes up (Klingaman, 2009) or when the baby falls asleep and wakes up (Baddock et al., 2017b). As this study was not looking specifically at night-time behaviour, these sampling methods were not appropriate. In a video study aiming to determine whether postnatal mother-infant sleep proximity affects breastfeeding initiation and infant safety, Ball and colleagues (2006) standardised video recordings into 4-hour blocks, sampling the middle 4-hours of the total observation period, overcoming the problems of differing video lengths and the lack of a common 'start' and 'stop' point between participants.

Once all the videos were recorded video lengths were examined. Video lengths varied widely, the shortest video was 1 hour and the longest video was over 26 hours (see table 3.3). The median video length across all videos was 13 hours and 59 mins. The shortest video (P8, 1h 1min) was excluded from all analyses as it was too short to provide any comparable data. Removal of this outlier increased the median value for all videos to 14 hours and 38 minutes (see table 3.4). The median time between birth and the start of recording for all videos was 3 hours and 17 minutes.

Table 3.3 Total video length and the time between birth and the start of recording for all videos recorded (n=32)

	Median (range)		
	All videos n=32	In-bed bassinet n=15	Standalone bassinet n=17
Observation length	13:59 (01:01 -26:16)	14:48 (01:01 – 26:16)	11:37 (07:14 – 25:27)
Time between birth and start of observation	03:17 (01:30 – 07:11)	03:34 (01:30 – 05:54)	03:08 (01:31 – 07:11)

Table 3.4 Total video lengths and time between birth and start of recording for videos used in analysis (n=31) excluding the outlier (P 8)

	Median (range)		
	All videos n=31	In-bed bassinet n=14	Standalone bassinet n=17
Observation length	14:38 (05:01-26:16)	16:07 (05:01 – 26:16)	11:37:13 (07:14 – 25:27)
Time between birth and start of observation	03:17 (01:30 – 07:11)	03:34 (01:30 – 05:54)	03:08 (01:31 – 07:11)

Video lengths were plotted (fig 3.3) and compared against the time between birth and the start of the recording to visually identify a common period that was covered by the videos. Time of birth was used as the standardised reference point rather than time of day as observations commenced as close to the time of birth as possible, irrespective of time of day. A sampling window of seven hours was identified, starting 5 hours after birth, and ending 12 hours after birth that maximised data capture for comparable periods from all participants (see fig 3.3). The sampling period for each video was calculated using time of birth and time stamps on the video recordings to ensure that any missing periods in the video recordings were accounted for. A code 'Sampling period start' was added to the behavioural taxonomy and the relevant sampling period was coded for each observation. Behaviours occurring within the sampling period were selected by using the 'select intervals' function in Noldus Observer.

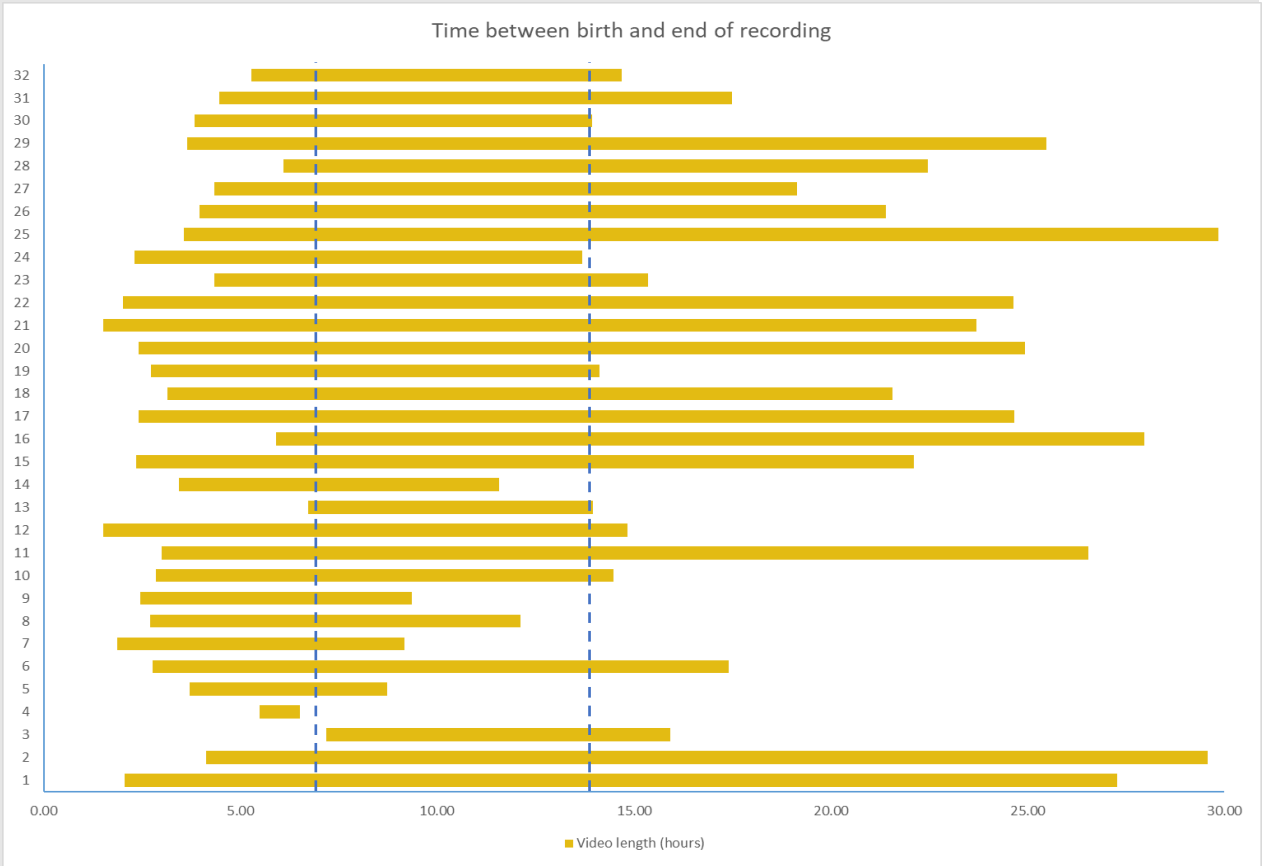

Figure 3.3 Graph showing the time between birth and the end of recording for each participant, with birth occurring at 0.00 video lengths varied from 1 – 26 hours. The 7-hour sampling period has been indicated by the dashed lines.

3.4.2 Missing Data

Participants and staff were told that they were free to turn cameras off throughout the observation if they felt uncomfortable or they were undergoing procedures that they were not comfortable being recorded. This resulted in cameras being switched off for periods of time throughout the observed period. Twelve observations had missing sections within the sampling period, with missing periods ranging from 10 minutes to 3.5 hours (see table 3.5). The distribution of missing data was equal across both bassinet groups, with 6 participants from the standalone bassinet group with missing data (mean duration 1h 33min), and 6 participants in the in-bed bassinet group (mean duration 1h 45min).

Table 3.5 Participant IDs and durations of videos that had missing sections within the sampling period (n=12)

Participant ID	Group	Total sampling period duration (hh:mm)	Missing period (hh:mm)
6	Standalone Bassinet	04:05	02:54
7	Standalone Bassinet	04:11	02:48
12	In-bed Bassinet	06:17	00:42
15	In-bed Bassinet	03:33	03:26

17	In-bed Bassinet	04:34	02:26
18	Standalone Bassinet	05:00	01:59
22	Standalone Bassinet	06:34	00:25
24	In-bed Bassinet	04:48	02:11
29	In-bed Bassinet	05:27	01:32
33	Standalone Bassinet	06:49	00:10
37	Standalone Bassinet	05:54	01:05
41	In-bed Bassinet	06:42	00:17

Many of the missing periods occurred when staff were providing care and support to patients, this predominately involved breastfeeding support. This may result in conservative estimates of time spent breastfeeding. It was decided that it would be too unreliable to estimate time spent breastfeeding whilst cameras were switched off. Some of the missing periods also occurred where participants completed their observations before the end of the sampling period, either because of early discharge or because they did not want the camera on for the remainder of their stay. Analysed video lengths are described in table 3.6.

Table 3.6 Analysed video lengths for the intention to treat group (n=31)

	Mean (range)		
	All videos n=31	In-bed bassinet n=14	Standalone bassinet n=17
Observation length	6:17 (03:33-07:00)	06:14 (03:33 – 07:00)	06:20 (04:04-07:00)

3.4.3 Per protocol and intention to treat analyses

In randomised trials, randomisation serves to ensure that any factors that may affect study outcomes are equally distributed throughout study groups; this guarantees that any difference in outcomes is due to the trial intervention (Roberts & Torgerson, 1998). Intention to treat is a strategy intended to maintain the integrity of study randomisation irrespective of trial outcomes such as treatment received, protocol deviations, participant compliance or withdrawal by analysing groups by the condition/treatment allocated rather than the condition/treatment received (Heritier et al., 2003). Intention to treat analyses generate conservative estimates of effect, because results can be diluted by non-compliance to the allocated condition, however these estimates more accurately reflect real-life situations and reduce bias (Heritier et al., 2003). Per protocol analysis selects those who actually received the assigned condition and participated in the trial as specified in the protocol. Per protocol analysis can be understood as capturing the 'true' effect of the intervention, however this method can introduce bias as it can mitigate the effect of randomisation on the population (Ranganathan et al., 2016; Tripepi et al., 2020). In order to understand both a realistic estimation of effect and a 'true' estimation of effect, intention to treat and per protocol analyses were performed and results of both these analyses are presented.

Compliance with the randomly allocated condition (cot type) was used to determine the per protocol analysis group. This method was used by Klingaman (2009) and Ball and colleagues (2006), both of whom recorded whether infants spent 50% or more of their sleep time in a location other than their allocated cot. Those who spent more than 50% of their sleep time in another location were excluded from the per protocol analysis group. In this instance, infant location was coded throughout the sampling periods and the percentage of the observation period that the infant spent in the allocated condition was calculated. If the allocated condition was used for more than 50% of the observed time when the baby was not being held by a caregiver or visitor this indicated compliance.

3.4.4 Taxonomy

In order to evaluate the influence of cot type on breastfeeding and other secondary outcomes, behaviours were coded based on a predefined behavioural taxonomy or 'ethogram' comprised of behavioural states among mothers, other primary caregivers, infants and staff (Table 3.7). The ethogram was operationalised in Noldus: The Observer XT 14.

Table 3.7 Behavioural Taxonomy used for the analysis

Subject	Behaviour Group	Behaviour	Modifier	Definition
Mother	Feeding	Attempted breastfeeding		Mother offers her breast to the baby, baby is at the breast and appears to be latched on or attempting to latch on. Feeding sessions were defined by episodes separated by at least five minutes.
Other primary caregiver		Other feeding		Baby is receiving food from something other than a breast (Eg. bottle, syringe, or cup). This may be breastmilk or artificial milk.
Staff		Feeding n/a		There is no feeding.
Mother	Sleep	Appears asleep		Caregiver is lying down with their eyes closed
		Sleep n/a		Caregiver has eyes open and/or isn't lying down
Infant	Infant safety	Risk	Suffocation risk	Infant's airways (mouth/nose) are covered
			Overheating risk	Infant is in heavy clothes/under blanket
			Falling risk	Infant is in a precarious position in a location with no means of fall prevention
			Entrapment risk	Infant is wedged between two surfaces in a location
			Overlaying risk	Infant is trapped under a caregiver
		Risk n/a		There are no observable risks

Infant	Infant location	Standalone bassinet		Baby is placed in standalone bassinet
		In-bed bassinet		Baby is placed in in-bed bassinet
			On parent/carer	Baby is being held by a parent/carer
			On visitor	Baby is being held by a visitor
			On bed	Baby is placed on the bed
			Other	Other location not applicable to any of the other categories (please note location)
		Infant location n/a		If the baby is in another location not listed this option is selected
Mother	Contact	Partial contact (touched)		Physical contact from a small degree (such as caregiver touching the baby or holding the infant's hand)
Other primary caregiver		Whole contact (held)		Infant's body is mostly in contact with the caregiver eg. Infant being held or lying up against someone
		Contact n/a		There is no contact between the baby and the caregiver
Staff	Staff presence	Staff present		There is a member of staff in the room
		Staff presence n/a		There is no member of staff in the room
Infant	Infant Cue	Cue (Escalation)	1. Early cue	Stirring, mouth opening, turning head/seeking/rooting
			2. Mid cue	Stretching, increasing physical movement, hand to mouth
			3. Late cue	Crying, agitated body movements, colour turning red
		Cue n/a		Baby is not giving any cues or baby is on parent or being interacted with by parent
Mother	Parent response	Infant alone		Baby is alone in bassinet, not being interacted with by caregiver
Other primary caregiver		Response	1. Looking	Parent looks at baby but doesn't touch
			2. Rocks cot	Parent reaches out and rocks cot to soothe baby
			3. Touching	Parent touches/strokes baby and/or looks
			4. Holding	Parent picks up baby or holds baby

			5. Feeding	Mother attempts to feed the baby
		Response n/a		Select this option if parent is interacting with baby and infant alone or response doesn't apply. Also select if visitors present.
Mother	Proximity	Within arm's reach		The caregiver does not have to reposition themselves to be able to be in physical contact with the infant
Other primary caregiver		Beyond arm's reach		The caregiver would have to reposition themselves to move within range of reaching the infant
		Proximity n/a		Infant not alone (in contact with a parent/caregiver/visitor/staff)
	Sampling period	Sampling period start		
		Sampling period n/a		

3.4.4.1 Feeding

Any instances where the infant was brought to an exposed breast and feeding was attempted were coded as 'Attempted feeding'. Baddock and colleagues (2017) defined feeding episodes if the infant returned to the breast, bottle or pacifier in less than 30 seconds. As this population was learning to breastfeed thirty seconds between feeding episodes was considered too short to accurately measure feeding bouts. Feeding sessions were therefore defined by episodes separated by at least five minutes, this procedure was consistent with McKenna, Mosko and Richard (1997) and Klingaman (2009). 'Attempted feeding' was used to code any instances of attempted or actual feeding at the breast as it was difficult to distinguish between the two without sound or multiple camera views. Use of the term 'attempted breastfeeding' was also important as many mother-infant dyads were learning how to feed and the successful transfer of milk/colostrum was considered less important than the frequency and duration of attempted suckling. The frequency of infant suckling in the days immediately following birth has been associated with subsequent increased milk production (Chen et al., 1998) and mothers whose infants were observed to suckle infrequently had lower prolactin levels and were more likely to experience late onset of Lactogenesis II (Chapman & Pérez-Escamilla, 1999). Any other feeding was defined as 'other feeding' irrespective of the milk being given (expressed colostrum/breast milk or artificial formula) as those feeds would not contribute to the hormonal production of breastmilk. All feeding that occurred when clinical staff were present was coded.

3.4.1.2 Infant Safety

In order to define what may constitute a 'risk' to an infant, behaviours were categorised into five groups: suffocation risks, overheating risks, falling risks, entrapment risks and overlaying risks. Risk codes were determined based on the postnatal environment and risk observed in previous studies, most notably the

categories defined by Klingaman (2009). In their study comparing a standalone bassinet with three-sided bassinet provided to mothers recovering from a caesarean delivery on a postnatal ward, Klingaman coded risks as: position, falling, suffocation, overlaying or other. In their analysis Klingaman observed parents placing their infants on their fronts into the bassinets, parents not providing as much support to their infant's necks when moving them into the standalone bassinets or parents dropping babies into the bassinets. She also observed infants lying precariously on top of pillows, creating potential falling risks. Other ethological studies of infant caregiving have observed similar risks; Ball et al. (2006) in their study of three infant sleep locations on the postnatal ward observed 'breathing risks' and 'falling risks' throughout the observation night. Position was not included as a code in this analysis, many families were encouraged to place their infant's skin-to-skin, which involved infants lying face down on a parent's chest. This was considered a physiologically beneficial behaviour and was distinct in risk status than infants being placed prone in a bassinet or on a flat inert surface. Coding prone position throughout the observation as a risk would have presented an inaccurate depiction of the inherent risks that infants were experiencing.

3.4.4.2 Infant location

The location of the infant was coded for all videos. This was used to describe the amount of time the infant spent in the allocated condition and the amount of time infant spent elsewhere. This was also used to group participants for per protocol vs intention to treat analyses (discussed on page 47). Locations were standalone bassinet, in-bed bassinet, other, location n/a. Other locations were categorised into on parent, on visitor, on bed or other. The code 'on bed' was used to refer to instances when the infant was lying on the bed separate from a caregiver, this was distinguished from when infants were lying on the bed in close physical proximity to their parents (co-sleeping). If infants were lying in bed with a parent but their whole body was in contact with a caregiver this was coded as 'on parent'[19]. Parent/caregiver holding included instances of skin-to-skin contact and clothed parent-infant contact, these were not distinguished within the coding scheme.

3.4.4.3 Contact

Caregiver-infant contact was coded continuously using the contact code. Contact was split into whole and partial contact. Whole contact was defined as instances when a majority of the infant's body was touching a caregiver's body. Partial contact was defined as instances where the infant was touched by a caregiver (e.g. putting a hand on the baby or holding baby's hand). Contact was only coded for mother and other primary caregiver and did not include whole or partial contact with a member of staff or a visitor. Whole contact was coded separately from infant location > on parent to allow for the specification of who was holding the baby.

3.4.4.4 Sleep

[19] Staff were proactive in teaching mothers how to breastfeed lying down, often infants would be observed lying on the bed whilst feeding in full bodily contact with a caregiver. This was considered as 'on parent' as the boundaries between the parent's body and the infant's body were indefinable.

Sleep was coded to understand how cot allocation influenced maternal sleep duration. Sleep was only coded for the mother, this allowed for the comparison of allocated condition on maternal sleep duration. Sleep status was defined using observed behaviour, when the mother was lying down and their eyes were closed, this was consistent with taxonomies used by Ball (2006), Klingaman (2009) and McKenna et al. (1997). Mothers were defined as asleep if they had their eyes closed and had not shown signs of wakefulness for 2 minutes. If the mother woke and returned to a settled state within 2 minutes, they were included in the sleep bout, however waking for more than two minutes was defined as a behavioural arousal.

3.4.5 Reliability of behavioural measures

The predetermined behavioural taxonomy was used to code behaviours. Participant videos were viewed multiple times, with each behaviour coded in a different viewing to ensure that the possibility of missing a behaviour was minimized. Videos were paused and replayed to ensure that codes were accurate.

To ensure that behavioural measures were as reliable as possible reliability tests were conducted. Coding was done by two observers, an undergraduate research assistant and myself, therefore it was important to ensure that there was agreement between observers (interobserver reliability). To assess inter-observer reliability, Cohen's Kappa was used (Cohen 1960). Cohen's kappa was developed to overcome issues related to calculation of proportional agreement score that did not account for chance (McHugh, 2012). Kappa has been described as the 'measure of choice' as it measures the degree of correlation between two independent measurements whilst controlling for chance agreement between the two measurers (Jansen et al., 2003). Kappa scores were calculated using the reliability analysis function in Noldus: The Observer XT 14, results for each behaviour measured as outlined below. In order to calculate interobserver reliability, three of the same videos (10%) were coded by both coders and then compared using the Kappa statistic for the main outcome variables; number of attempted breastfeeding events and length of time baby was at the breast and feeding was attempted. The Kappa score was 0.82 for the frequency measure and 0.99 for the duration measure, meeting the required reliability threshold of 0.80 (see table 3.8).

Table 3.8 Interobserver reliability scores

Research question	Reliability measure (frequency/duration)	Kappa score interobserver
Number of attempted breastfeeding events	Frequency	0.82
Length of time baby was at the breast and feeding was attempted	Duration	0.99

3.4.6 Data processing

Prior to analysis data needed to be processed. Data were exported from Noldus Observer XT for each behaviour using the data profiles function. Data profiles were used to select the data required, filtering by subject, behaviour and condition and exported from Noldus Observer as an Excel file. The data exported included mean duration that a behaviour occurred (mean bout duration), total duration that behaviour

occurred, number of times behaviour occurred, duration of sampling period and percentage of the sampling period that the behaviour occurred. This data was saved as a .csv file and processed in R. Processing involved changing column names, selecting the relevant data and compiling all behaviours into a single spreadsheet, with one row per participant. The function pivot_wider (tidyverse) was used to reshape data to one row per participant. Time values were expressed as hh:mm:ss in the export document so these were converted to decimal minutes to facilitate analysis. If the same behaviour had been coded by both coders for the same participant, then the coding done by the PI (AK) was given priority.

3.4.6.1 Time of day

Observations were grouped into 'predominately occurring in the daytime' and 'predominately occurring in the nighttime'. Daytime periods were determined as more than 50% of the sampling period occurring between 8am and 8pm, with nighttime periods determined by more than 50% of the sampling period occurring between 8pm and 8am.

3.4.6.2 Categorical/demographic variables

Categorical variables education and breastfeeding intention were recoded as displayed in table 3.9 below. The column on the left shows the original response options and the number of respondents in the analysed sample (n=31) for each category. The column on the right demonstrates the way in which these categories were collapsed. These categories were recoded because there were so few representatives in each category they could not be used in analysis in their current form.

Table 3.9 Recoding of categorical variables for analysis

Original variable	N per original category	Recorded variable	N per recoded category
Education			
Postgraduate degree	13	Degree and above	25
Degree	12		
AS/A-level	4	Below degree	5
GCSE	1		
Unknown	1	Unknown	1
Breastfeeding intention			
I will definitely breastfeed	17	Strong intention	17
I would like to breastfeed	11	Moderate to low intention	14
I will try and see what happens	3		

3.4.6.3 Time spent in any cot

As a number of those who were allocated an in-bed bassinet were also observed using standalone bassinets for some of their observation, 'time spent in any cot' was calculated in order to demonstrate the effect of overall bassinet use on parent-infant behaviors. Time spent in any cot was calculated for the in-bed bassinet group by adding the time spent in in-bed bassinet with time spent in standalone bassinet. This variable was used as the primary indicator of bassinet use in the regression analysis as it provided a more comparable measure.

3.4.7 Data Analysis

Of the 33 families who participated in the trial, two were excluded from analysis: one video was too short to analyse (P8, in-bed bassinet group), the other experienced technical failure that meant that the video was not captured (P2, in-bed bassinet group). This resulted in a final dataset based on 31 participants, 17 of whom were allocated a standalone bassinet, 14 an in-bed bassinet.

To assess whether there is any systematic bias, data were summarised by participant and non-participants (those who became ineligible/withdrew); and also by cot allocation groups. For descriptive results, continuous variables were summarised as median and interquartile range, and categorical variables were summarised as number and percentage. Independent t-tests were used to compare whether mean of the continuous variable (age) varied between those who participated and those who did not participate and group allocations (in-bed bassinet/standalone bassinet). Fisher's exact tests were used to examine associations between categorical variables (e.g., marital status, breastfeeding intention, ethnicity, education, delivered in water, and breastfeeding status at 6-8 weeks). For those cases when a categorical variable included no participants in at least one of the categories, Fisher's exact tests could not be performed (shown as not applicable). A p-value of <0.05 was considered to be significant.

All statistical analyses were conducted using R. A number of R packages were used in the statistical analysis, including CAR, ggplot2, tidyverse, moments and stargazer.

3.4.7.1 Between group differences: Duration of behaviour between those allocated an in-bed bassinet and those allocated a standalone bassinet

Duration and frequency of observed behaviours were presented for all data, standalone bassinet, and in-bed bassinet groups. Data was summarised as median, 25th percentile and 75th percentile. Due to the small sample size (n=31) non-parametric, Mann Whitney U tests were conducted to test between group (in-bed bassinet/standalone bassinet) differences in the frequency or duration of the behaviour of interest. A p-value of <0.05 was considered to be significant.

3.4.7.2 Predictors of time spent breastfeeding

Univariate linear regressions were conducted to assess associations between the outcome, total duration of breastfeeding (mins), and each of the independent potential predictor variables. The variables breastfeeding intention, age, time infant spent on visitor, duration of holding and touching by other, duration of touching by mother, time infant spent in any cot, education, time of day sampling period occurred, condition allocated and type of birth were then included a multiple linear regression to examine which factors were significantly associated with the outcome, when adjusted for presence of other confounding variables. These variables were included in the multivariate model because there was preestablished indications that they may influence breastfeeding initiation and duration.

Multivariate analysis involved conducting a stepwise backwards linear regression, to determine if breastfeeding duration varied by bassinet allocation group and if any of the identified variables were significantly associated with it. For continuous predictors a correlation matrix was created to assess

multicollinearity between predictor variables. One variable (time mother spent holding the baby) was removed due to correlation values over 0.4, with total duration of other caregiver touching and time infant spent in any cot. The function 'stepAIC' (part of the MASS package in R) was used initially to choose the best model by AIC, variables were then refined based on the p-value. Likelihood ratio tests were conducted to compare models and identify important predictors. For the models, the regression coefficients (*b*) with 95% confidence intervals are provided. R^2 and adjusted R^2 under each table reflects the variability in outcome explained by the model, whereas the p-values show the fit of the model.

3.5 Qualitative data

3.5.1 Postnatal Interviews

In order to understand parental postnatal experiences and the acceptability of the intervention a short debrief interview was conducted following the postnatal stay. The interview lasted no longer than 15 minutes and focused on parent's experiences in the Birthing Centre and participating in the trial (interview guide figure 3.4 below). The interviews were conducted either in-person before participants were discharged or on the telephone, up to a week following their discharge. Interviews were recorded using a dictaphone to ensure that key information would not be missed and to facilitate analysis. All participants were given information about the postnatal interview within the trial participant information sheet and provided written consent to participate on the trial consent form. Prior to commencement of the interview, participants were notified again that the conversation would be recorded and were given an opportunity to verbally consent to the use of the digital voice recorder.

- How did you feed your baby whilst you were staying in Newcastle Birthing Centre?
- What kind of bassinet were you provided with whilst you were staying in the Birthing Centre?
- What did you find positive about the bassinet that was provided for your baby?
- What did you find negative about the bassinet that was provided for your baby?
- Did you have any difficulties caring for your baby whilst you were in the birthing centre?
- How would you rate your postnatal stay?

For participants who were allocated the portable bassinet:

- Do you think that the portable bassinet should be offered to parents and babies in the Birthing Centre?

Figure 3.4. Postnatal debrief interview guide

3.5.2 Interview data analysis

Anonymous interviews were transcribed by a private transcription company (The Transcription Company) and were coded, using the principles of thematic analysis in Atlas.ti. Thematic analysis, as outlined by Braun and Clarke is a *'method of identifying, analysing and reporting patterns (themes) within data'* (2006, p. 79) and it was

considered the most appropriate method of analysing the interview data. Thematic analysis allowed for a flexible approach to analysing the data that meant that the perspectives of the respondents could be highlighted, whist still gleaning feedback relevant to the intervention evaluation. Prior to analysis, I was particularly interested in examining links between participants' ratings of their postnatal stay, their bassinet allocation and observed behaviours. This is based on the hypothesis that parents allocated the in-bed bassinet would report higher satisfaction with their postnatal stay than parents allocated a standalone bassinet. I was also interested in understanding the acceptability of the allocated bassinet. Although I went into the process of analysis with an understanding of what I wanted to get out of it, I attempted to use an inductive approach in which the coding was driven by the data, without using a predefined coding frame.

In analysing the data, I followed the six phases of thematic analysis as described by Braun and Clarke (2006): familiarisation, generating initial codes, searching for themes, reviewing themes, defining themes, producing the report. Coding was an iterative process; I began by reading through the transcripts to refamiliarize myself with the data and I coded the responses descriptively. Following an initial code, the interviews were read through again and codes were refined or added accordingly. I sorted through the codes into categories, by combining codes that were representing similar ideas into larger code groups, or combined codes that shared common meanings into interpretive codes. For example the codes '*cot too high'* and '*couldn't reach baby'* were combined into a new code '*height of standalone bassinet'*. Once in wider groups I used the 'network' feature in Atlas.ti (see fig 3.5 below for an example of a network) to examine and develop relationships between codes. Through this process, initial themes were generated and were reviewed until overlap between the themes were minimised and themes were distinct and a story of the postnatal experiences of families was built.

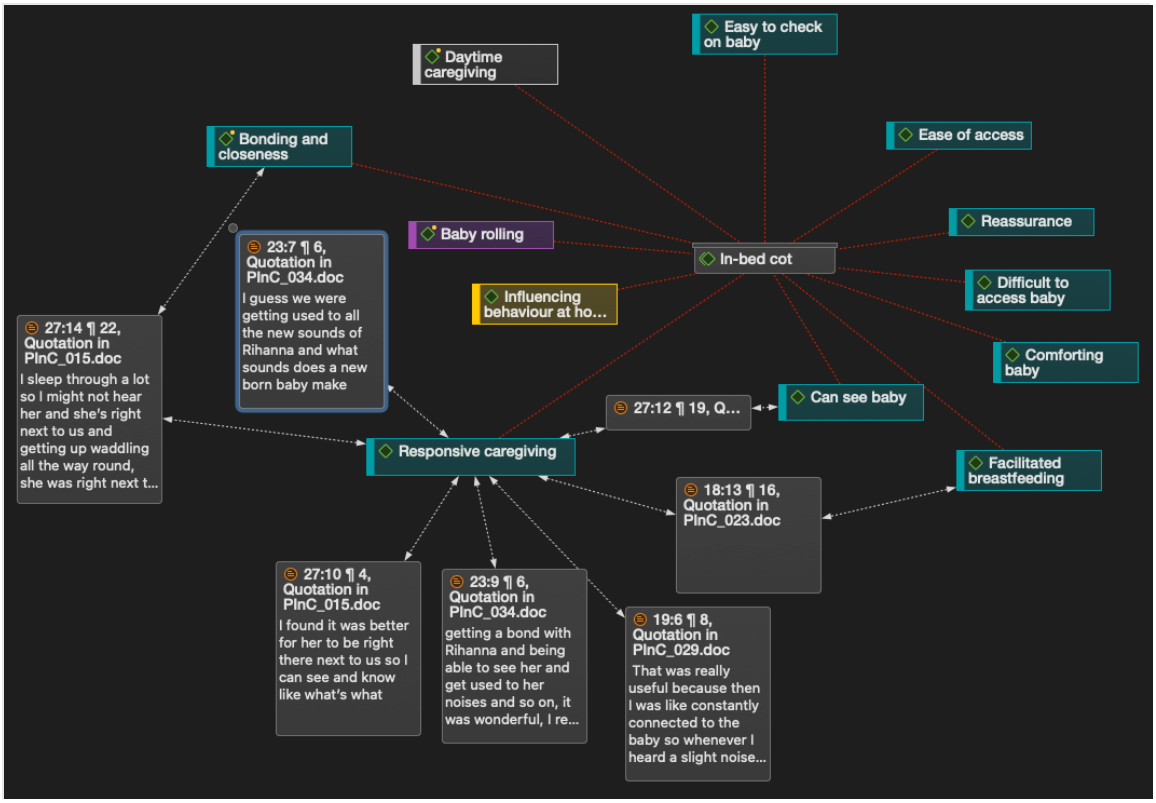

Figure 3.5. Network examining the relationship between the in-bed bassinet and responsive caregiving in Atlas.ti

This analysis was conducted independently, although I consulted about the development of themes with my supervision team, the coding was done autonomously. This may have resulted in my own subjectivity influencing the analysis process, the coding process would have been strengthened with the inclusion of a secondary, independent coder who may have highlighted alternative interpretations of the data and reduced the chance of individual bias.

4 THE IMPACT OF A RANDOMISED INTERVENTION ON PARENT-INFANT BEHAVIOUR DURING THE IN-PATIENT POSTNATAL PERIOD

4.1 Research questions

This chapter will be structured around the examination of the following research questions:

1. Does providing an in-bed bassinet affect the duration of attempted breastfeeding in the immediate postnatal period compared to providing a standalone bassinet? (Primary outcome)
2. Does providing an in-bed bassinet affect the number of attempted bouts, rate per hour and average length of breastfeeding bout compared to providing a standalone bassinet?
3. Does providing an in-bed bassinet affect where infants are located throughout the postnatal period? Is there a difference in the amount of time they spend in their allocated bassinet?
4. Does providing an in-bed bassinet affect the duration of parent/caregiver holding and touching in the immediate postnatal period compared to providing a standalone bassinet?
5. Does providing an in-bed bassinet affect maternal total sleep time in the immediate postnatal period compared to providing a standalone bassinet?
6. Does providing an in-bed bassinet influence the duration of staff presence compared to providing a standalone bassinet?
7. Does providing an in-bed bassinet have any impact on breastfeeding at 6-8 weeks compared to providing a standalone bassinet?
8. To what extent do demographic (maternal age, education, prenatal intention to breastfeed, type of birth) and environmental factors (bassinet allocation, total time infant spent on visitor, duration of maternal and other caregiver touching and holding, time infant spent in any cot, time of observation) influence breastfeeding duration throughout the sampling period?

4.2 Recruitment

A minimum of 468 pregnant women received study information at scan clinics, parent education classes, and when attending the birth centre. A flow chart of the recruitment process is shown in Figure 4.1.

There were 351 registrations of interest from individuals antenatally, with information about the study received at the 20-week anomaly scan or through parent education classes. The majority of those registrations (94%) were in person at the antenatal clinic where a member of the research team sat with patients, explained the study and asked them to provide their contact details if they were interested in being contacted. This approach produced an extremely low enrolment rate of only 4%. In total, 68% of enrolees received study information in Newcastle Birthing Centre, whilst in labour or shortly following birth. At

least 117 patients[20] received information about the study in Newcastle Birthing Centre with 24% of those approached enrolling in the trial. Of those who received information 79 (68%) declined to participate and 10 (8.5%) were transferred to the consultant-led unit. A total of 41 individuals were recruited into the PInC trial with 33 participating in the video study. Data regarding feeding at 6-8 weeks was retrieved for 31 of the participants, 16 in the standalone bassinet group and 15 in the in-bed bassinet group.

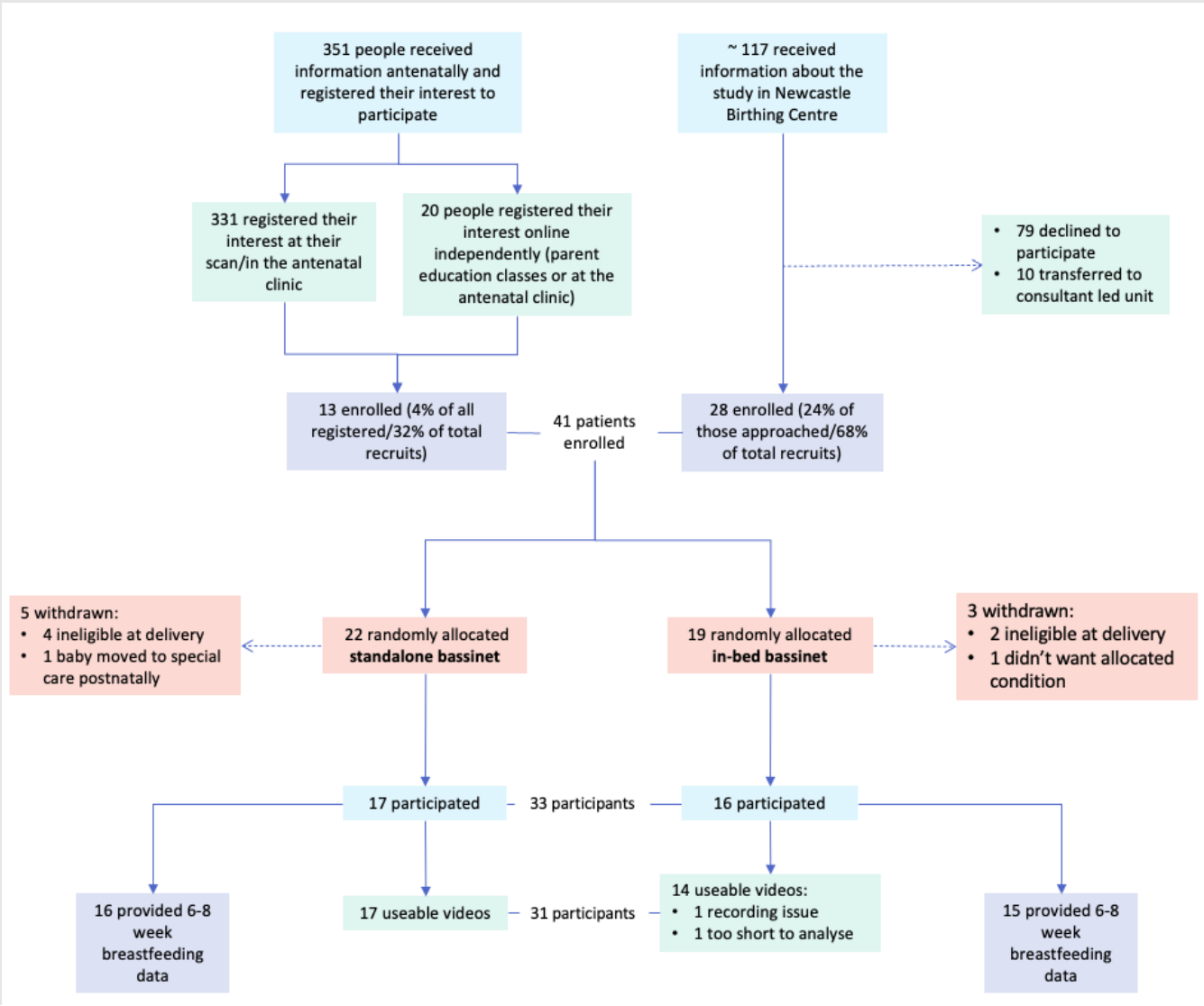

Figure 4.1. Flowchart indicating the recruitment methods and enrolment figures for the PInC trial

4.3 Participant Demographics

[20] This figure is an estimate based on information recorded on the screening log. The screening log was implemented a number of months into the study so those approached before the screening log was implemented were not captured in this figure and records were not kept consistently by all members of the midwifery and recruitment team, thus this figure may be an underestimation.

Of the 41 families who enrolled in the study, 8 (20%) withdrew or were withdrawn from participation. Most of these withdrawals (n=7) were due to participants changing their care plans and thus being ineligible to participate: 1 developing gestational diabetes, 1 premature birth, 1 induction, 1 baby moved to special care, 3 births in the consultant-led unit. One family withdrew because they did not want to receive their allocated condition (in-bed bassinet group).

For all enrolled participants the average maternal age was 28, most were married or living with a partner, had a strong to moderate antenatal intention to breastfeed, self-identified as White British, and were educated to degree level or above (see Table 4.1). Comparisons of the characteristics between those who participated and those who became ineligible or voluntarily withdrew indicated that there were no significant differences between the two groups[21].

*Table 4.1 Description of all enrolled participants, with comparisons of characteristics between those who participated in the PInC trial and non-participants (those who became ineligible or withdrew from the study prior to participating). * Indicates significant values (p=<0.05)*

	All enrolled (n=41)	Participants (n=33)	Non-participants (n=8)	P-value
	N (%) / median, range	*N (%)/ median, range*	*N (%)/ median, range*	
Age (years)	28 (18-41)	29 (18-41)	26 (18-33)	0.59
Marital status				0.73
Living with partner	12 (29%)	11 (33%)	1 (13%)	
Married/civil partnership	24 (59%)	20 (61%)	4 (50%)	
Prefer not to say	1 (2%)	1 (3%)	0 (0%)	
Single	1 (2%)	1 (3%)	0 (0%)	
Not provided	3 (7%)	0 (0%)	3 (38%)	
Breastfeeding intention				0.76
I will definitely breastfeed	22 (54%)	18 (55%)	4 (50%)	
I will try and see what happens	3 (7%)	3 (9%)	0 (0%)	
I would like to breastfeed	13 (32%)	12 (36%)	1 (13%)	
Not provided	3 (7%)	0 (0%)	3 (38%)	
Ethnicity				0.72
African	1 (2%)	1 (3%)	0 (0%)	
Any other ethnic group	1 (2%)	1 (3%)	0 (0%)	
Any other mixed background	1 (2%)	1 (3%)	0 (0%)	
Any other white background	1 (2%)	1 (3%)	0 (0%)	
White British	30 (73%)	26 (79%)	4 (50%)	
Chinese	2 (5%)	2 (6%)	0 (0%)	
White and Asian	2 (5%)	1 (3%)	1 (13%)	
Not provided	3 (7%)	0 (0%)	3 (38%)	
Education				1.00
GCSE	2 (5%)	2 (6%)	0 (0%)	
A/as level	4 (10%)	4 (12%)	0 (0%)	
Degree	15 (37%)	13 (39%)	2 (25%)	

[21] Independent t-test were used for comparing group characteristics in terms of continuous variables (age), and Fisher's Exact analyses were used for categorical variables.

Postgraduate	15 (37%)	12 (36%)	2 (25%)
Not provided	5 (12%)	1 (3%)	4 (50%)

4.3.1 Intention to treat (ITT) sample

Following intention to treat principles, descriptive statistics for all those randomised to intervention and control groups and had data available (Standalone bassinet = 17; in-bed bassinet = 14) were included in final analysis and presented in Table 4.2.

The average maternal age of the ITT group was 30 years. A t-test indicated that there was no significant difference between the maternal age of those allocated a standalone bassinet compared to an in-bed bassinet ($t(30) = -1.0414$, $p = 0.3063$). A majority of those who participated in the study were either married or cohabiting with a partner (93%), self-identified as White British (77%), and educated to degree level and/or above (81%). Just over half of the ITT group expressed a strong antenatal intention to breastfeed, with the remainder reporting a low to moderate intention to breastfeed. All participants experienced skin-to-skin contact with their babies during the first hour after birth and all breastfed as their baby's first feed. All but one of the participants was breastfeeding on discharge from the birth centre, with one participant mixed feeding. One quarter of the ITT group gave birth in water.

All tests found no significant difference between the characteristics of those allocated an in-bed bassinet and those allocated a standalone bassinet, indicating successful randomisation[22].

*Table 4.2. Description of participant characteristics (Intention to treat sample) by treatment condition allocations. *indicates significant values (p<0.05)*

	Both groups n=31	Standalone bassinet n=17	In-bed bassinet n=14	P-value
	N (median/%)	*N (median/%)*	*N (median/%)*	
Age (years)	30 (18-41)	30 (19-41)	29 (18-34)	0.31
Marital status				0.69
Living with partner	10 (32%)	5 (29%)	5 (36%)	
Married/civil partnership	19 (61%)	11 (65%)	8 (57%)	
Prefer not to say	1 (3%)	0 (0%)	1 (7%)	
Single	1 (3%)	1 (6%)	0 (0%)	
Ethnicity				0.19
African	1 (3%)	0 (0%)	1 (7%)	
Any other ethnic group	1 (3%)	1 (6%)	0 (0%)	
Any other mixed background	1 (3%)	1 (6%)	0 (0%)	
Any other white background	1 (3%)	0 (0%)	1 (7%)	
White British	24 (77%)	14 (82%)	10 (71%)	
Chinese	2 (6%)	0 (0%)	2 (14%)	
White and Asian	1 (3%)	1 (6%)	0 (0%)	
Education				0.87

[22] A comparison of the characteristics between those allocated an in-bed bassinet and those allocated a standalone bassinet has been included using independent t-tests (age) and fishers exact analysis (categorical variables).

Degree and/or above	25 (81%)	14 (82%)	11 (79%)	
Below degree	5 (16%)	3 (18%)	2 (14%)	
Not provided	1 (3%)	0 (0%)	1 (7%)	
Breastfeeding intention				0.87
Strong intention	17 (55%)	10 (59%)	7 (50%)	
Low to moderate intention	14 (45%)	7 (41%)	7 (50%)	
Skin to skin contact within the first hour				-
Yes	31 (100%)	17 (100%)	14 (100%)	
Baby delivered in water				1
Yes	8 (26%)	4 (24%)	4 (29%)	
No	23 (74%)	13 (76%)	10 (71%)	
First feed				-
Maternal breastmilk	31 (100%	17 (100%)	14 (100%)	
Discharge feed				0.11
Maternal breastmilk	30 (97%)	16 (94%)	14 (100%)	
Mixed (breastmilk and formula)	1 (3%)	1 (6%)	0 (0%)	
Breastfeeding status at 6-8 weeks				0.19
Breastfeeding	24 (77%)	13 (76%)	11 (79%)	
Bottle feeding	3 (10%)	3 (18%)	0 (0%)	
Supplemented breastfeeding	2 (6%)	0 (0%)	2 (14%)	
Data unavailable	2 (6%)	1 (6%)	1 (7%)	

There were also no significant differences between groups for these characteristics for the per protocol sample. A table describing the study sample for the per protocol analysis can be found in appendix G, table 9.1.

4.4 Comparison of observed behaviours between standalone bassinet and in-bed bassinet ITT groups

4.4.1 Infant location throughout the sampling period (RQ3)

Infant location was recorded throughout the entire sampling period and across both groups, infants spent marginally more time on a parent (median = 160 minutes) than in a cot (median = 157 minutes), a table with full results can be found in appendix G, table 9.3. Figure 4.2 displays the total duration of the 7-hour sampling window that infants spent in various locations (in any cot, on parent, standalone bassinet and in-bed bassinet) throughout the sampling period. Parents allocated a standalone bassinet spent slightly more time on average, with their baby on their bodies (median = 170 minutes) and less time using their allocated bassinet (median = 139 minutes) than those allocated an in-bed bassinet. In the latter group, infants spent an average of 9 minutes more in the in-bed bassinet (median = 145) than they spent on a parent's body (median = 136). The difference between time spent on a parent between the in-bed bassinet and standalone bassinet group was not significant. There was also no significant difference between the time that an infant spent in any cot between the standalone bassinet and the in-bed bassinet group.

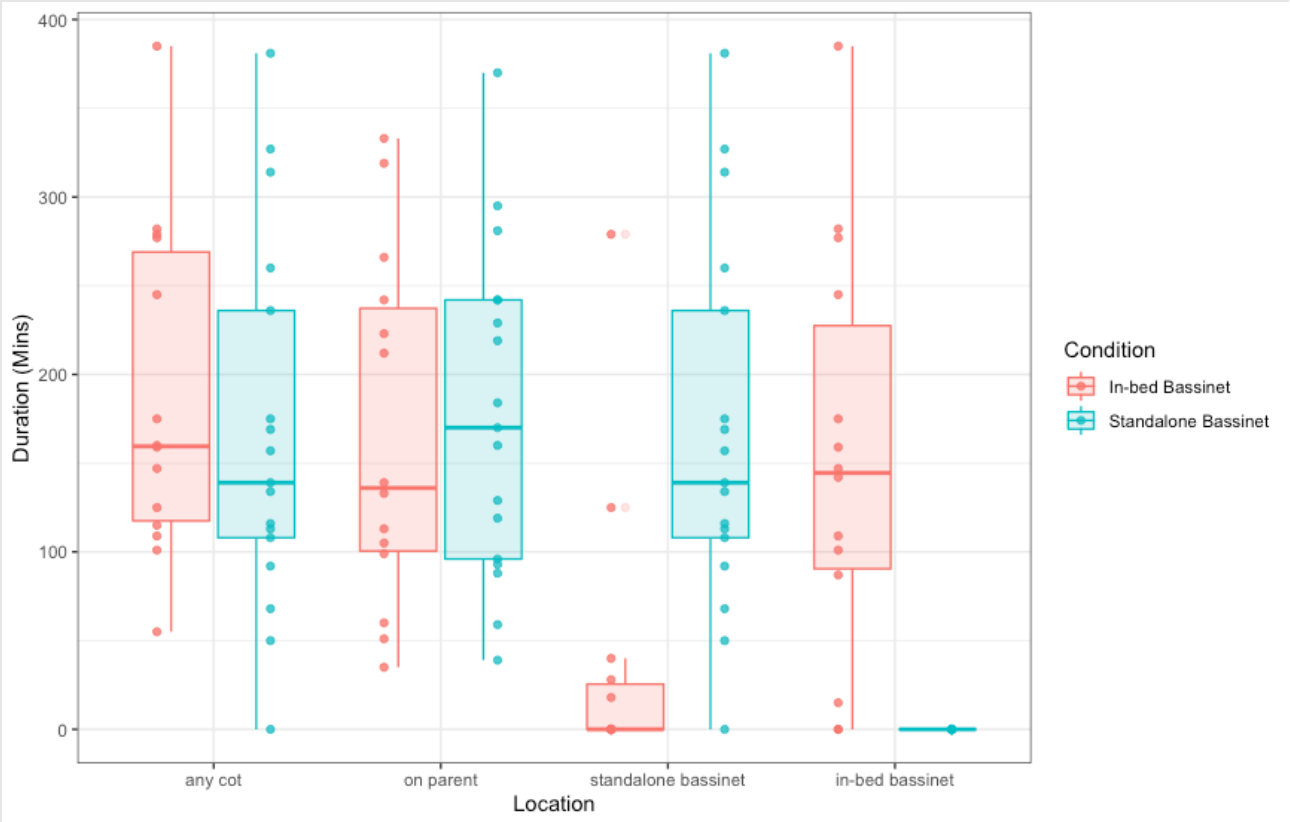

Figure 4.2. Box and whisker plots representing the time that infants spent in various locations throughout the sampling period for the standalone bassinet and in-bed bassinet groups[23].

The proportion of the sampling period that infants spent on their mother whilst the mother was awake and asleep was calculated (see table 4.3). Only five mothers were observed sleeping with their infants on them, three in the standalone bassinet group and two in the in-bed bassinet group. In both groups mothers spent a median of 41% of the sampling period with their infant on them whilst they were awake. When asleep, mothers in the standalone bassinet group spent a median of 13% of the sampling period sleeping with their infant on them, compared to a median of 6% for the in-bed bassinet group.

Table 4.3. The proportion of the sampling period infants were on their mother whilst the mother was awake and asleep

	Median % of sampling period (25th, 75th percentile)	
	Awake (n=31)	Asleep (n=5)
All data	40.9 (23.6, 57.7)	5.1 (3.4, 21.6)
Standalone bassinet	40.6 (23.5, 56.5)	12.5 (4.3, 24.2)
In-bed bassinet	41.1 (23.7, 58.5)	6.1 (5.6, 13.1)

The amount of time that the infant spent being held by a visitor was recorded and ranged from 0 to 28 minutes across both groups. There was no significant difference between the amount of time that infants

[23] On parent: W = 112, p = 0.78, Any cot: W= 137, p = 0.49

spent on a visitor between the standalone bassinet and in-bed bassinet groups (Mann Whitney U, W = 134, p = 0.50).

There was, however, a significant difference between the duration infants spent in 'other' locations, with infants allocated to the standalone bassinet group spending significantly more time in 'other' locations than those allocated an in-bed bassinet (Mann Whitney U, W = 78, p = 0.03), this difference is shown in figure 4.3. Other locations included infants lying on a bed[24], infants lying on pillows and infants placed in car seats, examples of these locations can be seen in image 4.1. Only one participant in the in-bed bassinet group was observed with their infant in an 'other' location compared to seven participants in the standalone bassinet group.

Image 4.1 Examples of infant observed in 'other' locations throughout the sampling period

[24] Infants were coded as 'on bed' if they were placed on the bed and were not in physical contact with a caregiver. If the infants were within close physical contact with a caregiver when lying on the bed they were coded as 'on parent'.

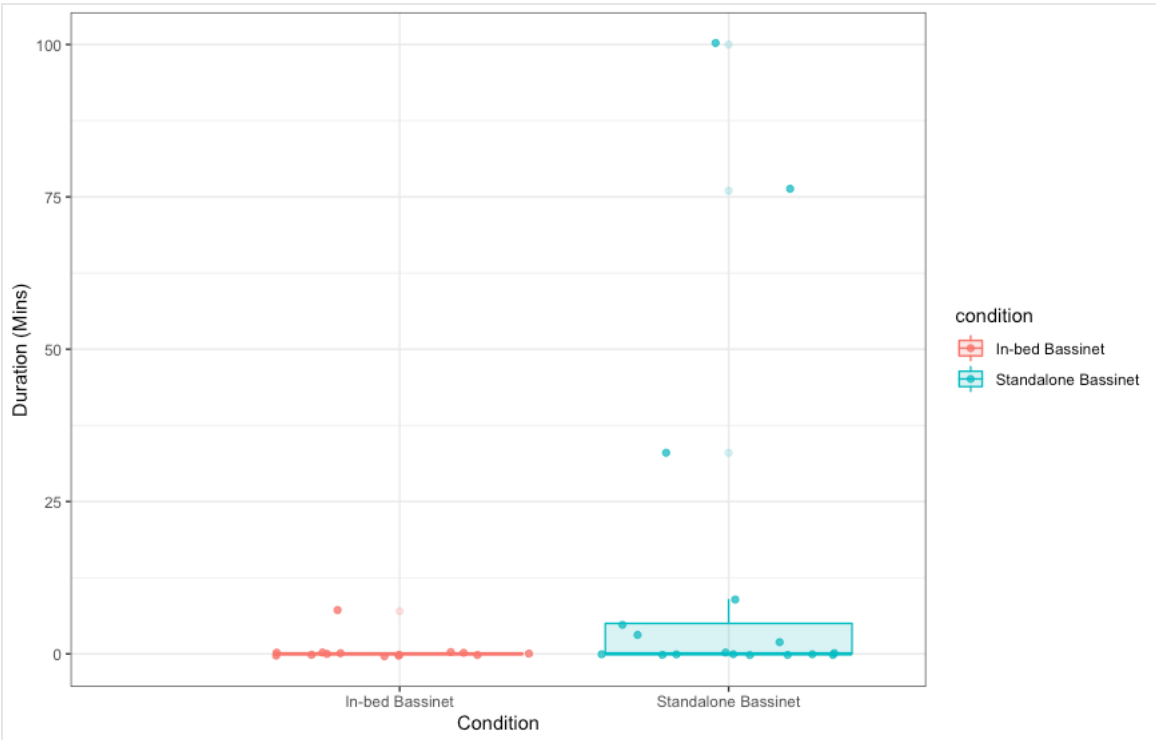

Figure 4.3. Graph indicating the duration that infants spent in 'other' locations throughout the sampling period for the in-bed and standalone bassinet groups

4.4.2 Compliance with allocated condition

Compliance with the allocated condition was assessed using data extracted from video observations. The proportion of the sampling period that the infant spent within the in-bed bassinet and the standalone bassinet was calculated. The in-bed bassinet was used for an average of 41% of the 7-hour sampling period, when this was adjusted for the period the baby was not held, the in-bed bassinet was used on average for 77% of the sampling period. The standalone bassinet was used for an average of 43% of the sampling period, and an average of 89% of the time when the baby was not being held (see appendix G, table 9.3).

Three participants in the in-bed bassinet group complied with their allocated condition for less than 50% of the time that the baby was not being held by a caregiver (14, 24, 36), preferring to use a standalone bassinet. One participant in the standalone bassinet group (21) used the standalone bassinet for less than 50% of the time that the baby was not being held by a caregiver, this family placed the baby on a pillow in the bed next to the mother or on the birthing couch next to the father (image depicting this can be found on page 104). These participants were thus excluded from the 'per protocol' analysis.

4.5 Comparison of observed breastfeeding duration (RQ1), frequency, and rate per hour (RQ2) by allocated cot type

4.5.1 Intention to treat analysis

The median duration of attempted breastfeeding for all participants was 59 minutes. Participants in the standalone bassinet group breastfed for a median of 12 minutes more (median=65m) than those in the in-bed bassinet group (median=53m) throughout the 7-hour observation period. There was no significant difference in breastfeeding duration between the two cot allocation groups. Likewise there was no significant difference in the total number of attempted breastfeeding bouts, and the average duration of breastfeeding bouts did not differ significantly between the two groups.

The rate per hour of breastfeeding was 0.57 for all participants. Those in the standalone bassinet group had a higher average rate per hour of breastfeeding (median = 0.71) than those allocated an in-bed bassinet (median = 0.50) but this did not vary significantly.[25] The duration, total number, rate per hour and average length of breastfeeding bouts for the intention to treat analysis are graphically demonstrated in figure 4.4.

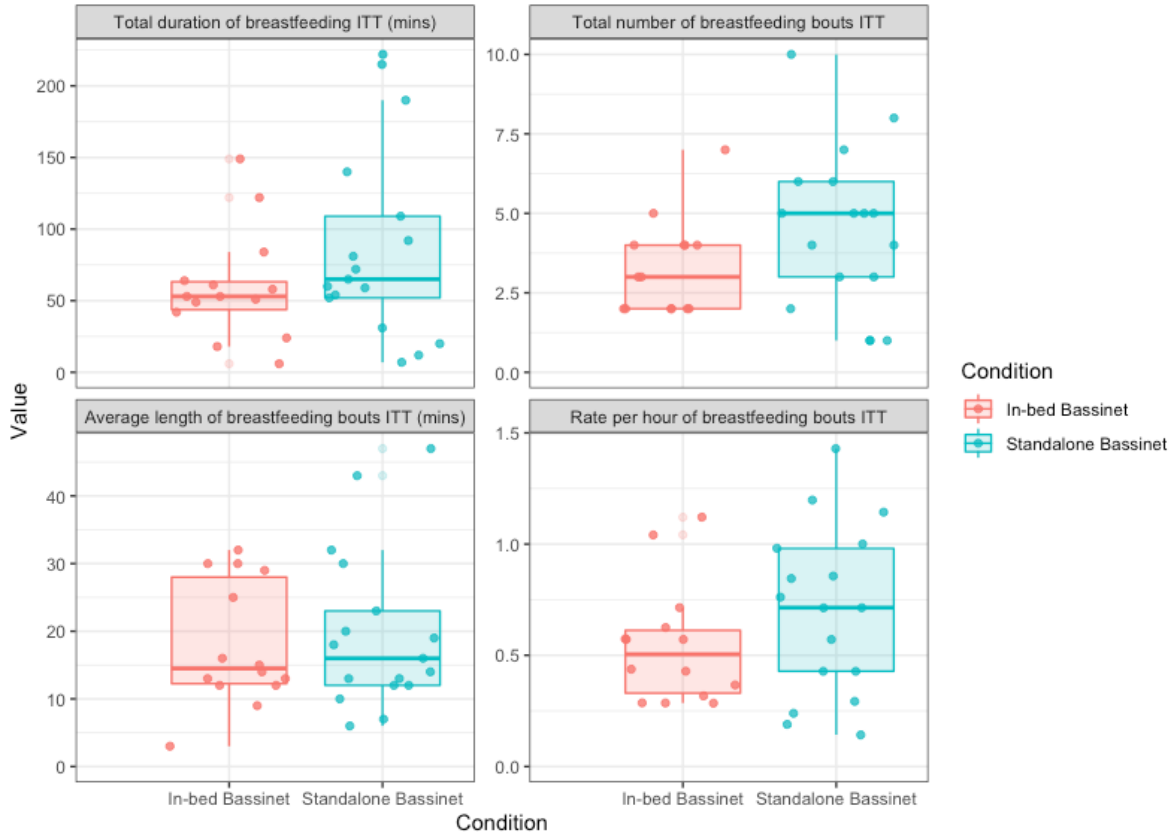

Figure 4.4. Box and whisker charts displaying total duration of breastfeeding, total number, average length of breastfeeding bout and rate per hour of breastfeeding bout for each group (Intention to treat).

4.5.2 Per Protocol analysis

In the per protocol group similar patterns were observed as in the ITT group, with the differences between the groups being more pronounced. A Mann-Whitney U test indicated that there was no significant

[25] Breastfeeding duration: W = 87, p = 0.204, Number of breastfeeding bouts: W = 83.5, p = 0.159, Duration of breastfeeding bouts: W = 113.5, p = 0.8423, Rate per hour of breastfeeding: W = 91, p = 0.2742

difference in breastfeeding duration between the in-bed bassinet group and the standalone bassinet group. There was also no significant difference in total number of breastfeeding bouts between the two groups.

The average duration of breastfeeding bouts was similar across both groups, with a median of 15 minutes for the standalone bassinet group and 16 minutes for the in-bed bassinet group, this difference was not significant.

The rate per hour of breastfeeding also reflected the intention to treat group with a higher rate of breastfeeding per hour for the standalone bassinet group than the in-bed cot group, this difference was not significant[26]. The duration, total number, rate per hour and average length of breastfeeding bouts for the per protocol sample are graphically demonstrated in figure 4.5.

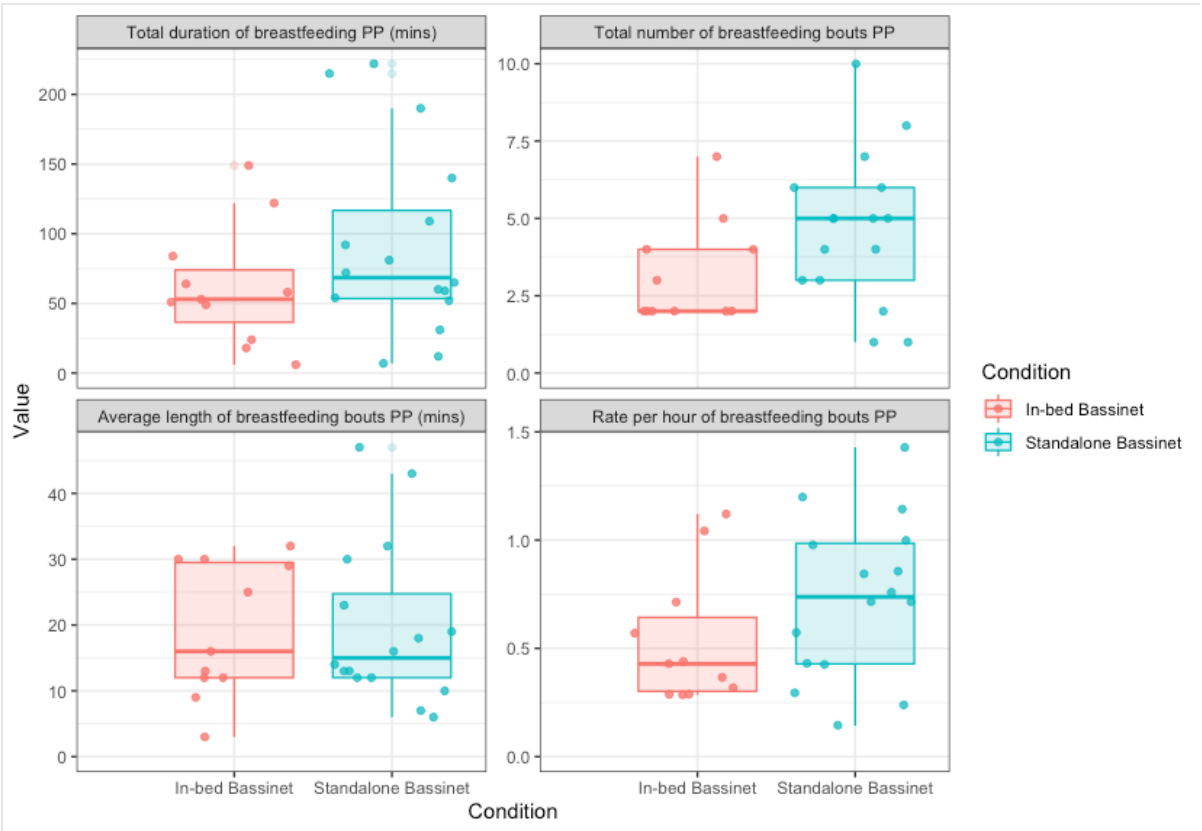

Figure 4.5. Box and whisker charts displaying total duration of breastfeeding, total number, average length, and rate per hour of breastfeeding bout for each group (Per protocol).

4.5.3 'Other' feeds

While most families breastfed their babies exclusively during the observation period, three families engaged in 'other' feeding;, two babies were fed expressed colostrum with a syringe and one was fed formula milk with a cup. Two were allocated an in-bed bassinet and one to the standalone bassinet. These feeds were

[26] Breastfeeding duration: W = 61, p = 0.195, number of breastfeeding bouts: W = 53.5, p = 0.089, average duration of breastfeeding bout: W = 87, p = 0.98, rate per hour of breastfeeding: W = 59.5, p = 0.1662.

given by mother, staff and other primary caregiver and had an average length of 1 minute 25 seconds and for all participants these other feeds only occurred once during the sampling period.

4.6 Comparison of parent-infant contact (holding and touching the baby) by allocated cot type (RQ4)

Two participants (7, 22) had more than one 'other primary caregiver' present throughout the postnatal period. These other caregivers were distinguished from visitors as they remained with the mother and baby for a majority of their postnatal stay and engaged with infant caregiving. For these observations, any instances of holding and touching of the baby by any of these individuals was included as 'other primary caregiver' holding and touching. Data for these participants was checked to see if they were outliers, and the analysis was run with and without these participants to see if their inclusion affected the results. The inclusion of these participants did not significantly affect the outcomes, so the results here include the data for these participants.

4.6.1 Intention to treat

Overall mothers held their babies[27] for a median of 46 minutes (25th percentile: 13m, 75th percentile: 69m). Mothers allocated a standalone bassinet held the baby for a median of 2 minutes more than those allocated an in-bed bassinet; this difference was not significant.

The median amount of time that the baby was held by the other primary caregiver for all participants was 30 minutes. There was a difference of 2 minutes between the two groups; those allocated an in-bed bassinet held their baby for a median of 32 minutes, whereas those allocated a standalone bassinet held their baby for a median of 30 minutes. There was no significant difference in the amount of time that the other primary caregiver(s) spent holding the baby between the in-bed bassinet group and the standalone bassinet group ($W = 129$, $p = 0.69$).

There was a significant between-group difference in the amount of time that the mother spent touching her baby ($p = 0.04$). Those allocated an in-bed bassinet spent a median of 16 more minutes touching their babies (median = 26 minutes) than those allocated a standalone cot who touched their babies for a median of 9 minutes within the sampling period, as shown in Figure 4.6. There was however no significant difference in other primary caregiver touching between the two groups, with other primary caregivers who were allocated a standalone bassinet spending a median of 5 more minutes touching the baby (median = 16m) than those allocated an in-bed bassinet (median = 11m)[28]. Data tables indicating results for parent-infant contact can be found in appendix G, table 9.6.

[27] This refers to non-feeding related holding

[28] There was no difference in the total duration baby held by mother ($W = 124$, $p = 0.860$), there was a significant difference in the total duration baby touched by mother ($W = 172$, $p = 0.036$).

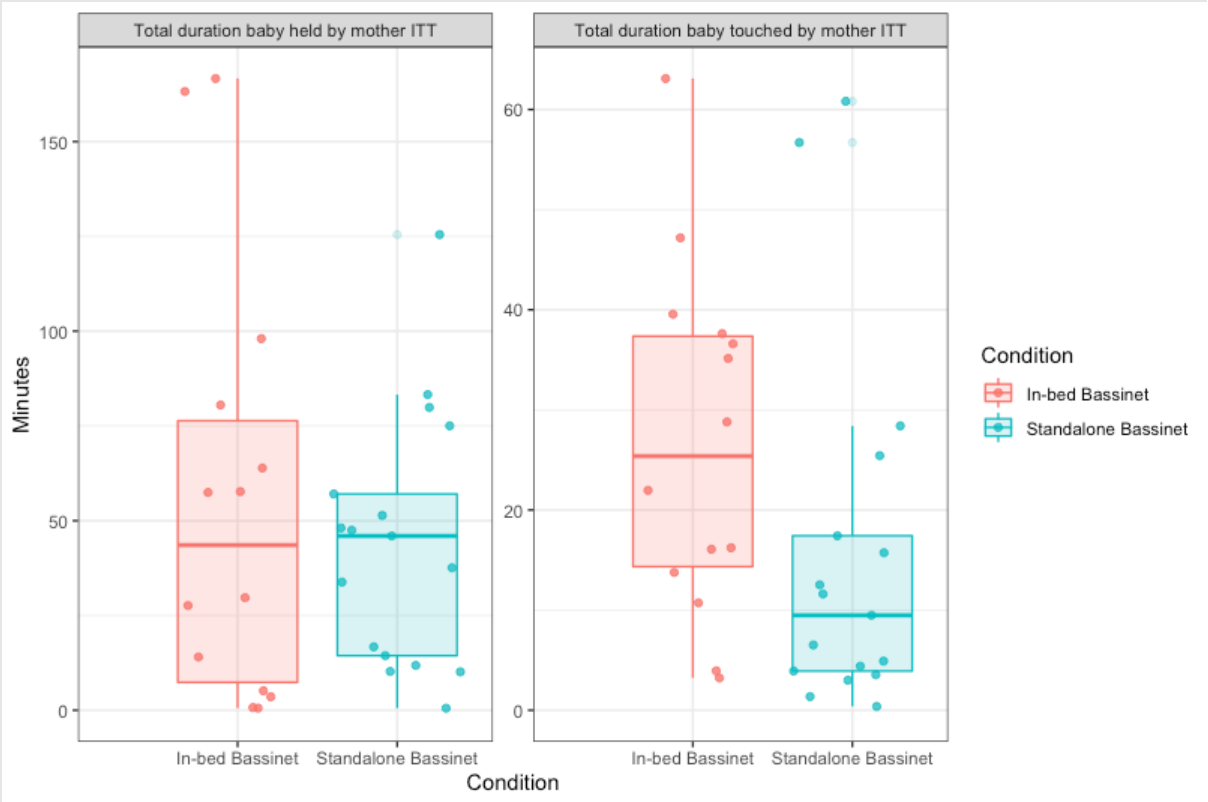

Figure 4.6. Box and whisker plots displaying the total duration baby held and touched by mother grouped by condition allocated (Intention to treat).

4.6.2 Per protocol

Overall, the median duration of maternal holding was 34 minutes. Those allocated a standalone bassinet mothers held the baby for a median of 19 minutes more than those allocated an in-bed bassinet (median=28), however this difference was not statistically significant (Mann-Whitney U: W = 77, p = 0.610), demonstrated in figure 4.7.

The median amount of time that the baby was held by the other primary caregiver(s) for all participants was 35 minutes. Those allocated a standalone bassinet held their baby for a median of 44 minutes, 11 minutes more than those allocated an in-bed bassinet (median=33 minutes). A Mann-Whitney U test indicated that there was a no significant difference (W = 94, p = 0.786) in the amount of time that other primary caregiver(s) spent holding the baby between the in-bed bassinet group and the standalone bassinet group.

The median amount of time that the mother spent touching the baby was 16 minutes for all participants. Those allocated an in-bed bassinet spent a median of 24 more minutes touching their babies (median = 35 minutes) than those allocated a standalone cot who touched their babies for a median of 11 minutes. A Mann-Whitney U test indicated that there was a significant difference (W = 128, p = 0.05) in the amount

of time that the mother spent touching her baby between the in-bed bassinet group and the standalone bassinet group.

Other primary caregiver(s) spent a median of 15 minutes touching the baby. Those allocated a standalone bassinet spent a median of 4 more minutes touching the baby (median = 16m) than those allocated an in-bed bassinet (median = 12m). A Mann-Whitney U test indicated that this difference was not significant (W = 78, p = 0.644). Data tables indicating results for parent-infant contact for the per protocol sample can be found in appendix G, table 9.7.

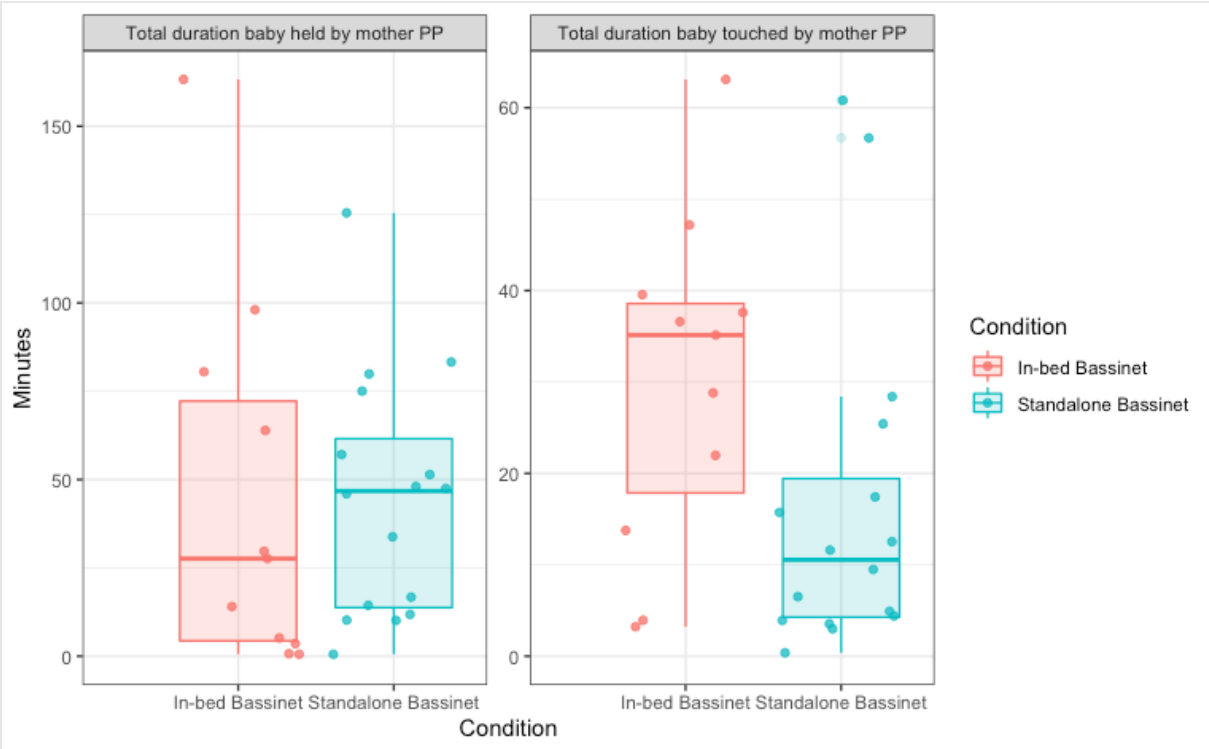

Figure 4.7. Box and whisker plots displaying the total duration baby held by mother and other and touched by mother and other grouped by condition allocated (per protocol)

4.7 Comparing duration of maternal sleep by allocated cot type (RQ5)

4.7.1 Intention to treat

The data presented in Table 4.2 shows the duration of maternal sleep throughout the sampling period. There was no significant difference in maternal sleep between the allocated groups. [29]

Table 4.2 Maternal sleep for the intention to treat group, there was no significant difference between maternal sleep between the standalone and in-bed bassinet groups.

	Median (25th percentile, 75th percentile)

[29] Maternal sleep: W = 119, p = 1 (intention to treat)

Participants	All data n=31	Standalone bassinet n=17	In-bed bassinet n=14	p-value
Maternal Sleep (mins)	82 (15,164)	78 (14,184)	96 (20,151)	1

Participants were divided into those whose observations occurred primarily in the day and primarily in the night. There was a significant difference between sleep for the studies that occurred predominately during the night (median=167mins) compared to those that occurred predominantly throughout the day (median=59 mins) (W = 67, p-value = 0.036), however there was no difference in the distribution of night and day observations between those allocated a standalone bassinet or an in-bed bassinet.

4.7.2 Per protocol

The results of the per protocol analysis for maternal duration of sleep are presented in Table 4.3. Similar differences are observed as in the intention to treat group with those allocated an in-bed bassinet sleeping for a median of 108 minutes, 28 minutes more than those allocated a standalone bassinet (median=80 minutes) however this difference was not statistically significant[30].

Table 4.3 Maternal sleep for the per protocol group. There was no significant difference in maternal sleep between the two allocated conditions

	Median (25th percentile, 75th percentile)			
Participants	All data n=27	Standalone bassinet n=16	In-bed bassinet n=11	p-value
Maternal Sleep (mins)	83 (23,173)	80 (16,193)	108 (48,143)	1

4.8 Comparing time staff were present by allocated cot type (RQ6)

4.8.1 Intention to treat

The median duration of staff presence for all participants was 25 minutes. Staff were present for a median of 13 minutes more for those allocated an in-bed bassinet (median = 37 minutes) than those allocated a standalone bassinet (median = 24 minutes). There was no significant difference in the time that staff spent present between the in-bed bassinet and the standalone bassinet group (W = 125, p = 0.812)[31]. Data tables for staff presence can be found in Appendix G, table 9.8.

4.8.2 Per protocol

[30] Maternal sleep: W = 119, p = 1 (per protocol)

[31] Some staff turned cameras off when they were in the room so these figures may be conservative estimates of total time staff spent present.

A per protocol analysis of staff presence indicated almost identical results to the intention to treat analysis. Those allocated an in-bed bassinet had staff present for a median of 37 minutes, compared to those who were allocated a standalone bassinet who had staff present for a median of 24 minutes, this difference was not statistically significant (Mann-Whitney U: W = 81, p = 0.729). Data tables for staff presence for the per protocol sample can be found in Appendix G, table 9.9.

4.9 6–8-week breastfeeding status by basinet allocated (RQ7)

Data was extracted from patient records and though communication with families regarding their feeding status at 6-8 weeks following birth, the frequencies are presented in Table 4.4, below. Due to the small group sizes for those formula feeding and supplemented breastfeeding, statistical analysis was not conducted.

Table 4.4 6-8 week breastfeeding status for all participants, those who were allocated an in-bed bassinet and those who were allocated a standalone bassinet

6-8 week feeding status	All data		In-bed bassinet		Standalone bassinet	
Exclusively breastfeeding	23	70%	11	69%	12	71%
Formula feeding	6	18%	2	13%	4	24%
Supplemented breastfeeding	2	6%	2	13%	0	0%
Data unavailable	2	6%	1	6%	1	6%
Grand total	**33**		**16**		**17**	

4.10 Predictors of breastfeeding duration in the sampling period (RQ8)

A simple linear regression was conducted to understand whether breastfeeding duration would vary when adjusted for possible confounders and also assess which factors may be significantly associated with predictors of breastfeeding duration, results are shown in Table 4.5. Initially, bivariate associations between breastfeeding duration and age, time infant spent on visitor, duration of holding and touching by other, duration of touching by mother, time infant spent in any cot, breastfeeding intention, educational level, time of day sampling period occurred, condition allocated and type of birth were assessed, using separate model for each indicator.

The results indicate that breastfeeding intention is a significant univariate predictor of time-spent breastfeeding (β =39.920 (95%CI 1.555, 78.285), those with a strong intention breastfed for significantly longer during the sampling period than those with a moderate intention to breastfeed. This variable along with age, time infant spent on visitor, duration of holding and touching by other, duration of touching by mother, time infant spent in any cot, education, time of day sampling period occurred, condition allocated and type of birth were included in the multiple regression model.

*Table 4.5 Univariate predictors of total duration of breastfeeding in minutes using simple linear regression. * indicates significant values (p<0.05)*

Predictor variable	*b* (95%CI)	p-value
Age	1.803 (-2.347, 5.953)	0.40
Time infant spent on visitor	-0.430 (-0.921, 0.061)	0.10
Duration of other touching	0.288 (-0.801, 1.377)	0.61
Duration of mother holding	0.039 (-0.427, 0.505)	0.87
Duration of mother touching	-0.002 (-1.131, 1.127)	0.10
Duration of other holding	0.355 (-0.198, 0.907)	0.22
Time infant spent in any cot	-0.176 (-0.377, 0.026)	0.10
Breastfeeding intention		
Strong breastfeeding intention	39.920 (1.555, 78.285)	0.05*
Moderate breastfeeding intention (referent)		
Education		
Above degree	51.400 (-1.890, 104.690)	0.07
Below degree (referent)		
Day/night		
Night	13.413 (-27.148, 53.973)	0.52
Day (referent)		
Condition allocated		
In-bed Bassinet	-27.546 (-67.326, 12.234)	0.19
Standalone Bassinet (referent)		
Type of birth		
Water birth	19.810 (-26.287, 65.907)	0.41
Land birth (referent)		

The multivariate model assessed whether breastfeeding duration would vary by allocation groups and also identified variables significantly associated with it, when adjusted for other possible confounders, results are displayed in table 4.6. One participant did not provide their highest level of education, therefore they were omitted from the multivariate analysis, resulting in a total sample size of 30. A backwards stepwise linear regression approach was used. Likelihood ratio tests were conducted to compare models and identify important predictors. The adjusted r^2 of the refined model was 0.289, indicating that 28% of the variance is explained by the model. The results show that adjusted for other confounders, time spent in any cot, education, and breastfeeding intention were significantly associated with total breastfeeding duration.

Maternal education level had positive statistically significant association, mothers with a degree or higher-level education would breastfeed their children for 50 minutes more than that of a non-degree level educated mother. Total duration spent breastfeeding and time infant spent in any cot were inversely related, the more time the infant spent in any cot, the less time infants were breastfed for (β=-0.21 (95%CI 0.40, -0.03)). Those with a strong breastfeeding intention were likely to breastfeed for 39 minutes longer than those who reported a moderate to low breastfeeding intention.

Before the model was finalised, the variable 'total time the infant spent on visitor' was also seen to have a significant negative association with breastfeeding duration. However, there were also statistically significant correlation between the total time that the infant spent on a visitor and breastfeeding intention, and likelihood ratio tests indicated that it would be redundant to include both variables in the same model. Therefore, time infant spent on visitor was omitted from the final model. It was observed that those with a strong breastfeeding intention were significantly less likely to have visitors. The relationship between breastfeeding intention and breastfeeding success is supported by the literature (DiGirolamo et al., 2005; Donath et al., 2003), and breastfeeding intention was a significant univariate predictor therefore it was included in the model.

Table 4.6 Multivariate regression results examining association of breastfeeding duration (minutes) with allocated condition and other characteristics (n=30)

Predictor Variable	*b (95% CI)*	p-value
Condition allocated In-bed bassinet Standalone bassinet (referent)	-21.232 (-56.892, 14.428)	0.25
Time spent in any cot	-0.213 (-0.40, -0.03)	0.03*
Education Degree level and/or above Below degree level (referent)	49.757 (2.158, 97.357)	0.05*
Breastfeeding intention Strong breastfeeding intention Moderate breastfeeding intention (referent)	39.185 (3.158, 75.213)	0.04*
Constant	58.625 (4.924, 112.326)	0.04*

R^2 = 0.387, Adjusted R^2 = 0.289; * Indicates significant values (p<0.05)

4.11 Summary

The results presented here indicate that being allocated either a standalone bassinet or an in-bed bassinet did not influence the duration, frequency or bout length of breastfeeding, duration of maternal or other caregiver holding, other caregiver touching, maternal sleep or staff presence. Bassinet allocation significantly influenced the frequency of maternal touching and the amount of time that infants spent in 'other locations' throughout the sampling period. Mothers who were allocated an in-bed bassinet spent significantly more time touching their infants than those who were allocated a standalone bassinet and families who were allocated a standalone bassinet spent significantly more time putting their infants in 'other locations' such as on the bed and on a pillow. The duration of breastfeeding throughout the sampling period was significantly positively associated with maternal education, antenatal intention to breastfeed and negatively associated with the duration that an infant spent in any cot.

4.12 Discussion

The present study attempted to determine whether the provision of an in-bed bassinet compared to a standalone bassinet for the in-patient postnatal stay would influence the duration and frequency of breastfeeding, parent-infant contact, maternal sleep, staff presence and breastfeeding status at 6-8 weeks. The results of this study found that breastfeeding and parent-infant contact during the in-patient postnatal period was unaffected by bassinet type, indicating that simple interventions, such as provision of an in-bed bassinet are unable to overcome the larger structural and personal antecedents to not breastfeeding, such as level of education, breastfeeding intention, spending time in any bassinet and visitor presence. This study was unique as the first video study to examine the in-patient postnatal experience for families giving birth in a UK alongside birth centre.

4.12.1 Breastfeeding and allocated cot type

It was hypothesised that the provision of an in-bed bassinet would increase the duration and frequency of breastfeeding by allowing mothers to observe their infants' feeding cues and access their infants more easily than those who were allocated a standalone bassinet. The total duration of breastfeeding across the observed period and the frequency of breastfeeding sessions observed did not differ significantly between those randomly allocated to an in-bed bassinet or a standalone bassinet. All participants in this sample initiated breastfeeding in the immediate postnatal period and all participants engaged in skin-to-skin contact with their infants following birth. As this study recruited people with an intention to breastfeed, and not those who had made a prenatal decision not to breastfeed, breastfeeding initiation was expected to be above the local average for the North East of England, where 50% of infants do not receive any breastmilk following birth[32]. The in-patient postnatal period is a critical period for breastfeeding initiation, during which time parents' and infants are able to access on demand assistance from trained breastfeeding supporters. This time is key for building maternal feeding self-efficacy, allowing mothers to build up performance accomplishments and receive verbal persuasion from healthcare practitioners. Any intervention that can increase feeding frequency in the immediate postnatal period therefore has the potential to positively influence breastfeeding initiation and breastfeeding continuation (Forster et al., 2015; Salariya et al., 1978).

The lack of a significant finding was consistent with Klingaman's study which observed breastfeeding frequency of post caesarean section mothers on the postnatal ward using either a standalone bassinet or a side-car crib. The results indicated that breastfeeding rate per hour did not vary significantly by postnatal cot allocation. Ball and colleagues (2006) observed breastfeeding frequency on the postnatal ward using either standalone cot, bedding in or side-car crib following a vaginal delivery. They found that those

[32] Data extracted from PHE Child Health Profiles (2018/19): https://fingertips.phe.org.uk/profile/child-health-profiles/data#page/3/gid/1938133222/pat/6/par/E12000001/ati/302/are/E08000021/iid/93580/age/309/sex/4/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/page-options/car-do-0 (accessed 30/10/2022)

allocated to the bed or a side-car crib conditions made significantly more attempts to breastfeed and exhibited more feeding effort than those allocated a standalone bassinet. That this finding was not replicated in this study may indicate that an in-bed bassinet was not an effective alternative to a standalone bassinet and may still have been creating a physical barrier between mother and infant.

Breastfeeding rate per hour was compared with those noted by Ball et al. (2006) and Klingaman (2009), both of whom recorded breastfeeding frequency in the in-patient postnatal period (see Table 4.7). Rate per hour of breastfeeding for the standalone bassinet group was greater than that reported by Klingaman or Ball and colleagues for their studies on obstetric postnatal wards. However, the rate per hour of breastfeeding for the in-bed bassinet group was lower than that reported by Klingaman and Ball and colleagues for their intervention group (side-car crib). Ball et al. (2006) saw a twofold greater frequency of breastfeeding in those allocated a side-car crib versus a standalone bassinet. There are a number of possible explanations for the difference in findings between Ball et al. (2006), Klingaman (2009) and this study which are described below.

Table 4.7 Breastfeeding rate per hour as reported by Ball et al. (2006), Klingaman (2009) and the present study (PInC).

Allocated group	Study	Rate per hour (range)
Standalone bassinet	Klingaman (2009), n=20	0.40 (0.00 – 1.07)
	Ball et al. (2006), n=23	0.5 (0.0 – 6.6)
	PInC, n=17	0.71 (0.12 - 1.42)
Intervention	Klingaman (2009) (side-car crib), n=15	0.64 (0.12 – 1.61)
	Ball et al. (2006) (side-car crib), n=20	1.3 (0.0 – 7.3)
	PInC (in-bed bassinet), n=14	0.50 (0.29 - 1.12)

4.12.1.1 Study location and timing of observation

Both studies (Ball et al., 2006; Klingaman, 2009) observed mothers receiving postnatal care on an obstetric postnatal ward, bedded in two bed bays. Those participating in Klingaman and Ball et al.'s studies were unable to have their partners stay with them throughout the observed period due to their location on an obstetric postnatal unit. This may have increased the inaccessibility of the standalone bassinet for those participants as they did not have another, generally more mobile caregiver to assist with passing the baby. Having partners or helpers present may have mitigated the difference between the two conditions in this study as partners could respond or pass the baby to the mother.

The sampling period for this analysis began 7-hours following birth and lasted for 7-hours. This meant that the analysed period included both day-time and night-time observations based on time of birth. This was considered the most appropriate way to analyse this sample as the postnatal rooms were autonomous spaces in which participants were not following normal diurnal/nocturnal patterns due the timing and intensity of their birth experience. This contrasted to Ball et al. (2006) and Klingaman's (2009) studies which observed only the night-time behaviour of their participants, who were bound by enforced night and day ward routines. Klingaman's sampling period began when mothers first went to sleep until they last woke up,

whereas Ball and colleagues standardised their sampling period to a 4-hour period during the night. Infants who have established breastfeeding have been reported to take their biggest breastfeed during the night (Kent et al., 2006), and night feeding plays an important function in the maintenance of milk production (Freeman et al., 2000), however little is known about the importance of night feeds in immediate postnatal period or in the establishment of breastfeeding. Both Ball et al. and Klingaman's sampling periods observed mothers caring for their infants alone, without any disturbances, which may have increased breastfeeding frequency.

4.12.1.2 Inclusion criteria

This study recruited mothers who were expecting their first baby which was consistent with Ball's inclusion criteria, however Klingaman did not define maternal parity within their inclusion criteria. The inclusion of multiparous women within Klingaman's sample may have influenced maternal breastfeeding self-efficacy and infant care decisions. Previous studies have demonstrated that mothers who experience breastfeeding difficulties with their first babies and give up breastfeeding are less likely to breastfeed with subsequent babies than those who do not experience such difficulties (Ingram et al., 2001). An increased efficiency of milk transfer for those breastfeeding a second child has also been demonstrated (Ingram et al., 2001). The present study included only those who had a normal vaginal delivery with minimal interventions, similar to those included in Ball and colleague's study. This differed considerably from Tully and Ball's (2012) Klingaman's study which included only those who had experienced a caesarean delivery. This likely had a considerable impact on maternal mobility and breastfeeding success within her sample. Women who deliver by c-section are less likely to receive skin-to-skin contact immediately after birth and are less likely to engage in breastfeeding within the first 24-hours following delivery (Rowe-Murray & Fisher, 2002).

4.12.1.3 The intervention

Although the in-bed bassinet facilitated more frequent parent-infant interactions (touching) it may still create a physical barrier between mother and infant that may hinder breastfeeding initiation. Unlike the side-car cribs used by Tully and Ball (2012) and Ball (2006) which allowed mothers to co-sleep without a 'wall' between themselves and the baby, the in-bed bassinet had sides which may impact physiological and hormonal feedback between mother and infant. The in-bed bassinet also impedes the baby's agency in initiating breastfeeding; in Ball's (2006) study same-surface co-sleeping facilitated by the three-sided crib meant that mothers were able to offer the breast immediately after infants began seeking and rooting.

4.12.1.4 Different ways of defining breastfeeding sessions

In this study breastfeeding bouts were defined as distinct if they were separated by at least five minutes, this procedure was consistent with McKenna, Mosko and Richard (1997) and Klingaman (2009). This method of defining breastfeeding bouts differed from Ball and colleagues who defined a bout as lasting longer than 30 seconds and bouts that were separated by any more than 30 seconds were coded as a new bout. This may explain why Ball reported a maximum rate per hour much higher than what was noted in this study or that by Klingaman. The median rates per hour are still comparable, with little difference in the

results found for the standalone bassinet group between the three studies. The method of defining bouts used by Ball and colleagues' was more effective in identifying 'cluster feeding' episodes in the intervention group, which may have been facilitated by the side-car crib as it was easier for infants to independently seek the breast, compared to the in-bed bassinet which still presented a physical barrier between mother and infant.

4.12.2 Infant location throughout the observed period

The most common location throughout the sampling period for all infants in both conditions was on a parent, indicating that parent-infant contact was prioritised by families during this early postnatal period. Although the total time spent on a parent was not significantly different between the conditions allocated, infants who were allocated to the standalone bassinet group spent more time on a parent than in a bassinet, whereas those allocated an in-bed bassinet spent more time in a bassinet[33] than on a parent. This may indicate that the inconvenience of using the standalone bassinet encouraged parents to keep their infants in contact so that they could easily monitor them, and that parents preferred close physical contact with their infant throughout the postnatal period. . Physical contact between parents and newborns in the immediate postnatal period is key to establishing breastfeeding, parent-infant bonding and attachment (Crenshaw et al., 2012; Mercuri et al., 2019; Widström et al., 2019). A preponderance of previous studies looking at parent-infant contact in the immediate postnatal period focus on the benefits of skin-to-skin contact or 'kangaroo care' focus for preterm infants (Mekonnen et al., 2019; Wang et al., 2021) and/or during the first 1-3 hours following birth (Bramson et al., 2010; Carfoot et al., 2005; Christensson et al., 1992; Moore et al., 2012). The influences of parent-infant contact which may or may not incorporate direct skin-to-skin contact following the initial post birth hours have been seldom discussed. Following a systematic review assessing the effects of early skin-to-skin for mothers and healthy newborns, Moore and colleagues (2012) recommend that skin-to-skin should continue for a long as possible over the first 24-hours. In an exploratory study assessing the efficacy of skin-to-skin contact as an intervention for those who were experiencing breastfeeding difficulties throughout the in-patient postnatal period, skin-to-skin contact was shown to be effective in reducing the likelihood of early breastfeeding cessation (Chiu et al., 2008). It is still unknown if similar benefits can be observed through non-skin-to-skin contact, as was observed in this study, however the indication that parents prioritised contact with their infants indicates that with the appropriate advice and support, implementing skin-to-skin interventions would be well accepted. Given this finding it is important that facility managers and NHS commissioners prioritise creating postnatal environments that can safely and effectively facilitate parent-infant closeness throughout the first 24-hours of life. This can be done by providing supportive double beds or bassinets that allow unhindered contact between parent and infant (e.g. side-car cribs (Ball 2006)) and/or spaces that are physically supportive for parents when holding an infant.

[33] Time spent in any bassinet includes both the in-bed bassinet and standalone bassinet

There was also a significant difference in the amount of time that infants spent in 'other' locations (in/on the bed, on a pillow, in a car seat) between the two groups with those allocated a standalone bassinet spending significantly more time in 'other' locations. Previous in-patient postnatal video studies have observed mothers bringing babies into bed in order to ease caregiving burdens in the postnatal period. In Tully and Ball's (2012) study a third of post-c-section mothers who were randomly allocated a standalone bassinet or a three-sided crib spent the majority of the observed period bedsharing, however there was no difference between those who were allocated a three-sided crib and a standalone bassinet. Bed-sharing in Tully and Ball's (2012) sample may have been more prevalent overall due to the physical limitations on the post c-section mothers, the lack of partner presence and the timing of the observation during the night.

In the present study, infants in both groups spent just over 40% of the entire sampling period in the bassinet that they were allocated, indicating that compliance with the allocated cot type was universal across both groups. This finding was similar to that of Tully and Ball (2012)who found that compliance to the allocated cot type (side-car crib or standalone bassinet) did not vary between groups. Adherence to the bassinet allocated was measured by the duration that infant spent in their allocated condition. Some participants who were allocated an in-bed bassinet used a standalone bassinet for some of the analysed period, although this time was minimal (max 26 mins) compared to the average time infants spent in an in-bed bassinet (max 228 mins). At least one participant terminated the recording when they began using the standalone bassinet as they thought that use of the standalone bassinet would invalidate their inclusion in the trial. This may have resulted in an overestimate of adherence to the in-bed bassinet. It is also important to note that the sampling period captured a 7-hour snapshot of the postnatal period and may not be representative of the entire postnatal stay and the variability of infant locations throughout that time.

Although few studies have observed families using an in-bed bassinet or similar devices (safe sleep enablers) in the in-patient postnatal period, a number of studies have observed families using similar devices, namely the Wahakura and the Pēpi-pod for co-sleeping at home. These studies indicated that compliance in using the safe sleep enabler was lower than compliance in using the standalone bassinet (Baddock et al., 2017a; Tipene-Leach et al., 2018). Baddock et al (2017) observed parents using a Wahakura or a standalone bassinet in their homes at 1-month following birth and 86% of those allocated a standalone bassinet slept in the bassinet and 57% of those allocated a Wahakura slept in the Wahakura. Tipene-Leach and colleagues (2018) collected maternal reports of Pēpi-Pod use at 1 and 3 months. At 1 month 49% of those allocated a Pēpi-Pod were using it compared to 70% of those allocated a bassinet. At 3 months the difference was greater with 25% still using the Pēpi-Pod and 50% using the bassinet (Baddock et al., 2017b). These studies may report lower usage because families had standalone bassinets or other sleep locations at home that they preferred or had grown accustomed to using.

4.12.3 Parent-infant contact and allocated cot type

It was expected that closeness facilitated by the provision of an in-bed bassinet would increase non-feeding related parent-infant contact in the in-patient postnatal period. As anticipated those infants who were

allocated an in-bed bassinet were touched significantly more frequently by their mothers than those allocated a standalone bassinet. However, there was no significant difference between the two bassinet groups for parental[34] holding. This result was similar to that of Mercuri and colleagues (2019) who used video to observe touch interactions between parents and infants in the first hour following birth. They noted that the most common touching behaviours for both parents (mother and father) was stroking and caressing the baby, with mothers touching their baby significantly more than fathers did. Unlike the findings of Mercuri and colleagues, this study did not distinguish between types of touch due to the nature of the recordings which did not allow for the detailed observation of behaviours. Touch is considered a primary means of early communication between caregivers and infants (Mercuri et al., 2019). Touch can provide newborns with a sense of familiarity, safety and comfort following their transition to life outside the womb. Premature infants who received more touch from their parents were shown to have lower stress responses at 7 months and this continued to show up to 10 years of age (Feldman et al., 2014). Touch also serves to facilitate the transition to parenthood for parents, enabling parents to get to know their infant and serves to reassure them of their infants' physiological state. Being able to touch infants frequently in order to check on their physiological state was mentioned by a number of mothers as a benefit of receiving an in-bed bassinet in the evaluation interviews (see page 100).

There was no difference in touching performed by other primary caregivers and their infants when comparing those allocated an in-bed bassinet or standalone bassinet. This study focused on the dyadic relationships between the mother and the infant and the other primary caregiver and the infant. However, this analysis overlooked the triadic nature of the family unit. Fathers or other primary caregivers may have been more concerned with supporting their partners, who were recovering from labour and birth. Feldman et al. (2003) conducted triadic analysis of families' interactions (mother, father and infant) in order to understand the influence of kangaroo care for premature infants on triadic interaction behaviour at home. The analysis involved coding touch patterns for each family member individually and bidirectionally between each dyad. A microanalytic analysis of triadic touch interactions may have provided a more thorough picture of the touch relationships within the family units within this study and may be worth exploring in future studies.

There was no difference between the bassinet groups for caregiver non-feeding related holding. The median duration of infant holding was low for both mothers and other primary caregivers who held their infants for an average of 12% and 8% respectively. There was a large variation in the range of maternal holding, with mothers holding for 0 mins to 167mins (2.8 hours). As this measure refers to non-feeding related holding, it is worth noting that it does not represent a complete picture of all mother-infant contact throughout the observed period.

[34] Holding by mother, father or another primary caregiver

4.12.4 Maternal sleep

Total maternal sleep time in this sample was low, with an average of 82 minutes sleep for all participants or 22% of the average sampling period for all participants. When split into day and night groups, mothers slept for 17% of the sampling period for those whose observation occurred primarily during the day and 40% for those whose observation occurred primarily during the night. This was considerably lower than that reported by Ball and colleagues (2006) noted that mothers slept for 65% of their sampling period. Limited studies have recorded postnatal sleep time in hospital with many focussing on sleep disruption in the weeks or months following birth. Hughes and Colleagues (2018) used questionnaires to record total sleep time in the first 48 hours following birth whilst staying in hospital and reported an average of 9.3 hours of sleep in the 48-hours following birth. They noted that sleep was unaffected by background noise, shared rooms, type of delivery or feeding and worrying about the neonate, however those who breastfed in this period reported sleeping significantly longer (average of 10.82 hours) than those who did not breastfeed (Hughes et al., 2018). The authors also noted that mothers had more sleep in the second 24 hours than the first 24 hours after birth (Hughes et al., 2018). As the sampling period for this analysis was within the first 24-hours, this may explain the low duration of sleep recorded.

Sleep disruption in the immediate postnatal period is well documented (Yang et al., 2020). Physiological and hormonal control of sleep may prevail over environmental factors such as infant proximity in the postnatal period. This idea is supported by research conducted by Keefe (1988) which demonstrated that women whose infants were taken into nursery care for the immediate postnatal period did not sleep more or better than those whose infants were rooming in. Other studies which examined the effect of bassinet allocation on in-patient sleep also found no significant difference in sleep time (Ball et al., 2006) and the time that mothers and their infants spent sleeping in relation to each other's sleep state(Tully and Ball 2012).

4.12.5 Staff presence

Bassinet allocation did not influence the amount of time that staff spent present within the sampling period. On average staff spent 7% of the observation period in the room providing support to families. This was similar to the result reported by Tully and Ball (2012) who found no significant difference between those allocated a standalone bassinet or a side-car crib. Previous research has indicated that staff provided less support to multiparous women within the in-patient period, assuming that they were already competent in infant caregiving (Taylor et al., 2015). Given that all those who participated in this study were primiparous it would be expected that staff would be cognisant of the importance of providing them with support throughout their in-patient stay. These figures may represent conservative estimates of the actual time that staff spent supporting families as many of the missing periods were due to staff turning cameras off when they were providing support because they did not want to be recorded.

4.12.6 6-8 week breastfeeding status

One intended outcome of this study was to understand if 6-8 week breastfeeding status (exclusively breastfeeding, mixed feeding or exclusively formula feeding) could be predicted by cot allocation in hospital. A previous study conducted by Robinson (2014) indicated that being allocated a three-sided crib on the postnatal ward significantly increased the proportion of breastfeeding at 26 weeks than receiving a standalone bassinet for those with a 'moderate' prenatal intention to breastfeed. It was therefore hypothesised that a similar difference may be observed in this sample. Of those who participated in the trial, 70% were exclusively breastfeeding, 15% exclusively formula feeding and 6% mixed feeding at 6-8 weeks. These averages deviated dramatically from the local and national breastfeeding rates, with more than twice as many people exclusively breastfeeding at 6-8 weeks than the local average[35]. This indicated that this study sample is biased to those who intended to breastfeed and therefore between group differences of breastfeeding at 6-8 weeks were unable to discern. This may be due to selective recruitment; those who were enthusiastic to breastfeed were more likely to be signposted for participation. It may also be that those who are likely to engage in research are more likely to be highly motivated to breastfeed (Barnett et al., 2012). Breastfeeding initiation and duration is highly correlated with higher educational level and married status, and this sample was largely comprised of people from those groups which may have influenced the breastfeeding outcomes (Avery et al., 1998; Skafida, 2009).

There may have been an effect of volunteer bias influencing the recruitment process which resulted in a large number of participants displaying characteristics that predisposed them to initiate and continue breastfeeding beyond 6-8 weeks. Volunteer bias occurs when the characteristics of those who participate in a study are different from the general population (Tripepi et al., 2020). There was difficulty engaging midwifery staff to support the research with many failing to understand the relevance of the study to their work. Following careful consideration, breastfeeding was disclosed as an outcome of the study to staff in order to improve engagement with the study and to enable staff to see the relevance to their work and importance of supporting the study for patients (Segre et al., 2011). This however led to some staff describing the study as '*the breastfeeding study*' to colleagues and patients, potentially biasing the recruitment process and minimising the influence of outcome concealment. This may have resulted in volunteer bias (Boughner, 2010); those with a strong intention to breastfeed may have been more motivated to engage in a study that was attempting to improve breastfeeding outcomes than those who were ambivalent. Those who volunteer in research tend to have a higher level of education and come from a higher social class (Boughner, 2010), traits that are associated with an increased breastfeeding duration (Avery et al., 1998).

4.12.7 Predictors of breastfeeding duration

[35] Newcastle Upon Tyne reported 34% infants totally breastfed, 15% partially breastfed, 51% not at all breastfed at 6-8 weeks. Breastfeeding at 6 to 8 weeks after birth: 2019-2020 quarterly data, accessed https://www.gov.uk/government/statistics/breastfeeding-at-6-to-8-weeks-after-birth-2019-to-2020-quarterly-data (accessed 30/10/2022)

In this sample, maternal education was positively associated with breastfeeding duration; those educated to degree level or above were observed breastfeeding for significantly more time in the sampling period than those educated below degree level. The relationship between education and likelihood of initiating breastfeeding (Skafida, 2009) and breastfeeding over a number of months is well established in the literature (Dabritz et al., 2010; Forster et al., 2015; Howel & Ball, 2013; McAndrew et al., 2010). There are several possible explanations for the relationship between education and in-patient breastfeeding frequency. Those with a higher level of education may have had more financial and/or temporal resources to engage in antenatal education about infant care and breastfeeding, which may have highlighted the importance of frequent suckling for breastfeeding initiation. Those with a higher level of education may be more likely to reside within socio-economic groups that are associated with greater breastfeeding initiation. This study found no relationship between education and intention to breastfeed or education and duration of visitor presence.

Breastfeeding intention was positively associated with the time spent breastfeeding in the observed period, such that those who reported having a strong intention to breastfeed breastfed for significantly longer throughout the sampling period than those who reported a moderate to low intention to breastfeed. Multiple studies have also previously documented the strong relationship between breastfeeding intention, breastfeeding initiation and continued breastfeeding over weeks and months (Dabritz et al., 2010; DiGirolamo et al., 2005; Donath et al., 2003; Forster et al., 2015), however studies assessing the relationship between breastfeeding intention and breastfeeding duration in the immediate postnatal period are extremely limited. Breastfeeding intention was highly correlated with duration of visitor presence; those with a strong breastfeeding intention were less likely to have visitors in the in-patient postnatal period or had visitors for a shorter time than those with a moderate to weak intention to breastfeed. Visitor presence was also significantly negatively associated with breastfeeding duration throughout the sampling period. Due to this correlation duration of visitor presence was omitted from the final model however, the influence of visitor presence on breastfeeding duration in the in-patient postnatal period is important to discuss. It has been demonstrated that breastfeeding rates have been improved by the implementation of schedules that impose 'quiet time' on postnatal wards, limiting visitors and disturbances in the postnatal period have been shown to impair breastfeeding initiation (Beake et al., 2010; Grassley et al., 2015; Lawrie et al., 2021). Those with a strong breastfeeding intention may have an increased awareness of the importance of uninterrupted mother-baby time in the immediate postnatal period and may be proactive in protecting this time.

The time that an infant spent in any cot, regardless of the type of cot was negatively associated with breastfeeding duration throughout the sampling period. This may indicate that the use of any bassinet hinders breastfeeding duration in the postnatal period. In-bed bassinets may create a barrier between mother and infant and may not be a suitable alternative to same-surface co-sleeping. Using a bassinet may increase the burden on mothers of responding to their infants, increasing the costs of breastfeeding initiation.

4.12.8 Strengths and Limitations

The results presented in this chapter should be interpreted with the following strengths and limitations in mind. The main strength of this chapter is that behavioural data were collected from families using video recordings. This allowed for the direct observation and analysis of behaviour within a naturalistic setting with limited interference from the researcher.

The absence of sound on the recordings meant that infant cues and feeding sessions were difficult to distinguish, especially as the size of the rooms made it difficult to see the infant's face clearly on the video recordings. Once recruitment for the study began it became clear that the inclusion of audio was too intrusive for participants and was limiting participation. Following consultation with the study steering committee it was decided that only video recordings would be taken and audio recordings would not be collected. Accurate coding of some behaviours, namely breastfeeding sessions and staff presence may have been limited by the quality of the video recordings. Several of the video recordings had missing sections in which cameras were turned off by participants and/or staff. Many of these interruptions happened during breastfeeding sessions with staff wanting to protect participants privacy when they were breastfeeding. Staff were told that they were free to turn the cameras off if they had to attend to a family but did not feel comfortable being recorded, so cameras were occasionally turned off when staff were present. Because staff were key in providing breastfeeding support cameras were more likely to be switched off when breastfeeding occurred. There was no difference between the standalone bassinet and in-bed bassinet group in the distribution or duration of missing video sections.

As well as limitations imposed by the lack of sound on the video recordings, time constraints due to the COVID-19 pandemic resulted in the intended coding scheme being adapted to make the coding more feasible. Cue and response behaviours, already limited by the lack of audio were removed from the coding scheme as well as infant risk. Once the coding process began, quantifying risk did not seem to be the most appropriate method of recording potentially risky situations, with potentially risky situations occurring infrequently and momentarily. Alternatively, case studies of potentially risky situations have been described qualitatively in the subsequent chapter rather than reported with the quantitative findings.

4.12.8.1 Fidelity

Fidelity, or the degree to which an intervention is implemented as intended was measured by the adherence to the intervention allocated. Ensuring fidelity is important as studies without fidelity can mask between group differences (An et al., 2020). Fidelity is also key in understanding whether the intervention can be successfully implemented in real-word settings. Five (36%) of those who were allocated to receive an in-bed bassinet used a standalone bassinet for some of the observed period with two of them using the standalone bassinet exclusively. This may have interfered with the ability of the analysis to demonstrate a clear difference between the two interventions. A per protocol analysis was included in the results to understand whether omitting those who did not use their allocated bassinet for more than half of the

observed period influenced the study outcomes. The results of the per protocol analysis did not differ from to the intention to treat analysis, indicating that bassinet compliance did not significantly impact the outcomes of the study.

Another key factor that may have influenced fidelity was the timing of the intervention. All families received a standalone bassinet following birth to use until their willingness to participate was confirmed and they were randomised to their study group, this often coincided with being moved into a 'postnatal room' for postnatal rest. Once participants received their bassinet, video recording commenced so the time between birth and the start of recording serves as an indicator of the time between birth and receipt of the intervention. The average time between birth and start of the recording was 3 hour 17 minutes, and there was a difference of 5h 41m between the shortest and longest time between birth and time of recording which may have impacted the influence of bassinet allocation. Those in the intervention group (in-bed bassinet) were having to change the bassinet that they were allocated whereas those in the standalone bassinet group could continue in the arrangements they were using, which may have impacted compliance with the intervention and fidelity.

4.12.8.2 The sample

It was intended that we would recruit 152 participants in order to detect a clinically relevant treatment effect. Unfortunately, multiple recruitment barriers resulted in a smaller than expected sample, leading to underpowered results. The inclusion of only primiparous women substantially limited the number of eligible patients that could be approached for recruitment. There is evidence that primiparous women have longer labours (Nesheim, 1988; Vahratian et al., 2006), are at increased risk of intrapartum complications (Hashim et al., 2012) and undergo more obstetric interventions (Brocklehurst et al., 2011; Malkiel et al., 2008) than multiparous women. These factors result in reduced eligibility for low-risk midwife-led intrapartum care and high transfer rates during labour. Staff were very clear that excluding multiparous patients was significantly impacting the recruitment potential of the study. Patients having their first baby were more apprehensive about the postnatal period and commonly expressed that not knowing what to expect in the postnatal period was putting them off committing to take part in the study. It was considered that expanding the recruitment criteria to include multiparas would negatively affect the scientific value of the study. However, it was noted that there were also several occasions when eligible patients were transferred to the obstetric unit in labour but gave birth without intervention and consequently returned to the birth centre for their postnatal stays. As the eligibility criteria for the study specified that individuals had to give birth in the birth centre, these patients were considered ineligible. In order to allow us to approach these patients for recruitment, the study protocol was amended to include any primiparous patient who was receiving postnatal care in the birth centre regardless of birth location. As previously discussed (page 82), volunteer bias may have contributed to recruitment of participants who were already highly likely to initiate and continue breastfeeding to 6-8 weeks which may have diluted the effect of bassinet allocation.

4.12.8.3 Protocol deviation

Whilst conducting this research there was a protocol violation that occurred where a patient was inadvertently filmed whilst receiving postnatal care within the birth centre. This deviation occurred due to a communication error - the patient who was participating in the study had been discharged and the study team had not been notified. This resulted in the camera continuing to record after the participating family had been discharged and continuing to record when another patient was admitted into the room. This deviation was highlighted by a member of the research team, within an hour of the patient being moved to the room and the patient was notified that they had been inadvertently filmed, whilst they were present in the birth centre. All footage that was recorded was destroyed and the protocol deviation was reported to the trial steering committee and appropriate regulators. Following this deviation the communication channels were reviewed, with staff being reminded that posters indicating recording was in progress essential to keep up and to pay attention to. When participants were being recorded their discharge was followed carefully and staff were reminded how to turn the cameras off themselves should a member of the research team be unavailable.

4.13 Conclusions

The results presented in this chapter indicate that there was no significant difference between the observed duration of breastfeeding in the immediate postnatal period for those who were allocated a standalone bassinet and those allocated an in-bed bassinet. Cot type also had no significant influence on number of attempted breastfeeds, average length of breastfeeds and rate per hour of breastfeeds during the observed period. Those allocated an in-bed bassinet showed significantly more maternal-infant touching than those allocated a standalone bassinet but there was no significant difference in maternal holding between the two groups. There was also no significant difference in holding or touching for other primary caregivers between those allocated an in-bed bassinet and those allocated a standalone bassinet. There was no significant difference in maternal sleep or duration of staff presence within the sampling period between the two groups.

A multivariate model indicated statistically significant positive association between the time the infant spent in any cot, highest level of maternal education, breastfeeding intention, and duration of breastfeeding throughout the sampling period. There was an inverse relationship between the time the infant spent in any cot and time spent breastfeeding; the more time infant spent in any cot, the less time they spent breastfeeding. Those who were educated to degree level and above and those with a strong antenatal intention to breastfeed spent significantly more time breastfeeding than those educated below degree level and those with a low to moderate intention to breastfeed. These results indicate that the birth centre environment is impeding breastfeeding initiation for those who are already less likely to breastfeed, namely those educated up to degree level and those who had a moderate to low intention to breastfeed.

5 PARENTAL EXPERIENCES OF IN-PATIENT BIRTH CENTRE POSTNATAL CARE

5.1 Introduction

This chapter presents a qualitative analysis of feedback and behaviour throughout the in-patient postnatal period, data was collected through qualitative interviews with families to understand the experiences of in-patient postnatal care and to assess the acceptability of the allocated bassinet. Semi-structured interviews were conducted with families either before discharge from the birth centre or over the phone a few days after birth. The responses from these interviews have been contextualised with case study descriptions from the video observations. These case studies demonstrate the complexity of infant caregiving and the constant negotiations being made between the needs of the parents and the needs of the infant. By understanding the various, conflicting needs of the postnatal parents and their infants we can ensure that in-patient environments are created that optimise the needs of both and reduce this conflict.

5.2 The Sample

All families who participated in the video study (n=33) were invited to participate in a postnatal interview. An overview of interview completion is shown in figure 5.1. Overall, 26 participants completed an interview: 13 from the in-bed bassinet group, 13 from standalone bassinet group. Those who did not complete an interview were discharged out of hours and it was not possible to contact them to complete a telephone interview. One interview (P27 – standalone bassinet) was lost due to a recording error, resulting in 25 analysed interviews. Face-to-face interviews were conducted in the postnatal rooms in the birth centre and frequently partners participated in interviews alongside mothers. The interviews ranged in duration from 3 minutes to 17 minutes (mean duration 7 minutes). Most people agreed to be interviewed for 10 minutes or more with a number of participants only available for <5 minutes. Many families were keen to be discharged from the hospital and/or were caring for their newborns so interviews were kept brief and followed a structured format to facilitate this.

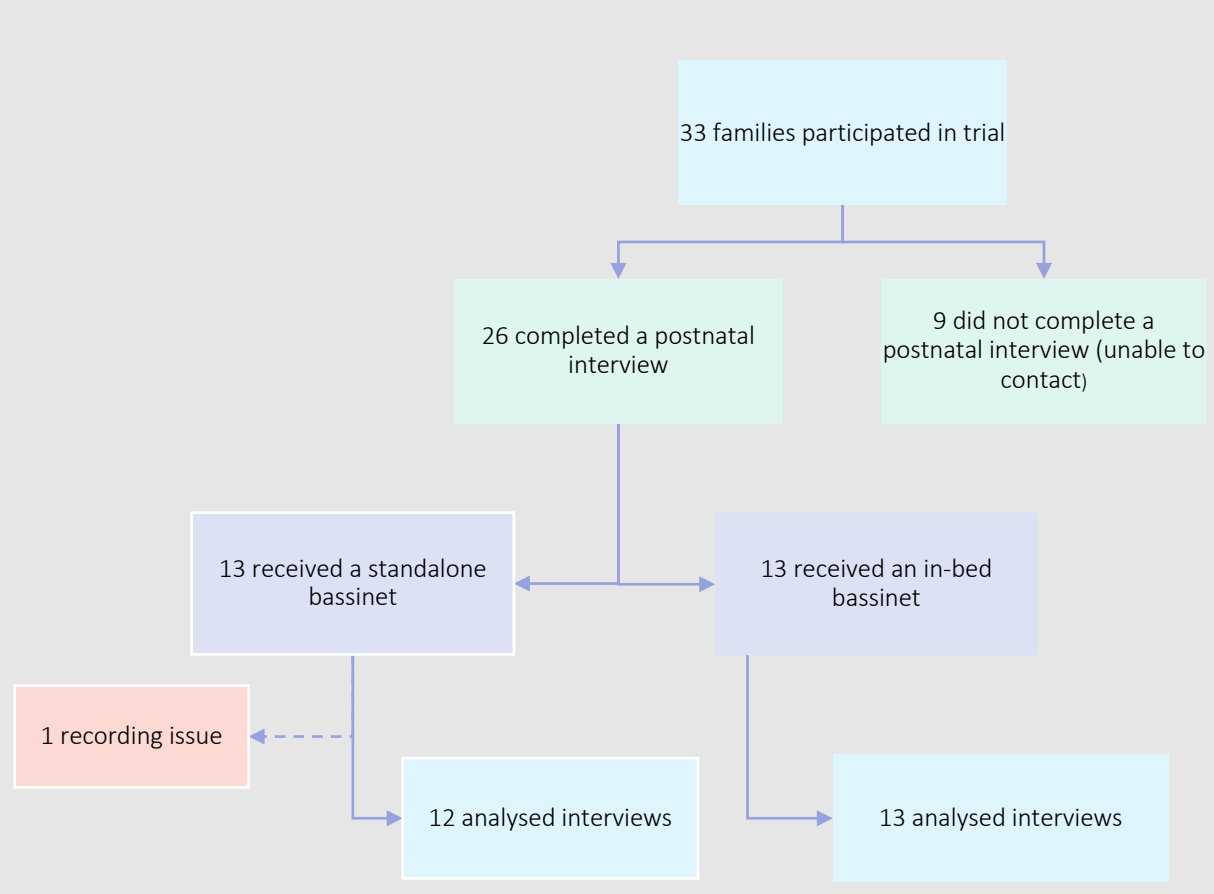

Figure 5.1. Interview completion flowchart, a total of 26 interviews were conducted, with 25 analysed interviews.

In the analysed interview sample the average age of the mother was 28 years. Just over half of the mothers (n=13) had a strong breastfeeding intention, with the other half (n=12) having a low to moderate breastfeeding intention. Table 5.1 summarises the age group, marital status, educational attainment, and ethnicity of the interviewees grouped by whether they were in the intervention or control arm of the trial. To provide the contextual case-study data qualitative video analysis was conducted on the entire video observations (n=32), with videos ranging in length from 1 hour to 26 hours. The mean analysed video length for the in-bed bassinet group was 14 hours and 57 minutes and the mean video length for the standalone bassinet group was 15 hours and 37 minutes.

Table 5.1. Characteristics of those who completed a postnatal interview

Characteristics		In-bed Bassinet (n=13)	Standalone Bassinet (n=12)
Age	<20 years	2	1
	20-25 years	3	2
	25-30 years	4	3
	>30 years	4	6
Marital status	Married/civil partnership	7	8
	Living with partner	5	4
	Prefer not to say	1	0
Ethnicity	White British/other	11	11
	Non-white	2	1
Educational qualification	Degree and above	9	10
	Below degree	3	2
	Not provided	1	0
Mean video length (SD) (n=31)		14h 57m (7.19)	15h 37m (7.43)

5.3 Satisfaction with care provided

When asked about their postnatal experience almost all respondents expressed their satisfaction with the care provided in the birth centre. Many expressed gratitude that they were able to access the facilities, have their own private space and were able to have their partners stay for the postnatal period. One participant described the unit as 'relaxed' and 'homely':

> *…it's all relaxed isn't it, I think rather than being in like a proper hospital ward it just feels a bit more kind of homely, which is nice.* [P22 – Standalone bassinet]

Having partners to stay was a major benefit for participants, they provided emotional and practical support for mothers as well as providing families with time to bond together:

> *Personally I've loved having [partner] here so at least it's support for me more than anything. I've felt the facilities are fantastic and even just the little bits of help that you still get 'cause obviously we're not deemed that we need a lot of help but there's extra support, teas and coffees and that kind of thing, and having a nice bath there as well.* [P6 – Standalone bassinet]

Privacy was an important feature of the birth centre stay for participants, especially access to a private bathroom. Six respondents mentioned the relief they felt that they had access to a private bathroom, which protected their dignity whilst they were going through the process of birth and recovery.

> *"I think we're so, so lucky and I've been saying that to people. And when I found out I was pregnant I always said I wanted to come here 'cause I heard really good things about it and it's only when you kind of live and experience it that you realise how important it actually is, how important it is to have the dad here, not just here but present in the room and he can stay with you. To have a toilet where if you was feeling poorly or if*

you're bleeding quite a bit you don't have to worry about waiting or seeing other people potentially. It's just so private and convenient." [P6 – Standalone bassinet]

One participant described the idea of a postnatal ward as a '*public environment'*, indicating the vulnerability that they may have felt sharing a space with others whilst they were recovering from birth:

"*…I couldn't imagine having to go to a ward after having given birth and being in kind of a public environment when yes you are kind of in that position so they were just fantastic in the birthing centre."* [P36 – In-bed bassinet]

As well having access to a private bathroom, families in the birth centre did not have to adhere to hospital routines and protocols as they would on a postnatal ward. Two families mentioned how this allowed them to rest without being disturbed by other families.

"it just felt really nice to do that and be the three of us but with support of the midwives but also being apart from everyone else so we felt like that was our little space and we could just go to bed at half past seven, which is what we did, yeah like the whole thing, like the birth centre and having those rooms was fantastic" [P32 – Standalone bassinet]

"…the idea of [husband] having to sleep in a chair and having to share the bathroom and being in the environment with other mums where all the babies are waking up at different times and stuff, compared to that the Birthing Centre was absolutely amazing for the fact that you had so much privacy and it was very much the three of us and we were all sort of getting used to each other, so I think that was really, really nice…" [P40 – Standalone bassinet]

Breastfeeding support and infant care advice from staff was highlighted as one of the benefits of staying in the birth centre. One participant described staying on the unit like being in '*assisted living'* (P30) the space was private, and families could be autonomous within it, but they had the support and care of staff available to them on request. Another participant described how the breastfeeding support and advice was reassuring and built up their confidence prior to being discharged:

There was always someone available to ask sort of for advice, but she seemed to latch on reasonably well, but I did seek a bit of advice about positioning and that sort of thing and again everyone was really helpful about that, so it was quite reassuring to have people to ask and to feel that I'm confident before going home [P39 – Standalone bassinet]

They kept popping in and checking in but weren't like hovering over you and things so let you have your space but they were there if need be which was nice to know. And quite often, well once or twice they were busting to check that they were happy with how I was breastfeeding, making sure I was doing it right which was nice to have that kind of support as well. [P15 – In-bed bassinet]

One family commended the staff's expertise in understanding their infant's cues, teaching them how to attend to their infant, as well as practical advice about hand expressing:

> *"The other that we quite appreciate is that early morning she cried a lot and we had no clue what was happening because we fed her and 45 mins later she was crying, there was no poo, no pee and she was crying. The midwife came in an immediately recognised that she was hungry and we didn't expect that because it was less than an hour, how could she be hungry? And the milk a bit sticky in this early morning so the midwife also provided up with tips for hand expressing to get some milk for us."* [P38 – in-bed bassinet]

Two families discussed receiving a range of advice from staff within the birth centre regarding breastfeeding. One participant (P36) saw this as a positive thing, allowing them to get a range of approaches for which they could pick and choose the ones that worked for them, whereas another participant (P15) discussed the different opinions around the best way to care for their infant as a negative.

> *"So just getting used to like different positions and like the different midwives each had a different kind of approach or a point of view on it which was quite helpful and then I could take kind of the best bits from different people…"* [P36 – In-bed bassinet]

> *"The only thing is quite a lot of the midwives will tell you, diff…not different things, but they will have their own way of doing it. So one midwife might come and say, oh do it this way and then someone else will come and say, I wouldn't say do it this way, I'd do it this way, I'm like yeah, lots of different opinions*." [P15 – In-bed bassinet]

In contrast, one participant mentioned that they felt like they did not get adequate breastfeeding support, whilst they were in the birth centre, and that their breastfeeding issues were dismissed as normal:

> *"I would say probably could have got a bit more help with that [breastfeeding], just in general, because obviously when it's the first time it's a bit hard to get used to it, so I would say a bit more help with the breast feeding would have been better…I think I had quite a lot of pain when she was latching and obviously I've heard that if you have pain it's normally that she's not latching properly, but when I pointed that out they said that everything was kind of fine so I don't know whether I just needed a bit more support in that way whether I needed them to kind of guide us a little bit more because I was very like blistered and things after the first night, so I just think I needed a little bit more guidance on things rather than just kind of 'yeah you're fine', in feeding kind of thing.* [P21 – Standalone bassinet]

Overall respondents were satisfied with the care that they received in Newcastle Birthing Centre and appreciated having their own private space, having their partners to stay and the support and guidance that they received from staff.

5.4 Feedback and evaluation of allocated bassinet

Participants were asked to consider positive and negative features of the bassinet that they were randomly allocated. Themes emerged from the data through the thematic coding process (discussed on page 56), each feature mentioned was coded and codes were merged to generate themes based on how the features affected the parents' or babies' postnatal experiences. Figure 5.1 shows a code cloud of the codes, which were merged onto four key themes: rest and recovery, responsiveness, parental values and safety. The full coding and analysis process has been described in the preceding methods chapter (section 3.5.2).

Figure 5.1. A code cloud displaying codes which were sorted into key themes

A summary of the feedback about the allocated bassinet and the four key themes are displayed in Table 5.1.

Table 5.1 A summary of feedback about the allocated bassinet

Themes	In-bed bassinet		Standalone bassinet	
	Positives	Negatives	Positives	Negatives
Rest and recovery	Parents did not have to keep getting up off the bed to respond to the infant	Limited space in the bed interrupted sleep and parents were uncomfortable	Having baby in separate space allowed for most space in the bed	Hindering recovery - difficult for mum to get up and respond to baby after birth
			Parent's both up and down throughout the postnatal stay	
Responsiveness	Facilitated breastfeeding as	Limited space in the bed when	Sturdy frame could lean on for	Different height from the bed –

	could observe baby's feeding cues	using the in-bed bassinet – chance of knocking the bassinet and disrupting baby	support when tired / in pain	parents felt far away from their baby
	Could move around the bed and the room	Mother still required to twist to get baby out of bassinet	Portable – could be wheeled around the room according to needs	
Parental values	Allowed parents who valued closeness to have baby close	Utilitarian design of the bassinet was off-putting for some	Baby could have their own separate sleep space	Parents who valued closeness could not have baby close
			Putting baby down could foster independence	
Safety	Parents could observe infants breathing easily	Parents observed lifting in-bed bassinet with infant inside	Infant not in parents' sleep space	Parents unable to respond to infant immediately
		Bassinet tilted on mattress which caused concerns that infant could roll over		

5.5 Key themes

5.5.1 Rest and recovery

Many families saw the in-patient postnatal period as a time to rest and recover from birth before returning home with their new baby. Due to the nature of the facilities in the birth centre, primarily the bassinets used in the trial and the fold out sofa beds, the need for rest and recovery was repeatedly being negotiated with many families having to prioritise one over the other. The need for rest, or sleep was more or less important for each family depending on the length of labour, intensity of the birth experience and the time of birth with some requiring more rest than others. Bassinet allocation both supported and hindered rest and recovery in different ways, for some the in-bed bassinets supported recovery but hindered rest, with standalone bassinets supporting rest but hindering recovery.

5.5.1.1 Recovery

Physical recovery was a priority for mothers, especially those who had stiches following birth and almost all mothers spoke about being achy and sore whilst staying in hospital. Mothers who were recovering from birth expressed concern about how the sofa beds in use in the birthing centre may have hindered their recovery, especially those who had stiches following birth:

> *"I genuinely think that recovery of my stitches and so on probably only started when I got home, when I had a more comfortable bed, it got very achy and it got, well it was very painful on and off."* [P34 – In-bed bassinet]

> *"I would have to say that the pull out bed was so very uncomfortable not only the sort of metal sides which were very difficult to get in and out of but also all the springs of the mattress I just felt absolutely everything so I think the bed, unfortunately, put me back a few days in terms of my stitches and my recovery on that side but in terms of getting a bond with [baby] and being able to see her and get used to her noises and so on, it was wonderful, I really enjoyed it."* [P34 – In-bed bassinet]

In addition to being '*squeaky'* and '*uncomfortable'*, one respondent also mentioned how she felt that the sofa-bed did not provide sufficient support, which made breastfeeding '*hard work'* and put pressure on her back:

> *"I think the only thing is the bed and you don't have arms to lean on, I found that quite hard work, so feeding in bed I don't really like, I prefer to be in a chair so at least you've got something to lean on and can take the pressure off your back, but it was okay."* [P40 – Standalone bassinet]

Interview reports and behavioural observations indicated that mothers struggled getting up and down from the sofa beds, with many pulling strained expressions or having to ask for assistance from their partners to get on and off the bed. Case studies 1 and 2 describe two incidents where participants struggled to manoeuvre themselves whilst lying on the bed, in both these examples mothers required help from another adult to support them in getting up. Using an in-bed bassinet mitigated some of this strain by allowing parents to observe and interact with their infants without having to frequently strain themselves, giving them the opportunity to recover from birth. One participant said:

> *"[The in-bed bassinet] was really useful because then I was like constantly connected to the baby so whenever I heard a slight noise or I felt like he was hungry again I'd just be able to get to him quickly and it wasn't too much of a stretch"* [P29 - In-bed bassinet]

Case study 1 – Mum struggling to get comfortable

Baby stops feeding and mum moves her onto her chest, cradling her in her arms. Baby is crying and mum is rocking and shushing her. Mum is lying down and tries to shift herself higher on the pillow whilst holding the baby, dad is out of the room. Mum puts her hands above her head and attempts to pull herself up holding onto the back of the sofa cushion behind her head. She is winching and wriggling her body whilst shushing and kissing the baby. Mum reaches down and pulls out some objects that have fallen down the back of the bed, between the top of the mattress and the 'headboard' (sofa cushions). Mum attempts to get up, twisting her lower body off the side of the bed and reaching over towards the arm of the sofa bed, she still has the baby in her arms and is huffing and wincing as she twists. She gives up trying to get up and rolls onto her back and tries to get comfortable by rolling the other way. Again, she reaches above her head to try and leverage herself using the cushion behind her head, this is rather unsuccessful. The dad returns from the shower and takes the baby from mum who is then able to sit up more easily. [P15 – In-bed bassinet]

Case study 2 – Mum struggling to get up from the bed

21:55- mum is attempting to feed in a different position, but she is struggling to move herself whilst she is holding the baby. Dad takes the baby whilst mum pushes herself into a sitting up position, and dad passes the baby back for another attempted feed.

22:03 – mum passes the baby to dad as she attempts to get up from the bed, pushing and rolling her body over, slowly and obviously in pain. Dad stands next to the bed and verbally encourages her to get up. When she is standing she takes the baby back and attempts to breastfeed standing up. Dad stands next to her watching the feed and helping to hold the baby in position, cupping the back of the baby's head. Mum looks like she is uncomfortable, occasionally grimacing as the baby is suckling. Mum reaches out and uses the side of the standalone bassinet for support as she stands feeding the baby. [P37 – standalone bassinet]

One participant who was allocated an in-bed bassinet expressed relief that she could recover and did not have to keep on getting in and out of bed to respond to her infant:

> *"we didn't have to like keep getting up and keep looking at her, see I was really sore and I had stitches as well plus I bled a bit more than they'd wanted so I felt a little bit faint initially so it was really good because I could just stay in bed to get her in and out and I didn't have to keep waking [my partner] up so I really liked it (15:6)"* [P19 – In-bed bassinet]

In contrast, the height discrepancy between the standalone bassinet and the sofa beds meant that parents were frequently having to get up and down from the sofa bed in order to respond to the baby, hindering their ability to recover. One respondent, however noted that the height discrepancy between the bed and the standalone bassinet was not a problem as her and her partner were '*both up and down'* anyway:

> *"having the cot next to the bed and higher than the bed in the hospital was fine, it didn't matter at all, we were both up and down, it didn't really make any difference"* [P32 – standalone bassinet]

Having partners and family present for the in-patient postnatal stay meant that they could engage with caregiving and/or pass the baby to the mother, allowing her to lie down, rest and recover, potentially alleviating the impracticality of the standalone bassinet. Although this was the case, some mothers did not have overnight support or were the primary caregivers. Some mothers who were allocated a standalone

bassinet were observed trying to rock the bassinet to settle their babies when they stirred in order to avoid getting up, or having to kneel on the bed to reach their infants (see image 5.1).

Image 5.1 Participant 3 and 25, responding to their infants in who were placed in standalone bassinets next to the bed

5.5.1.2 Rest

The in-bed bassinet was used differently depending on the time of day and was often moved around the bed and the room to facilitate the parent's needs. For night-time care seven parents slept with the in-bed bassinet between their pillows, with a parent on either side of the bassinet. Some respondents reported that they felt that having the bulky bassinet in bed with them was hindering their ability to get sufficient rest and resulted in them using alternative sleep spaces - bringing the baby into bed without the bassinet or using a standalone bassinet. The sofa-beds in the birth centre were small (4ft wide) and it was a squeeze for both parents to fit with an in-bed bassinet.

> *"To be honest just the beds aren't the right kind of size to be having that [in-bed bassinet] in the middle. We're all squashed up so in the end we had to take her out because we were both on our sides..."* [P15 - In-bed bassinet]

Four families who were allocated an in-bed bassinet ended up using a standalone bassinet for more of their stay than they used in-bed bassinet, with two of those not using the in-bed bassinet at all. Two of these

families spoke enthusiastically about the idea of using the in-bed bassinet, but found that the practicalities of the reduced space meant that it was not appropriate for them:

> *"Yeah we did get allocated the box but we didn't use it […] because we found there wasn't enough room in the low sofa bed thing and like I thought that idea was really good actually, in hindsight, because it was hard for me to get in and out of the sofa bed to the like cot that stood alone but there just wasn't enough room"* [P36 – In-bed bassinet]

Videos showed participants leaning on the bassinet in order to comfortably fit into the bed (see image 5.2). One father mentioned that he was nervous about the baby being in the in-bed bassinet next to him as he worried that he would knock the bassinet or end up smothering the baby in some way because he was a deep sleeper and did not have much room (P15 – In-bed bassinet).

Image 5.2 Family using an in-bed bassinet, father leaning on the bassinet (P29)

Staff were proactive in finding solutions and in some cases, families were also provided with a birthing couch to allow one parent to sleep on the sofa-bed with their baby in the in-bed bassinet whilst the other slept on the birthing couch as indicated in image 5.3. Four participants mentioned how this setup allowed them to sleep more comfortably throughout their stay, with many preferring to sleep on the birth couch than the uncomfortable sofa beds. One family (P41 – in-bed bassinet) discussed how they could alternate between them, allowing them each to have time close to the baby whilst the other one was able to rest on the more comfortable birth couch.

Image 5.3 Partner sleeps on the birthing couch as mother and baby sleep in the bed (P41)

Those who had this arrangement were wholly more positive about the benefits of the in-bed bassinet than those who were not provided with a birth couch, indicating that the benefits of the in-bed bassinet were mitigated by the discomfort of having it in the sofa-bed. One participant used the idiom 'swings and roundabouts' to highlight the trade-off between the two bassinets – the standalone bassinet allowed for better parental rest and comfort however it was more difficult to respond to the baby. Whereas the in-bed bassinet facilitated recovery and responsive caregiving but hindered parents' ability to get sufficient rest:

> "*I did think part way through the experience, the night or in the evening when I was a bit sore and was having to get up and go over to [baby] and then sit back down that having him in a cot in the bed might have been much easier but really I think that possibly we slept better because he wasn't in the bed so… swings and roundabouts!!*" [P32 - standalone bassinet]

One family pushed the birthing couch next to the bed and placed the in-bed bassinet on the birthing couch (see image 5.4). When asked about this, they mentioned that they did not feel that they had enough space in the bed for the in-bed bassinet between them in bed so put it elsewhere. This arrangement did not allow the mother to reach her infant whilst she was lying down but did allow her to observe and touch the infant whilst sitting up in bed.

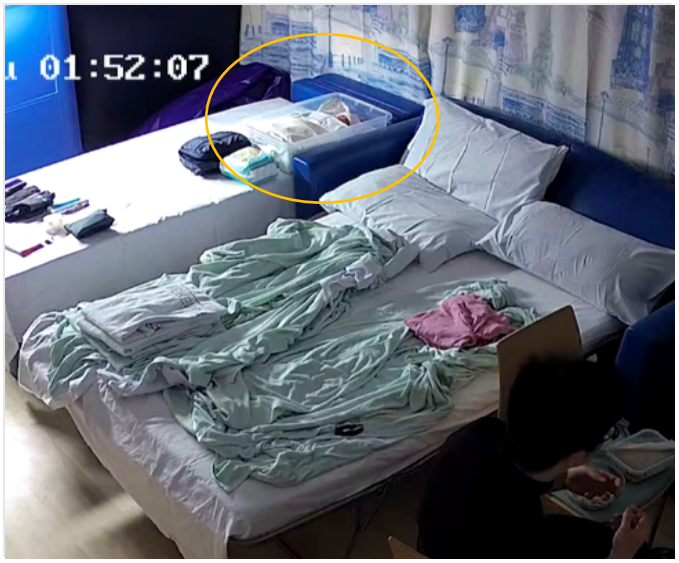

Image 5.4 Participant 38 the in-bed bassinet with the baby in is placed on the birth couch

5.5.2 Responsiveness

Parents who were allocated an in-bed bassinet appreciated having their baby close to them and found that the closeness gave themselves and their babies emotional comfort, enabled them to respond to their infants easily and allowed them to bond with their babies. Four respondents spoke about how the in-bed bassinet gave them the opportunity to observe their newborn closely in order to learn their sounds and cues, which helped to facilitate breastfeeding.

> *"I thought [the in-bed bassinet] was quite useful because obviously I'm trying to just figure out when she's hungry or what she needs and stuff like that so it's quite useful, like, observationally just to watch her and stuff and see what she's doing, like if she starts crying, if she's going to carry on crying and things like that so that's been really nice so I really liked it, I thought it was really good."* [P23 - In-bed bassinet]

When using the bassinet in the bed, parents could see their baby easily this was something that participants valued:

> *"when we first came in and it was really nice having her right there in the bed, although I was very distracted because I was just like looking at her the whole time"* [P23 – in-bed bassinet]

> *"I thought that was really good, the fact that you could just, you didn't have to then, if you heard him [stir] or anything, like get up and have a look somewhere you just, just open your eyes and you can see straight away so, I wasn't opposed to possibly doing that at home would be nice, so it was good."* [P17 – in-bed bassinet]

For all families, as this was their first baby, many had anxieties about their baby's condition, needing frequent reassurance that they were safe and healthy. Two parents mentioned that they liked the in-bed bassinet because they could easily monitor their baby's breathing and temperature, this provided reassurance that their new born was safe and well.

"Yeah I think the obvious benefits are being able to see her all the time and reach out and feel the temperature and breathing and things, it's really good… whether you need either not the dad staying in the same bed or bigger beds!!" [P23 – in-bed bassinet]

" So yes I mean I guess it is a nice option to help to be close to your baby because it made it easier for me being on high alert and not really sleeping and wanting to look at that he's breathing all the time, I didn't have to sit up and do that so I could lie down and see. So I guess that was a good thing." [P41 – in-bed bassinet]

Although the in-bed bassinet allowed for continual monitoring of the baby and parents could easily touch and reassure their infants, one participant described that they found it awkward to manoeuvrer their baby in and out of the in-bed bassinet whilst sitting in bed; they had to sit up and twist which they found difficult following birth. Although the in-bed bassinet was a useful solution, it still posed difficulties for some.

Those who were allocated a standalone bassinet mentioned how the height of the standalone bassinet, which stood much higher (approximately 50cm) than the bed was prohibitive for bonding and responsiveness. One respondent mentioned how the height of the standalone cot meant that they could not see their baby's face and felt like their baby was "*really far away*":

"Yeah, so it was too far away the cot I think and too high, so obviously I couldn't necessarily see, it would be much nicer if the cot was at a similar level to where you were lying so you could just look across instead of having to sort of sit up to be able to see. I mean I know it's see-through but you can't see the top – you couldn't quite see her face when she was in that cot, I just felt like she was really far away and so I think it would have been nicer if the cots were a little bit lower so that they are the same height at the sofa bed." [P40 – standalone bassinet]

Case study 3 illustrates how one mother attempted to respond to her cueing infant but could not reach the baby from her position on the sofa bed and her partner was asleep on the other side of the room. Rather than wake her partner, this mother decided to ignore her infant's cues, in the hope that she would settle again.

Case study 3 – Mother unable/unwilling to respond to infant in standalone bassinet

03:59 – Baby stirs in standalone bassinet, dad is asleep on the birth couch, mum is lying in bed looking at her phone. The standalone bassinet is located on the mother's side of the bed but is out of reach of the mother. The baby is moving her arms and legs and opening and closing her mouth. Mum glances up from her phone and looks at baby but doesn't react. Baby continues to squirm and wriggle

04:13 – Baby wakes again and is opening and closing mouth and covering her face with her hands. Mum continues to look at her phone, occasionally glancing over at the baby. Baby is opening and closing her mouth and is spitting up vomit, mum glances over but can't see the that the baby is vomiting. After 3 minutes (04:16) mum reaches over and pulls the standalone bassinet closer to her bed. She reaches her hand over and tries to touch the baby with her fingertips and glances over at dad to see if he is asleep, which he is and then she returns to looking at her phone. The baby is still wriggling and opening and closing their mouth, albeit less intensely. (P37 – standalone bassinet)

When asked to describe positive features of their allocated condition, those using the standalone bassinet appreciated its physical features; it had a rocking motion that provided comfort for their babies and the rocking alerted them when their baby was stirring. Parents also spoke about the portability of the standalone bassinet; it was on wheels and could be moved around the room allowing them to move their baby to wherever they were. The bassinet could be tipped in its frame which a number of families mentioned that they liked as it gave them '*different options'*, especially for those families who were worried about their babies having mucus congestion.

> "*I've learnt now that he's sort of full of mucus and he had quite a lot of reflux, mucoussy reflux last night so that gave me peace of mind, having that tip, it was kind of quite nice, and yeah the rocking, the rocking's really nice as well, he's enjoyed that haven't you?"* [P30 – standalone bassinet]

These features all reduced the need to be responsive – the rocking of the bassinet meant that babies might settle themselves without parental intervention and being able to tip the bassinet alleviated anxieties that infants needed to be monitored closely.

5.5.3 Parental values

A number of parents discussed their in-patient experiences through the lens of their own parental or personal values. This was echoed by participants in both groups; some participants expressed beliefs that babies should be independent or have their own very separate sleep space, whereas others intended that they would keep their babies close to them throughout their in-patient stay regardless of bassinet allocated. For some, the separateness of the standalone bassinet was reassuring; they were confident that their baby was in a safe space and could not be disturbed by them:

> *"so not having him in the bed maybe that was a plus point because we were sleeping separate we didn't worry about him because we knew where he was and that we couldn't be, you know, we couldn't wake him or we weren't wary of him because he was not in the bed, he wasn't, you know, he was very separate so that was great,*

yeah so I guess I don't really have any more kind of thoughts on that, it worked for us when we were there." [P32 - standalone bassinet]

These ideas centred around separateness and independence and were echoed by one participant who spoke of trying to '*promote independence'* in their newborn by encouraging them to settle in the standalone bassinet, quickly finding that their baby preferred to settle on them:

"To be honest with you the way that he is, he's been out of it more than he's been in it. Yesterday it was more useful to have him in there. I like to cuddle them. Then I realised that, you know, try and promote independence, I put him in there. Couldn't do that last night like after eight o'clock, he's just like I'm not having any of it. So he lay down and then he'd be like no, I want a cuddle, I want to be fed, I want to be fussed with kind of thing. So it's [the standalone bassinet] practical. It's just for him he wanted to be closer to us" [P6 – standalone bassinet]

One family who were allocated an in-bed bassinet discussed how they did not personally appreciate the bassinet describing themselves as "*not that type of person*". They explained:

"Mum: I definitely know some people who would have like loved to have had something like that so definitely [it should be offered for people to use]."

"Dad: I think some people would probably quite like it.

Mum: People do it [bed-share] at home so I would assume that people have the baby in the beds at home, some of them. I wouldn't but…" [P2 – in-bed bassinet]

The utilitarian design of the in-bed bassinet also caused concern for some participants, with two families mentioning how they were hesitant about the in-bed bassinet, they felt uncomfortable putting their newborn baby into what looked like a storage box; one participant said:

"*Initially just the fact that it looked like a box!! Like literally like, in you go baby and putting it in like a box but like it was fine, it was just like the other one really, we forgot about it quite quickly"* [P19- In-bed bassinet]

Parental values also dominated for families who intended to spend as much time in close contact with their newborn, one family said '*we would have made anything work really'*, decoupling their own intentions from the facilities that they were provided;

"Father: I mean I think you know we would have made anything work really and you know we've just, most of the time he's been with us, like last night he spent a lot of time on our chests, he just wanted kind of warmth and just to be nurtured really [mmm] so we kind of had him on the chest and then on [mum's] chest and then on the chair breastfeeding…

Mother: We tried to do as much skin to skin as possible…" [P30 – standalone bassinet]

5.5.4 Safety

There were no observed or reported incident of harm that occurred to those who participated in the study, however safety was discussed by families who participated and a number of incidents were observed that had the potential to cause harm. Parents in both intervention and control groups discussed sleeping with their baby in bed and some highlighted that the sofa-beds did not provide a safe space for bed-sharing with the baby. One father said:

> *"you could see the mechanisms on the side and you just felt a bit kind of exposed to all of those hard bits of the sofa bed"* [P41 – in-bed bassinet]

Although this was the case, parents were frequently observed falling asleep with their babies on them or in the bed. These occasions were mostly accidental with parents extremely tired after birth and babies who preferred to settle on a parent. One family (P15 – in-bed bassinet) described how they were *'really really scared'* by how easily they fell asleep whilst feeding the baby in bed (see image 5.5). Of those who were observed falling asleep with their babies in their arms or in the bed five were allocated a standalone cot and four were allocated an in-bed cot.

Image 5.5 Participant 15 falling asleep whilst breastfeeding and baby slipping between both sleeping parents

In order to mitigate the dangers and discomfort posed by the sofa beds, three families stuffed pillows or sofa cushions at the side of the bed to cover the mechanisms and to stop the baby from falling through the gaps. Rather than placing the baby directly onto the sofa beds three families were also observed placing infants on pillows. One family (P21 – standalone bassinet) used a pillow as the primary sleep space for almost the entire observation period (see image 5.6). This behaviour was particularly notable as the pillow was used as a 'portable' sleep space to place the baby and to enable caregivers to interact with the baby whilst lying down in different locations around the room, emulating the experience of using an in-bed bassinet. This family were allocated a standalone bassinet and were wholly positive about their experience with it during the postnatal interview.

Image 5.6 Participants 21 were allocated a standalone bassinet, however they placed their infant on a pillow for a large proportion of the sampling period

Parents provided with an in-bed bassinet mentioned how the instability of the bed caused the bassinet to lean or to tip to one side, causing their baby to roll onto their side. This was a safety concern for some parents who were conscious of their babies rolling onto their sides and potentially ending up on their fronts, and could see that their baby's face was close to the side of the in-bed bassinet:

> *"because of the way that the sofa bed was he kind of leaned the way that we were lying so he would roll that way and then sometimes he was almost like with his nose towards the – well he was with his nose towards the side of the cot"* [P41 - In-bed bassinet]

One family who were allocated an in-bed bassinet were observed placing the infant between their legs and lying back and falling asleep. The incident is described in case study 4.

Case study 4 – Infant placed at the end of the bed

Baby stirs again and dad wakes, sits up and places the baby on the bed between his legs. The baby seems calm so dad lies back and closes his eyes (05:10), with the baby sleeping between his legs at the end of the bed. Mum is lying down with her eyes closed and arm resting on dad's shoulder. Mum feels the baby wriggling at the end of the bed, sits up and sees the baby at the end of the bed (05:12). She taps dad awake and motions to him to move the baby. Baby is then placed on a pillow in-between mum and dad. Dad lies on his front facing away from the baby and mum sits up with arm around baby stroking the baby's stomach. [P29 – in-bed bassinet]

Image 5.7 Family places baby between their legs and falls asleep for a few minutes before realising and moving the infant

Two families were observed carrying the infant in the in-bed bassinet in order to move the baby around (see image 5.8), these incidents only happened for a brief moment but may have resulted in the baby being dropped whilst in the bassinet.

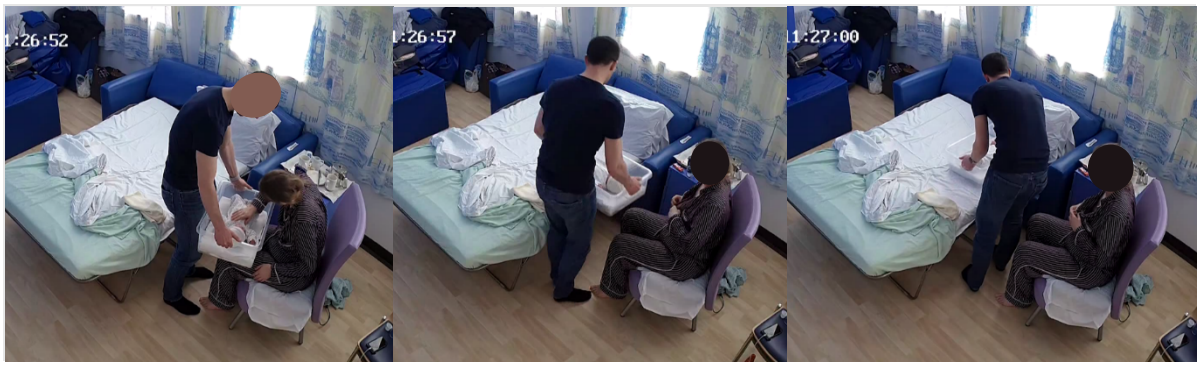

Image 5.8 A father holding the in-bed bassinet with the baby in and lifting it into the bed (P34)

For one family who were allocated a standalone bassinet the time that it took for them to reach their infant was a concern. They discussed an incident in which the baby was choking on mucus and it took some time to get up and call for assistance. This was compounded by mum struggling to get up from the sofa bed, the buzzer being located on the far side of the room a distance away from the bed and the baby being located in the standalone bassinet, out of close reaching distance. The incident is described in case study 5. The mother said about the event:

> *"I've had a hard time getting up and about so we did have a little scare earlier where he did go blue and he was choking a bit and obviously [partner] was with him but it took me that time actually get up and be able to help and go press the buzzer. So that was a little bit tricky just in the time that it takes I think for mum"* [P16 – standalone bassinet]

Case study 5 – Infant choking on mucus

Mum is lying in bed sleeping and dad is sitting on a chair in the corner of the room, next to the standalone bassinet. Baby is asleep in the standalone bassinet, which is placed to side of the bed between the parents. Dad stands and moves to a chair on the other side of the bed, he is now on the opposite side to the baby. Mum wakes and they begin talking. Dad leaves the room and mum lies in bed looking at her phone. Dad is in and out of the room rummaging through bags. Baby begins to squirm with eyes closed and brings hands to their face. Mum, still lying sits up and points towards the baby. Dad walks over to the bassinet and peers in to look at baby's face. Baby is opening and closing mouth with hands on their face. Mum is lying in bed with her face turned towards dad and bassinet. Baby spits out some mucus and dad moves to get closer to the baby's face. He is hesitant to touch or interfere with the baby. Mum looks around and pulls the covers off her body. The baby is still in bassinet spitting up mucus and dad is watching looking nervous. Mum touches her sanitary pad to check if she has been bleeding and slowly starts to move her body over trying to push herself up. Dad turns baby onto his side and starts tapping his back. Mum manages to stand up after 20 seconds manoeuvring herself up off the bed. Mum checks baby and pats his back briefly before running to the other side of the room to press the buzzer and call for assistance rushing back to the pat the baby on their back again. Mum picks up baby who has gone blue and puts him over her shoulder whilst dad pats the baby on the back. The midwife enters, takes the baby over to the Resuscitare inspecting him. Mum and dad calm down and sit down, after a minute the midwife returns with the baby, turning him over and tapping his back to make sure that his airways are clear. Baby seems ok and the midwife puts him into the standalone bassinet and undresses him, picking him up again, putting him over her knee patting his back. Baby looks like he is coughing with his mouth opening and closing. Baby is redressed by midwife and put onto mum for a cuddle. Mum attempts a breastfed. Midwife comes in with heart rate monitor and takes the baby's stats. [P16 – standalone bassinet]

5.6 Discussion

This chapter aimed to evaluate the acceptability of providing an in-bed bassinet or standalone bassinet for the in-patient postnatal stay, and to understand the postnatal experiences of those giving birth within the birth centre. This discussion will focus on acceptability of the intervention whereas a full discussion of the patient experience of those receiving care in the birth centre will be in the ensuing chapter.

Results from interviews with families who participated in the trial indicated that they had four priorities in the postnatal period: rest and recovery, responsiveness, safety, and parental values, and that these priorities were sometimes in conflict with one another. Bassinet allocation and postnatal arrangements each influenced these priorities in different ways, with no solution fulfilling all parental postnatal needs.

Acceptability of the allocated bassinet was strongly influenced by participant birth experience and physical condition following birth. Rest and recovery were two key factors highlighted by families as influencing their in-patient postnatal experiences. In order for an intervention to be acceptable; the effort required to participate in the intervention must be satisfactory for participants (Sekhon et al., 2017). For those who were struggling to recover from birth, the standalone bassinet increased the burden of responding to their infant as they were continually straining themselves to access their infants. The presence of supportive partners and other primary caregivers allowed mothers to receive assistance; passing the infant to the mother when they struggled to get up. For some this mitigated some of the strain of using the standalone bassinet but meant that mothers were reliant on assistance from another caregiver to reach their infant. In instances where other primary caregivers were not available mothers were observed not responding to their infants as frequently or trying to settle their infants in other ways, for example rocking the bassinet rather than physically comforting them.

Positive feedback was received from those using in-bed bassinets, they enabled mothers to access their infants easily, facilitating recovery and limiting strain. For some however, space was a huge limitation with much of the critical feedback about the in-bed bassinets focused on the space that it took up in the bed and the impact of reduced space on parents' ability to rest. Space limitations have been highlighted in previous evaluations of First Days Pēpi-Pods; Cowan (2016) collected written feedback from parents who received a First Days Pēpi-Pod on a New Zealand postnatal ward and reported that space limitations were raised by users. Young et al (2019) conducted a randomised trial of three different sleep locations (First Days Pēpi-Pod, MaBim side-car bassinet, standalone bassinet) on an Australian postnatal ward. Users of the First days Pēpi-Pod reported that the Pēpi-Pod took up too much space in the hospital bed; it was comfortable for infants but not for mothers when sharing a single hospital bed. This issue might be resolved by reducing the width of the in-bed bassinet, or by increasing the width of the beds used for postpartum recovery. Alternatively providing an additional adult sleep space, such as a birth couch seemed to satisfy parents and alleviate the discomfort of using the in-bed bassinet.

The ability to observe infants' cues and respond quickly is important in the in-patient postnatal period for the development of the parent-infant relationship and the establishment of breastfeeding (Brown & Arnott, 2014). In order to be acceptable, interventions must be perceived to be effective by the user (Sekhon et al., 2017). Many parents who were allocated to the in-bed bassinet group praised how the bassinet allowed them to respond quickly to their infant, demonstrating that the usefulness of the bassinet was apparent to users. Likewise in her assessment of First Day's Pēpi-Pods, Cowan (2016) reported that users of the Pēpi-Pod commended its usefulness, ease of access to baby, settling ease, improved sleep, closeness, responsiveness, independence (for parent) and peace of mind/safety.

Safety was of utmost importance in the in-patient postnatal period with many parents anxious to ensure that their newborn was safe. Those who were allocated an in-bed bassinet appreciated that they could easily watch and monitor their infant's breathing and well-being due to the increased closeness facilitated by the bassinet. Although this was appreciated by users, the in-bed bassinet did cause unique safety concerns as the instability of the bed caused the bassinet to wobble or tip with parents fearing that their baby would roll over. This may have created unique anxieties in parents and diminished the benefit of increased ability to monitor the infant whilst using the in-bed bassinet. Parents discussed having to be vigilant to ensure that infants did not roll onto their fronts or end up with their faces pressed against the side of the bassinet. Similar feedback has been noted in previous evaluations of safe sleep enablers, Ball and colleagues (2021) conducted an evaluation of an infant sleep box that was provided to parents to use in the home. One respondent reported that their infant was 'rolling around' in the infant sleep box because the adult's weight was moving the mattress. Safe sleep guidelines state that infants should sleep on a firm mattress, it is therefore important to ensure that any spaces where in-bed bassinet are used provide a firm base to avoid tipping the bassinet.

One participant discussed feeling scared by how easily accidental bed-sharing occurred, and a number of participants were observed accidentally falling asleep with their infants in the sofa bed. Co-sleeping on postnatal wards in the UK has been generally accepted as a beneficial practice (Drever-Smith et al., 2013) and previous randomised trials have indicated that the benefits of bed-sharing on the postnatal ward outweighs the risks (Ball et al., 2006, 2011). There was no difference between the number of families who bed-shared between the two groups, indicating that the likelihood of bed-sharing was not influenced by cot allocation. This may indicate that experience of using an in-bed bassinet could not replicate the benefits of unhindered parent-infant contact facilitated by bed-sharing.

Two families were observed carrying the in-bed bassinet whilst the infant was inside it. Participants were not given any guidance or safety instructions about how to use the bassinet. Infant safe sleep enabler programmes, such as the Pēpi-pod programme (Mitchell et al., 2016) and the ESCCaPE trial (Young, Kearney, Rutherford, & Hoey, 2019) come with associated education and usage instructions which may ensure correct use and avoid risks to the infant. Given what was observed in this study, it is important to provide parents with guidance about safe usage of infant sleep enablers.

One of the domains in the theoretical framework of acceptability: 'ethicality' defines that for an intervention to be acceptable, it must fit with an individual's value system (Sekhon, Cartwright and Francis 2017). In their responses some parents described the in-bed bassinet as meeting their parental values for closeness and responsivity with others preferring independence and separation. Participant's responses to their allocated bassinet were influenced by their own values. Some families came into the postnatal period with clear ideas and parental values which influenced the acceptability and practicality of the bassinet they were allocated. For others the facilities that were available to them in the in-patient period helped them establish their values and understand the kind of parent that they wanted to become. For one participant (P29 – in-bed bassinet), the facilities in the birth centre helped to define the kind of parent that she wanted to be. This participant completed the interview over the telephone and discussed how using the in-bed bassinet had influenced her decisions about where her baby slept once she returned home. Following discharge she purchased a co-sleeper because she found using the in-bed bassinet was '*much easier'* than having to get up and respond to the baby in a separate sleeping space. Having the in-bed bassinet had given her the flexibility '*try out'* different infant care arrangements in hospital, allowing her to make an informed decision about where her baby slept at home. For those with ambivalent parental values, being allocated an in-bed bassinet had the potential to influence their parenting decisions and encourage them to prioritise closeness and responsivity. Ensuring that interventions meet individual values reflect the cultural appropriateness of interventions. Young and colleagues (2019) assessed the 'cultural appropriateness' of the First-Days Pēpi-Pod within an Australian hospital environment, 41% of the staff surveyed considered the Pēpi-Pod to be culturally appropriate intervention. Within this study population the standalone bassinet, as the control condition conformed with traditional Eurocentric ideas about where babies 'should' be sleeping and represented what was understood as a traditional hospital bassinet. In contrast, in-bed bassinet required participants to be open minded and reconsider their ideas of a traditional infant sleep space.

The simple, utilitarian design of the in-bed bassinet was highlighted by a number of respondents as an off-putting feature. This was also highlighted in previous evaluation of First-Days Pēpi-Pods, with respondents suggesting the design should be more aesthetic (Cowan, 2016). Attractiveness of interventions may increase the affective attitude and perceived effectiveness of the intervention, increasing acceptability (Sekhon et al., 2017). The in-bed bassinet had a utilitarian design and was likened to 'Tupperware' or a 'storage box' by participants and staff. Ball and colleagues (2021) conducted an evaluation of an infant sleep box scheme conducted in England and Scotland that involved providing a polypropylene box to families to use within the home as a portable sleep space. Respondents were similarly critical of the utilitarian design of the boxes, however some liked the similarity to the hospital bassinets. Similar criticisms have also been fielded about other portable sleep spaces, namely cardboard baby boxes; Salvie and colleagues (2019) explored mothers perceptions of cardboard baby boxes and some respondents discussed the product as 'socially undesirable' as they did not like the idea of placing their infant in a cardboard box (Dalvie et al., 2019). Since its inception the original Pēpi-Pod sleep space implemented in New Zealand has been updated with a dedicated design

to address issues that were seen as barriers to acceptability, adoption and use (Ball et al., 2021), indicating that a custom designed in-bed bassinet for clinical settings may improve desirability among users.

5.7 Strengths and limitations

A key strength of this chapter is that it contextualises the observed behaviour of families throughout the in-patient postnatal stay through the inclusion of qualitative data (semi-structured interviews and video case studies). The interviews gave the participants an opportunity to voice their own perspectives about their needs and experiences of receiving postnatal care in the birth centre, as well as providing feedback on the influence of bassinet allocation on their experiences. Case study descriptions provide a more holistic representation of the behaviour of families than is achievable with quantitative analysis.

This interview portion of this study is limited in several ways. Participants were aware of the study aims and as blinding was not possible due to the nature of this trial, this means that they were able to evaluate the bassinet they received in relation to the other bassinet. Participants were also aware of the aims of the interviews which may have biased their responses to fulfil the aims of the study, rather than provide their own opinions. Many of the interviews took place within the birth centre before participants were discharged. My affiliation with the hospital and role as a researcher may have influenced what participants were willing to share during the interview.

As previously mentioned, interviewing participants whilst they were still in hospital was considered a useful strategy to reduce the burden of following families up prior to their in-patient stay. This however meant that the interviews were limited in length, as many families were distracted caring for their newborns and undergoing pre-discharge checks. This resulted in a number of very short interviews which may have lacked the depth and richness of fewer but more in-depth interviews.

5.8 Conclusions

Families were mostly positive about their postnatal experience in the birth centre. They appreciated the environment, the care and the support that they received. Four priorities for parents in the postnatal period were identified; rest and recovery, responsiveness, parental values and safety. Both bassinets had benefits and costs for families and there was no single acceptable solution for parents that fulfilled all priorities. Optimum in-patient postnatal care provision may be best achieved by creating environments that facilitate prioritisation of all these needs, by providing a variety of bassinet options that parents can 'try out' to enable them to establish a relationship with their infant in a way that suits their preferences and needs.

6 THE BIRTH CENTRE PATIENT EXPERIENCE

The aim of this chapter is to consider the birth centre environment as unique and distinct from traditional postnatal ward environments and understand how that environment influences parent-infant caregiving and breastfeeding initiation. This chapter will draw on qualitative and quantitative results from the randomised trial to consider the patient experience of those receiving postnatal care in UK birth centres and how this experience can be optimised.

Over the past six years the proportion of NHS trusts with midwifery-led units has risen from 50% to 76% (Walsh et al., 2018), maternity figures for 2020 reported that of all births that had place of birth recorded, 12% of those occurred in a midwifery led unit, 11% in an AMU, 1% in an FMU[36], indicating that there is still some way to go in implementing midwife-led care in the UK. The effectiveness of midwifery-led care on birth outcomes has been extensively demonstrated. The Birthplace in England study, commissioned by the Department of Health to examine the effect of birth setting on processes, outcomes and costs of care indicated that giving birth outside of an obstetric unit (either at home, in an AMU or FMU) was associated with better outcomes and was economically less costly for low-risk women. Rates of caesarean section were two thirds lower for infants planned to be delivered in an MLU compared to an OU (Birthplace in England Collaborative Group, 2011). An associated economic analysis found that birth in non-obstetric settings had significant cost savings for related complications, intrapartum and after birth care (Schroeder et al., 2012). The National Institute for Health and Care Evidence (NICE) updated guidelines recommend that midwifery-led units are particularly suitable for low risk women (National Institute for Health and Care Excellence, 2017) establishing midwife-led care as the standard for low risk women in the UK.

Although the importance of a positive birth experience is well understood, it is vital to ensure that women are also receiving effective care during the in-patient postnatal period. The significance of this period has been emphasised by increased pressure on hospital turnover times and a reduction in the number and frequency of at home midwife visits (Beake et al., 2010) which means that families are relying on their in-patient postnatal stay to get assistance and support with their new baby from professionals. An evolutionary perspective on infant care highlights the trade-offs and negotiations that mothers make around feeding decisions in the postnatal period. Breastfeeding is an intensive aspect of parenting that requires a significant amount of investment to establish. It involves a maternal energetic burden that can be intensified by inadequate postnatal environments that exacerbate mother-infant separation and disrupt lactation physiology (Klingaman and Ball 2009).

In-patient postnatal care provision in the UK is the least favourably reported aspect of maternity care and is rarely incorporated as part of the continuum of effective maternity care (Beake et al 2010). Postnatal care provision in birth centre settings has been even more neglected; the birth centre mapping exercise reported

[36] https://digital.nhs.uk/data-and-information/publications/statistical/nhs-maternity-statistics/2020-21

in Chapter 2 indicated that provision is diverse and complex and there are vast differences in physical facilities, routine practices, and length of hospital stay[37] with no consistent guidance about optimal postnatal arrangements. In their systematic review of expectations and experiences of hospital postnatal care in the UK, Malouf, Henderson and Alderdice (2019) did not find any studies reporting the expectations and experience of postnatal care in birth centres, indicating that research has thus far overlooked birth centre postnatal care. The midwifery unit standards, developed in response to the lack of practical guidance on the most appropriate ways to develop, staff and run midwifery units (Rayment et al 2020) briefly consider postnatal care in their guidelines, however the guidance is by no means comprehensive. The standards define that MLUs should provide a double bed for postnatal rest, allow partners or companions to stay overnight and allow women to stay in the same room for birth and postnatal rest (Midwifery Unit Network, 2020). Standards have also been created for US Birth Centres which define '*family centered postnatal and newborn care with non-separation of the mother and baby for routine care'*, defining a birth centre as a freestanding unit, not located within a hospital. Stevens and Alonso (2021) reviewed local and national birth centre standards and developed global standards with a particular focus on low and middle income countries. The resulting standards were organised into three domains; quality standards for care providers, dignity standards for women and community standards for administration. These guidelines make scant mention of postnatal care; the provider focused standards define that midwife-led centres should '*strive to achieve the Baby Friendly Health Initiative 10 Steps to Successful Breast Feeding*' (Quality: 2) and to ensure tbat '*the midwifery center staff collectively has the skills and competencies to meet the needs of women and newborns during labor, childbirth and in the early postnatal period, meeting ICM[38] standards and trained on BEmONC[39] functions'* (Quality: 12). The development of local and global standards demonstrates that midwife-led care is becoming a more formalised and distinct aspect of maternity care from current biomedical models. The results of the present study can be utilised to enhance current understandings of what is meant by midwife-led postnatal care and to ensure that adequate and beneficial postnatal care can be incorporated into the development of midwife-led units and associated standards.

Midwife-led units are established on a biopsychosocial model of care that considers that health is shaped by biological, social, psychological, and cultural processes (Saxbe, 2017). This salutogenic approach to care focuses on factors that support health and wellbeing, considerably distinct from hegemonic medical and technocratic models which emphasise risk aversion and disease prevention (Downe et al., 2022). This philosophical approach is aligned with evolutionary understandings of intrapartum physiology, that prioritise supporting evolved maternal physiology throughout the process of birth and consider the effect of birthing environment on birth experience. The creation of a 'home-like' environment or 'de-medicalising'

[37] As indicated in the mapping exercise, results of which are presented on page 24

[38] International Confederation of Midwives

[39] Basic Emergency Obstetric and Neonatal Care

the birthing room is seen as integral in supporting the psycho-social health of birthing families within midwife-led units. In this context of this research this was done primarily by providing a 'double' sofa bed for postnatal rest, allowing the partner or other caregivers to be present for the in-patient postnatal period, facilitating unlimited and unrestricted visiting, and providing each family with their own private room.

6.1 Postnatal amenities

The provision of fold out 'sofa beds' was implemented as a strategy to support active labour and promote natural birth whilst still providing families with the amenities to stay together in the postnatal period (C Saunders personal communication). The absence of traditional hospital beds from the birth centre rooms was intended to encourage birthing people to labour in upright positions rather than adopting a supine position which has been associated with increased risk of instrumental delivery, episiotomy and more severe maternal pain (De Jonge et al., 2004). The use of fold out sofa beds was intended to create a space that was flexible and responsive to a family's needs in the birthing and postnatal period. Although this was the intention, many respondents were highly critical of the sofa-beds provided and found that they did not support their need for recovery or rest within the postpartum period, especially for women who had experienced perineal trauma during birth. Many families noted that the sofa beds in the unit were inadequate for fulfilling this need, with some describing how they felt that the unsupportive and uncomfortable sofa beds hindered their physical recovery. Prior studies have noted the importance of supporting the physical recovery of women following birth (Beake et al., 2010; Gaboury et al., 2017). Pearsall and colleagues (2022) found that mothers reported meeting their breastfeeding goals if the postnatal care they received supported their emotional and physical health, emphasising the importance of environments that support the physical health of postpartum women. This is reinforced by parent-offspring conflict theory, which asserts that maternal self and child care is being constantly and repeatedly renegotiated based on the ability of the mother to invest in their infant (Tully & Ball, 2013). Due to the paucity of comfort in the birth centre environment mothers who were recovering from birth were having to prioritise self-care, clearly affecting the energetic resources that they had available to invest in breastfeeding initiation.

Previous research has indicated that uncomfortable postnatal environments can impact the initiation of breastfeeding; Gaboury and colleagues (2017) described how uncomfortable furniture impeded breastfeeding and interfered with Baby-Friendly Care for families in the in-patient postnatal period. Klingaman and Ball (2009) describe the 'iatrogenic obstacles to breastfeeding' in hospital environments, namely parent-infant separation, and caesarean deliveries. Within this context uncomfortable postpartum environments can have iatrogenic effects; unsupportive breastfeeding environments may lead to poor positioning and latch causing severe nipple damage which may undermine breastfeeding initiation as well as hindering the recovery of perineal trauma. Way (2012) conducted interviews with women exploring their personal experiences of their perineum following childbirth. Respondents reported being unprepared for the intensity of perineal pain they experienced and that this caused them to have difficultly doing everyday tasks. Women also noted how the severity of pain when sitting down impacted on their relationship with

breastfeeding, nursing became an arduous task that they were hoping to be over as soon as possible, perineal pain was thus both physically and emotionally demanding. Perineal pain can cause significant distress even in the absence of a significant perineal tear, women who have slight damage, may experience as much pain as those with a large degree of damage (Wylie, 2006). Perineal pain following childbirth has also been reported by those who did not experience perineal trauma, as well consequent morbidities such as incontinence and pain during sexual intercourse (Sleep & Grant, 1987). The severity of perineal pain can be dismissed by clinical staff as a normal part of the healing process of birth (Salmon, 1999), which may result in women receiving inadequate pain relief and creates unrealistic expectations of women's abilities to carry out basic tasks in the immediate postnatal period. The importance of self-care for mothers in the immediate postnatal period was identified by Ruchala (2000) who described a conflict in the information that mothers believed they needed and what nurses prioritised, with mothers wanting to learn about self-care, episiotomy and perineal care and nurses encouraging them to learn infant care and breastfeeding. As well as impacting breastfeeding, uncomfortable postnatal environments may encourage early discharge by patients who might require observation and support from staff. Kokab et al. (2022) conducted interviews with community midwives about postnatal care provision in the UK; the community midwives observed women requesting early discharges from the postnatal ward in order to be more comfortable at home, sometimes risking their own health. This was also reported by Malouf et al. (2019) who described discharges led by women because they preferred the conditions at home to the postnatal ward.

Even though birth centres aim to offer a 'home-like' environment, it is acknowledged that they do not adequately substitute for the psychosocial safety of home (Jordan & Davis-Floyd, 1993). Results of the mapping exercise demonstrated that there was a substantial variety in the offering of birth centre in-patient postnatal care, however over 90% of postnatal stays in both AMUs and FMUs were less than 24-hours in duration[40], indicating that a quick discharge is a common feature of birth centre care. Postnatal hospital stays in the UK are the shortest amongst high-income countries for singleton vaginal deliveries (Campbell et al., 2016), with an average 1-2 day discharge. As those that deliver in birth centres have unmedicated vaginal births with few complications, staff working in MLUs may not consider postnatal care as an important part of their remit as those patients with more complex needs are regularly transferred to a consultant-led postnatal ward. Although those that receive care in birth centres may not have complex medical needs, the importance of professional support and observation in the immediate postnatal period cannot be disputed. Jones et al. (2018) conducted a cross-sectional analysis of over 1-million infants admitted to English hospitals between 2008 and 2014 and reported the biggest increase in hospital admissions within the first 0-6 days. The most common conditions were physiological jaundice, feeding difficulties and gastroenteritis, 85% of the increase in admissions could be preventable with increased postnatal support and/or an extended in-patient postnatal stay.

[40] As indicated in the mapping exercise, results of which are presented on page 24

Although previous research has shown no negative impact of early discharge (>48 hours) on breastfeeding outcomes at 1 month (Winterburn & Fraser, 2000), many of those who were discharged early in the analysed studies received additional breastfeeding support at home which may have influenced the effect of early discharge on reported outcomes. Community and at home postnatal care in the UK is delivered on a resource-led, rather than needs-led basis which results in families not receiving the care that they need (Kokab et al., 2022) and missing out on essential community support. Postnatal care has been described as the 'Cinderella' (Barker, 2013) of perinatal services in the UK, equally, if not more important than other services, yet severely underfunded. Due to budget constraints, families with the most complex needs are being prioritised, yet those with less complex needs who still need support are being discharged to under resourced community care, which for many is inadequate for their needs (Kokab et al., 2022). As well as reducing infant readmissions, adequate in-patient and at home postnatal support is essential to support the mental and physical health of postpartum women. Evolutionary explanations for postnatal depression highlight the isolating and pressurised culture of contemporary society, and the influence that has on maternal mental health. Crouch (1999) describes how postnatal depression which may have played a functional role in soliciting support within an evolutionary adaptive environment can be dysfunctional within contemporary environments, in which effective, immediate support from a close social unit is seldom available. Withdrawal of or inadequate postpartum support can thus have a significant impact on maternal morbidity and mortality in the days and weeks following birth.

6.2 Partner presence

Partner and other caregiver presence was an important benefit for those who gave birth in the birth centre, all participants had at least one other infant caregiver stay with them for some or all of the postnatal stay and many were positive about having the support of another caregiver to facilitate the transition to parenthood. Partners and other caregivers played a key role in minimising the burden of responsive care and breastfeeding initiation in the birth centre environment by being on hand to pass the baby to the mother and sharing the parental load. In a review of studies that discussed the experience of early fatherhood Goodman (2005) describes how part of the fathers' role is supporting their partner in the mothering role. Having partners on hand to support with caregiving decreases the cost of responsive infant care for mothers during the in-patient postnatal period, allowing them to allocate resources to more intensive activities such as breastfeeding.

Partner presence is considered an important aspect of biopsychosocial/family-centred care, providing new mothers with practical and social support from a coparent as well as providing the opportunity for partners and fathers to bond with their new infants. Having partners or a significant other close at hand in the postnatal period is reported to increase both mothers' and fathers' sense of security (Persson et al., 2011). Newburn (2012) explored parents' motivations for using an alongside birth centre and partner presence was highlighted as a key benefit of birth centre care by respondents as it provided reassurance that mothers would not be left on their own. As well as providing the mother with reassurance, allowing partners to stay

made them feel valued and included (Newburn 2012). A wealth of evidence demonstrates that engaged and supportive fathers/partners can enhance the breastfeeding experience, encourage maternal self-efficacy, and increase the duration of exclusive breastfeeding (Arora et al., 2000; Mannion et al., 2013; Pisacane et al., 2005; Tohotoa et al., 2009). Restricted visiting for partners has been reported to interrupt interaction between partners and their infants and decrease maternal and paternal satisfaction with postnatal care (de Montigny & Lacharité, 2004; Hildingsson et al., 2009). Previous research has demonstrated that women reported having a more positive postnatal experience if there were facilities for their partner to stay and they were able to stay together in a private family room (Forster et al., 2008; Malouf et al., 2019). It has also been found that when partners do not have unrestricted visiting mothers report having a less positive experience of postnatal care provision (Malouf et al., 2019).

Engaging partners in the immediate postnatal period can also facilitate the provision of information and education about infant care and promote breastfeeding. A wealth of research has demonstrated that educating fathers about breastfeeding results in more women initiating breastfeeding and a longer duration of exclusive breastfeeding (Cohen et al., 2002; Hackman et al., 2022; Panahi et al., 2022; Sherriff et al., 2014). The in-patient postnatal period may be a key time to include fathers in breastfeeding education, teaching them how to effectively support their partners on discharge. Although this is the case, it is important that the presence of fathers does not replace support from health care professionals throughout the in-patient period. Salonen (2010) did not find a significant difference in parenting self-efficacy among mothers or fathers based on the fathers' presence on the maternity ward, rather efficacy increased with satisfaction of advice that was received from hospital personnel. This indicates that support from skilled professionals may be more beneficial for building self-efficacy, consequently supporting breastfeeding initiation than support from partners in the in-patient postnatal period. Gaboury (2017) explored the effect of the hospital environment on the arrangement of mothers and fathers goals' and noted that mothers and fathers had the same or similar goals for the in-patient postnatal period but they tended to focus on different aspects of these goals, for example mothers tended to focus on establishing functional breastfeeding whereas some fathers were weighing the advantages of breastfeeding versus what was realistic for their partner, potentially leading to conflict about caregiving priorities in the postnatal period and undermining their partners breastfeeding efforts.

Although the influence of partner presence on maternal experiences of postnatal care has been reported on, little is known about the influence of partner presence during the in-patient postnatal period on breastfeeding support from staff. Partner presence may impede interactions or support from maternity staff, especially when postnatal units are organised with private rooms. Ball (1994) described how the layout of maternity wards into postnatal rooms resulted in fewer natural interactions between mothers and nursing staff with mothers having to initiate contact with midwives. In this study, families were encouraged to create 'home-like' environments within their private room, which may have resulted in staff feeling intrusive or awkward entering the 'family' space. Participants were observed watching breastfeeding videos on their

phones and looking at leaflets when they were learning to breastfeed rather than requesting support from staff, indicating that those with low confidence and self-efficacy were struggling to ask for support. Taylor and colleagues (2015) noted new mother's hesitancy to ask for support from staff for what they interpreted to be straightforward tasks, such a placing the baby into the bassinet. Burden (1998) conducted ethnographic observations of women on a UK postnatal ward and observed women using curtain positioning to 'signal' their needs and invite attention from staff and/or other patients. This strategy allowed women to subtly indicate their needs, without having to directly ask for what they needed, something which was not possible when families are organised into their own rooms.

Midwife-led units are unique from other healthcare facilities in that they are managed and run by midwives who are able to care for their patients within an environment removed from the patriarchal model of clinical medicine (Cahill, 2001). The presence of male partners may increase hesitancy from midwifery staff to enter the family space due to the presence of men within what is perceived as a traditionally female space. Given historical and cultural norms of female-female caregiving following birth there may exist a tension between the direct provision of postpartum support by midwives during the birth centre stay, and the goal of empowering and encouraging partners to provide support and be involved in postpartum and postnatal care. Traditionally postpartum practices have belonged within the female domain, with female relatives, midwives and mothers providing help with childcare, providing food and advice to new mothers (Lundberg & Trieu Thi Ngoc Thu, 2011). Cross-cultural and historic descriptions of postpartum traditions frequently involve periods of 'postpartum confinement' or 'lying-in periods' which serve to provide the new mother with a period of rest and recovery following birth (Huang & Mathers, 2001; Kim-Godwin, 2003). Lying-in periods which range from 20-40 days serve to reduce pressure on the pelvic floor and aim to bring the body back to health following birth (Huang & Mathers, 2001). A comparative perspective highlights the disparity in expectations of the postpartum mother following birth within traditional and medical models of childbirth. Davis-Floyd (1987) discusses how medical birthing environments result in the erosion of rituals that prioritise sustained periods of postpartum rest that historically protected women from the exhaustion of childbirth. Incorporation of partners within postnatal support may help mothers to some extent but it may not be an adequate replacement for the needs of new mothers who require a team of supporters.

6.3 Autonomy and safety

The autonomy of the postnatal spaces in the birth centre, whilst allowing parents to create a 'home-like' atmosphere may have encouraged parents to engage in behaviours that could put their infant at risk, such as placing infants on pillows and bringing babies into unsuitable co-sleeping environments. Jordan and Davis-Floyd (1993) describe alongside midwifery units as a "superficial response" to the desire to change maternity care; although they promote ideals of natural birth, their location within hospitals requires them to adhere to hospital protocol and procedures. In this context, hospital procedures limited the availability of equipment and the layout of the postnatal space; hospital management were only able to purchase equipment from approved hospital suppliers, whose products prioritise infection control over suitability

for the postnatal environment (C Saunders, personal communication). This meant that staff and parents were having to 'make do' with what was available to them, namely sofa beds and standalone hospital bassinets. Although the provision of an in-bed bassinet was intended to mitigate some of these issues, the intervention was too simple to overcome the larger determinants in the postnatal environment.

Whilst staying in the birth centre families were often seen bringing their infants into bed to sleep with them or accidentally falling asleep with their infants in bed. This may have been a strategy that was employed to reduce the burden of infant care and conserve maternal resources for breastfeeding initiation. Bed-sharing prevalence did not differ between those allocated a standalone bassinet or an in-bed bassinet, indicating that neither option was an adequate substitute for unhindered parent-infant contact. Co-sleeping in the immediate postnatal period has been accepted as a beneficial practice (Drever-Smith et al., 2013) and unhindered contact between mother and infant is essential to establishing a responsive relationship. This study found that the time spent in any cot was associated with decreased time breastfeeding, indicating that spending time close to a parent, primarily facilitated by bringing the baby into bed and/or parent-infant body contact, was positively associated with increased breastfeeding duration. Although this is the case, the sofa beds in the birth centre were not safe or adequate for co-sleeping; they had large gaps at either side, exposed mechanisms and mattresses were unstable[41], emphasised by the observations of families stuffing pillows down the sides of the of the bed to cover the gaps and hide the mechanisms, which may have introduced suffocation risks into the infant sleep environment. Previously on postnatal wards safe co-sleeping environments have been created by adding a mesh side-rail on the side of the hospital bed to reduce the chances of infant falls and providing parents with three-sided cots (sidecar cribs). Sidecar cribs have been demonstrated to be as effective as bed-sharing in increasing the rate of breastfeeding per hour (Ball et al., 2006). The sofa beds within the birth centre were not compatible with current models of three-sided cots or safety rails, which left parents with few alternatives.

The in-patient postnatal period can be a critical time to model safe responsive caregiving behaviour and set a precedent for behaviour at home. Authoritative environments, such as healthcare institutions can prescribe the way that staff and patients are expected to behave, in particular how infant care is managed (Jordan & Davis-Floyd, 1993). The use of standalone hospital bassinets creates a normative expectation of parent-infant separation, which many may feel that they cannot question because of the authoritative nature of the hospital environment. Davis-Floyd (1987) describes how plastic bassinets in the immediate postnatal period serve as a tangible demonstration of the separateness between mother and infant. Although the birth centre environment was intended as an 'alternative' clinical space which empowered families, its location within the hospital still made it feel clinical, with the inherent power structures that exist in such spaces. Jordan (1993) describes birthing rooms within alongside birth centres as a '*token demedicalisation'* and a '*superficial response'* (pg. 73) to a desire to change maternity environments, as they still require women to

[41] Safe sleep guidance recommends that infants sleep in a 'firm, flat sleep space' (Lullaby Trust)

receive care in unfamiliar environments, attended to by unfamiliar people, on '*someone else's turf*' (pg. 73). Alternatively modelling can also be significant in educating parents about safe and adequate infant sleep environments. Shaefer (2010) and Thomson (2005), discuss the impact of 'modelling' on maternal behaviours, with parents viewing healthcare professionals as "experts" whose caregiving behaviours they must strive to emulate (Thompson, 2005). The relationship between health care professional role modelling and parental safe sleep behaviours has been well demonstrated (Andreotta et al., 2015; Gelfer et al., 2013; Mason et al., 2013; McMullen, 2013; Moon & Omron, 2002). The responses from participants who discussed establishing their at home sleep arrangements based on the hospital experience demonstrates the impact of modelling sleep environments within the postnatal period. Behaviour change theories indicate that modelling and restructuring of the physical environment can be useful techniques for 'nudging' individual's behaviour (Michie et al., 2011). Nudging, or the concept of using subtle stimuli to direct people's behaviour has been popularised by Thaler and Sunstein (2008). Choice architecture is one of the principal components of nudge theory which focuses on designing the way that choices are presented to decision makers, with the hope of influencing the decisions that are made, whilst preserving individual choice (Thaler & Sunstein, 2008). The role of 'nudging' in breastfeeding promotion has been discussed by Paudel, Bhatta and Timilsina (2021), who mention initiatives such as providing breastfeeding literature throughout pregnancy, ensuring families have paid and adequate parental leave and implementing the World Health Organisation (WHO) code for marketing breastfeeding substitutes as strategies to 'nudge' parents towards breastfeeding. Postnatal environments that are purpose built to promote responsive infant care may be effective interventions to 'nudge' families towards optimal parent-infant caregiving behaviour and model appropriate care. 'Nudging' behaviour can otherwise be understood as modelling environments that reduce the burdens or costs of breastfeeding initiation and infant care, reducing trade-offs.

6.4 Visiting

Those who were receiving postnatal care in the birth centre were permitted to have unrestricted and unlimited visiting from friends and family[42]. Allowing visitors in the in-patient postnatal period has been considered an important aspect of family-centred care that can help to acknowledge birth as a celebratory social event (Beake 2010). Uptake of visiting varied between the participants in this study, with some participants inviting visitors for almost the entire observed period with others who did not have any visitors throughout their in-patient stay apart from their partner or other caregiver. Quantitative results demonstrated that there was an inverse relationship between time the infant spent on a visitor and time spent breastfeeding, indicating that visitor presence may create barriers to breastfeeding initiation and maternal-infant bonding. Beake (2010) highlights the contradictions of unlimited visiting within hospital postnatal settings, describing the importance of creating a peaceful and protected birth environment where birthing women have their privacy protected to the contrast of open visiting, exposure and disruption of

[42] This research was conducted prior to the COVID-19 pandemic, visiting protocols were since modified to restrict visiting for infection control reasons

recovery following birth. Postnatal 'rituals' enacted in Western, industrialised cultures, such as postnatal visiting often focus on 'meeting the baby' rather than supporting the postpartum mother. Davis-Floyd (1987) describes how the most desirable end product of the birth process is the baby and that mothers become 'secondary by-products', with little consideration of the mother's experience once a healthy baby is in the world.

The relationship between reducing postnatal disturbances and breastfeeding success have been well documented (Church, 2020; Grassley et al., 2018; Lawrie et al., 2021) with women staying on postnatal wards showing a preference for restricted visiting or 'quiet time' where they could rest and have undisturbed time to breastfeed (Beake et al., 2010) enabling them to balance self and infant care. Visitor presence requires division of maternal physical and mental resources between themselves, their baby and their visitors which may increase trade-offs associated with breastfeeding initiation. Mothers, especially mothers in this study who were all learning to breastfeed for the first time may feel embarrassed or shy about breastfeeding in front of family and visitors. The presence of visitors may have affected the physiological and affective state that surrounded feeding, increasing maternal anxiety. For those without a strong desire to breastfeed or who may have been lacking confidence, the presence of visitors can create a barrier to breastfeeding initiation. Maternal self-efficacy is a well-documented antecedent to breastfeeding success (Bomer-Norton, 2014), therefore increasing maternal feeding self-efficacy should be a key priority of in-patient postnatal environments. Encouraging frequent feeding enables the breastfeeding person to build performance accomplishments, contributing to the development of self-efficacy. Therefore, it is important that an environment that encourages frequent feeding is prioritised in order to support women in developing breastfeeding competence and confidence. As well as impacting maternal breastfeeding self-efficacy, the presence of visitors may also dissuade staff from supporting or checking on families whilst they have visitors present, limiting the amount of support available.

Visitor presence may also disrupt maternal-infant skin-to-skin in the immediate postnatal period. This study observed that for those who had visitors, visitors held the infant for an average of 16% of the observed period, with one infant spending 48% of the observed period on visitors and only 28% on a parent. Support from family and friends can be key in building maternal external resources for breastfeeding (Bomer-Norton, 2014) however family networks and social environments may not always be supportive of breastfeeding and their presence can be pervasive in influencing decisions to prematurely discontinue breastfeeding. Lavender, McFadden and Baker (2006), conducted interviews with women who breastfed and their immediate social networks in the North West of England and found that family members, whilst trying to be supportive were often undermining the experience. Relatives who had previously failed to breastfeed actively discouraged it, using feeding difficulties as opportunities to justify their own failings. Family members also discussed feeling embarrassed for other members of the family when the mother was breastfeeding, and mothers reported feeling like they were not receiving the appropriate practical support from their relatives (Lavender et al., 2006). A number of studies assessing the influence of the COVID-19

pandemic and related lockdowns on the breastfeeding experience have noted fewer visitors and time to focus on breastfeeding as positive outcomes (Brown & Shenker, 2021; Pacheco et al., 2021). These benefits were outweighed however by the routine separation of mothers and infants and decreased family and professional support (Pacheco et al., 2021). Limiting visitors in the postnatal period may be an effective intervention to support the needs of the mother-infant dyad in the immediate postnatal period. Alternatively, the in-patient postnatal period can be harnessed an as opportunity to educate extended family in how to effectively support their breastfeeding relative and the importance of promoting uninterrupted maternal-infant contact.

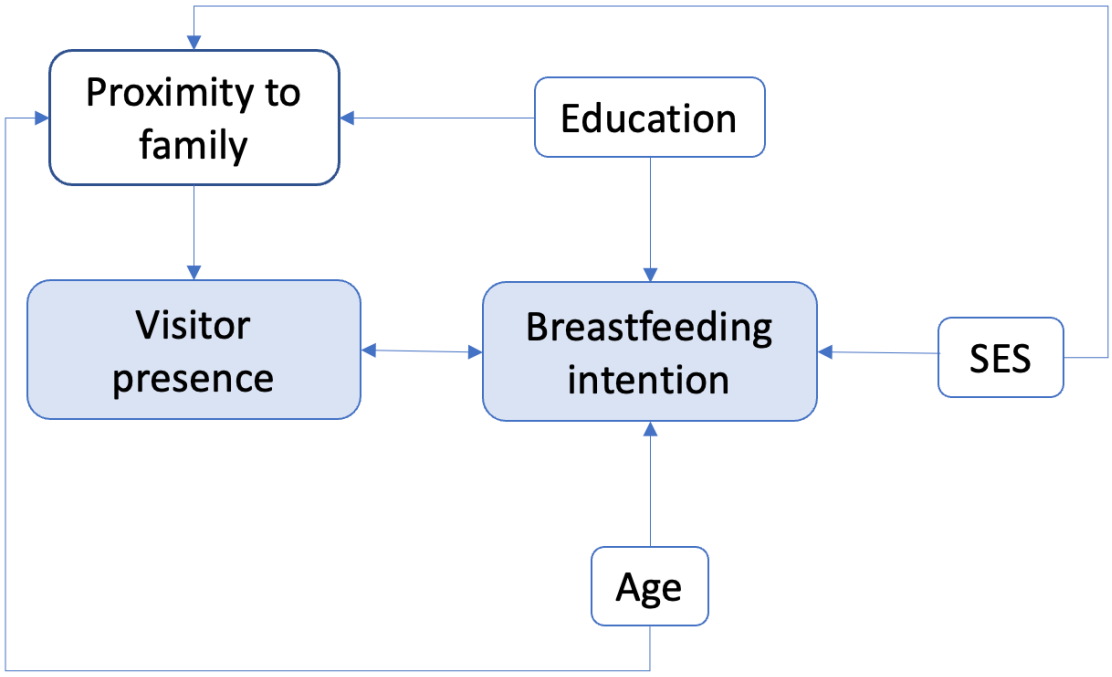

Figure 6.1. Relationship between breastfeeding intention, visitor presence and sociodemographic factors

In this study, visitor presence was negatively correlated with breastfeeding intention, indicating that those with a strong intention to breastfeed had fewer visitors. This may be explained by several factors; those with a strong intention to breastfeed may understand the importance of protected time to establish responsive care with their infant, or these findings may be associated with socioeconomic and cultural factors (see Figure 6.1). Respondents did not indicate whether the absence or presence of visitors was intentional or premeditated during postnatal interviews. Breastfeeding intention is a strong predictor for breastfeeding success. Donath et al. (2003) conducted a population-based study of women in the South West of England to understand the relationship between prenatal intention and breastfeeding duration. They found that prenatal intention to breastfeed was a stronger predictor of breastfeeding duration than all demographic factors combined. Breastfeeding intention is associated with education, age and socioeconomic status (Avery et al., 1998; Mclnnes et al., 2001; Skafida, 2009) in the UK, with breastfeeding rates increasing with income, age and education (Agboado et al., 2010; Avery et al., 1998; Dennis, 2002;

Kelly et al., 2006; Skafida, 2009). The likelihood of having visitors may have also been influenced by the proximity of participants to their family, for example those holding a degree are less likely to live close to their parents (Shelton & Grundy, 2000), hindering their family's ability to be present in the immediate postnatal period. Avery et al. (1998) used the theory of planned behaviour to understand the relationship between intention, demographic characteristics, beliefs and attitudes about infant feeding and consequent breastfeeding behaviour. Although they found that intention was significantly associated with variation in weaning, it was one of many variables associated with breastfeeding duration.

6.5 Staff engagement

Some families who participated in this study highlighted how important the support of staff was during their stay in helping their recovery, assisting them in the transition to parenting and supporting them with breastfeeding. Respondents praised that staff were available when they needed them but did not overcrowd or excessively bother them. Quantitative results indicated that staff were present for an average of 25 minutes, or 7% of the observed period. Participants appreciated having their own semi-private family space with the ability to request assistance if they required it, usually by ringing the buzzer. Although this setup was reported favourably by some families, the ethos of leaving families to request support may exacerbate inequalities and can result in families who require the most support missing out. Dykes (2005) reported that women from lower socio-economic occupational groups were less likely to request breastfeeding support whilst staying on the postnatal ward. This pattern demonstrates the inverse care law (Hart, 1971); that those who require the most support or assistance are least likely to ask or receive it. Previous research has also reported that parents are aware of the pressure on staff and staffing levels and can be reluctant to ask for assistance when they need it because they do not want to be a burden (Taylor et al., 2015). Staffing levels have been previously reported as an issue for UK postnatal care (Turner et al., 2022). Previous studies have reported staff anticipating that they might be transferred to another unit during their shift., causing them to rush through their work (Dykes, 2005). Hunter and colleagues (2015) conducted observations and interviews with staff working on a postnatal ward to identify barriers to implementing a breastfeeding support intervention. The results of their evaluation indicate the extent to which unrealistic workloads caused staff to rush through tasks and reduce the amount of support and assistance they were able to offer to patients. In an ethnography of interactions between midwifes and breastfeeding women on postnatal wards, Dykes (2005) observed that temporal pressures on midwives resulted in the unmet emotional, esteem, information, and practical needs of breastfeeding women.

Many families in this study had a low level of need whilst staying in the birth centre, all had experienced uncomplicated births and had the support and assistance of another primary caregiver with them. This may explain the high level of satisfaction with the care that was received from midwifery staff and their appreciation of 'light touch' support. The level of support, described by one participant as like '*assisted living'*, may have increased parental confidence, allowing them to build infant caregiving performance accomplishments within a monitored and controlled setting. McLeish et al. (2020) describes the expectation

and experiences of first-time mothers receiving postnatal care in England. Women were generally satisfied if they received support proportionate to their needs, for example; those who had low expectations, low needs and received a low level of care were satisfied with their experiences, however when those needs increased and the level of care did not satisfaction decreased. One participant in this study reported that they did not get adequate breastfeeding support and felt their concerns were dismissed as normal breastfeeding issues. This participant may have had higher needs than most, resulting in a dissatisfaction with the care they received. Malouf et al (2019), highlight that much of the support around breastfeeding is informational and practical with little guidance on providing emotional support around breastfeeding. Unresolved challenges with breastfeeding can hinder the development of breastfeeding self-efficacy and exacerbate feeding issues when parents return home with reduced support. The decision to breastfeed can be closely linked to maternal identity and for those where this is the case, it is key that women receive sensitive support to cope with unsuccessful breastfeeding attempts (Sheehan et al., 2013).

Two participants discussed receiving conflicting information from midwifery staff, for one this was a positive thing, it allowed them to pick and choose the advice that was most useful to them. For another this was a negative, highlighting how 'opinions' were prevailing in the information they were receiving. Conflicting information surrounding feeding has been reported as a key theme in a number of studies assessing experiences of postnatal care in the UK (Malouf et al., 2019). The relationship between early breastfeeding cessation and conflicting advice has also been previously reported, describing that conflicting advice can lead to mothers becoming frustrated and confused (Garner et al., 2016; Ingram et al., 2002; Lamontagne et al., 2008). Page, Emmot and Myers (2022) reported that women who received unhelpful informational support, be it from family, friends or midwives were more likely to stop breastfeeding prior to 3 months.. Recommendations in the NICE guidelines for postnatal care[43] highlight the need for clear and consistent information to be provided to postnatal families. As well as receiving consistent information, research has indicated that women want easy access to reassurance that they are feeding and looking after the baby well and what they are experiencing is normal (Alderdice et al., 2020). Although the example presented above indicates that, for some, reassurance that their breastfeeding issues are normal can result in individuals feeling like their concerns are not being taken seriously. It is important to ensure that care is proportionate to individual needs and that support is offered in a manner that demonstrates an awareness of the inherent inequalities in care. Staff should be mindful that the ability to request appropriate support can vary and they should ensure that support needs are pre-empted based in individual circumstances.

Evolutionary perspectives on breastfeeding highlight the complexity of breastfeeding as a behaviour and the importance of learning in developing breastfeeding proficiency (Volk, 2009). Given this, support from experts is key to developing breastfeeding competence, especially within industrialised communities with historically low breastfeeding rates, such as the UK where many new mothers lack close contact with

[43] NICE guideline NG194 published 20 April 2021

experienced peers who can offer them support. Breastfeeding is closely correlated with socioeconomic factors, such as deprivation (Brown et al., 2010) and age (Oakley et al., 2013) and those who are from groups who are or were historically less likely to breastfeed will be even less likely to find community support. It is therefore, vitally important that in order for women to develop breastfeeding competence they receive adequate support within the postnatal period from healthcare professionals.

6.6 Strengths and limitations

The main strength of this study is that it used a mixed methods approach to understand the in-patient experiences of families throughout the in-patient postnatal period. The use of video observation throughout the in-patient stay allowed for the analysis of parent-infant behaviour and interactions without having to rely on self-reports. Previous evaluations of First Days Pēpi-pod safe sleep enablers have involved maternal self-reports of use, this is the first study to observe them being used by families which provides a unique perspective on their potential within clinical settings. Video observations were contextualised with postnatal interviews with families and provided a more holistic understanding of the experiences of families throughout their in-patient stay. Regardless of the efficacy of the intervention on parent-infant behaviour, personal preference is key to determining the acceptability of interventions such as this. Evaluation interviews highlighted costs and benefits of using the allocated bassinets that could not be gleaned from video observations alone.

A number of important limitations must be considered. Most notably the sample size for the study was considerably smaller than that indicated by the sample size calculations, resulting in a lack of statistical power to detect the intended outcomes. Recruitment was limited by a number of factors. Firstly, families who were giving birth for the first time may have been hesitant to be videoed. The intrapartum period can be a vulnerable time and the idea of being observed shortly following birth may have been off-putting for some. As this study consistently observed the postnatal room throughout the entire postnatal stay, consent was required from partners and other primary caregivers as well as mothers which meant that multiple people had to agree to participate. Although a large number of patients were provided with study information at their antenatal appointments, and showed interest in participating, there was a considerable drop in the number of people who ended up giving birth in the birth centre and subsequently participating. This resulted in much of the recruitment happening within the birth centre as people were admitted or shortly following birth, this required 24-hour recruitment and study engagement by midwifery staff to facilitate interactions with patients.

There were difficulties engaging staff with the study and there were incidents of gatekeeping by midwifery staff. Gatekeeping refers to actions of individuals that provide or deny researchers access to potential, eligible participants (Kirchhoff & Kehl, 2008). A key theme in discussions with midwives was the 'appropriateness' of potential recruits or whether it was 'appropriate' for the research team to be talking to patients. There were occasions where the staff deemed it an 'inappropriate' situation therefore we were not permitted to speak to the patient about the research. Many of these occasions appeared to be dictated by

the midwives and not by the individuals themselves. This kind of gatekeeping by clinical staff can be harmful for research studies, and may lead to bias in study results, paternalism and loss of patient autonomy (Kirchhoff & Kehl, 2008). Staff were vocal about their dislike of the premise of the study (video observation) and had emotive responses to the idea of being filmed. Some staff objected to the idea of themselves being on camera, some objected to being recorded whilst working and others objected to patients being filmed whilst staying on the unit. Although I attempted to alleviate their concerns by reassuring them of the thorough ethical protocols in place, my position as an 'outsider' may have caused staff to question my professional and ethical credentials. As Leslie and Mcallister describe; professional identities can communicate positive researcher characteristics such as caring, capacity to listen and empathy. For many staff my identity as an 'Anthropologist' was new to them, they had no pre-existing experience of working with Anthropologists and were therefore hesitant to allow me to enter their professional sphere. These concerns may have also been exacerbated by a general dissatisfaction and mistrust of management within the hospital, a fear of being surveilled at work or a fear of clinical negligence litigation. Litigation fears have been demonstrated to lead to 'defensive practice', where clinical decisions are based on a fear of legal liability rather than patients' best interest (Robertson & Thomson, 2016). A study conducted by Symon (2000) which explored obstetric clinician's perspectives of litigation and defensive practice, found that 86% of midwives surveyed believed that lawsuits were growing in number and 53% reported changing their practice due to fear of litigation.

Additionally, this study was limited in scope due to time and ethical limitations imposed by the NHS research ethics procedures. The challenges imposed by the research ethics process on junior researchers has been previously discussed by Jamie (2013). Although this process is wholly necessary to protect patients who engage in research studies, the process can be lengthy, for this study it took 12 months to receive the final approvals to go ahead with the research, followed by another 4 months before access to the birth centre was granted and cameras were installed. This limited the time available to recruit research participants and collect data. The study was also truncated by the COVID-19 pandemic and resulting lockdowns which meant that recruitment had to be ended early and access to research data was limited for a number of months.

Another major limitation of the study is the generalisability of the results. This study discusses the experiences of families who have given birth and received postnatal care in this one birth centre and some of the results from this study may not be generalisable to other settings. Given the diversity of postnatal arrangements and the lack of clear guidelines on optimal postnatal arrangements, there are vast differences in the facilities available to families. Many of those who participated in this study were white British, many had a high level of education and a strong desire to breastfeed. Those with more complex needs, for example young parents, single parents or those with a strong cultural traditions around postnatal care may have more specific needs and preferences of the postnatal period that have not been discussed here.

6.7 Conclusions

Although the in-patient postnatal period is a crucial time to establish responsive parent-infant caregiving behaviour, the results of this study indicate that families giving birth in the birth centre are being let down by the current provisions and are not receiving the optimal postpartum patient experience. Viewing postpartum experiences through an evolutionary perspective, in particular the parent-infant trade off model, demonstrates the importance of supporting maternal recovery to enable mothers to allocate resources to their infants in order to successfully initiate breastfeeding. Interview responses indicated that the environment, namely the provision of sofa beds for postnatal recovery were not physically supporting mothers and hindering their recovery in the postpartum period, which may influence the physical and mental resources that they have available to allocate to infant caregiving. The association between visitor presence and breastfeeding duration also demonstrates that mothers were having to split their resources between self, infant and visitor, further diluting the energy that they had to allocate towards breastfeeding. Visitor presence may also impede the physiological relationship between mother and infant which facilitates the onset of lactogenesis II, by reducing the amount of time that mothers spend in contact with their infants immediately following birth. Breastfeeding is a costly behaviour that requires a significant amount of investment and learning to establish successfully. Families appreciated the autonomy of the birth centre, where they were able to have their own space in a time that they were feeling sensitive and vulnerable. Although this was the case, mothers had no opportunities to observe other mothers breastfeeding and video observations showed them looking at leaflets and videos on their phone to check they were breastfeeding correctly, rather than requesting support from midwifery staff. A comparative perspective emphasises the importance of peer learning and support from female kin in breastfeeding initiation and infant-care, something that is overlooked in the UK postnatal provision. It is important that a balance is struck between allowing new mothers to retain their privacy and dignity in the postpartum period whilst allowing them to receive care from appropriate and supportive caregivers.

7 CONCLUSION

In this concluding chapter the main findings of the study are summarised, along with a discussion of the implications of the study findings and directions for future research are identified.

7.1 Review of main study aims and findings

There were three mains aims of this thesis: first to trial an intervention to improve parental-infant proximity and contact during the birth centre post-natal stay, with the hope of improving breastfeeding outcomes (both in hospital and to 6-8 weeks after birth), promoting infant safety, and encouraging cue-based care and to make it easier for families to look after their infants, second to evaluate the acceptability of the in-bed bassinet compared to the standalone bassinet, third to understand the in-patient postnatal experiences of families giving birth in an alongside midwifery-led maternity unit in the North East of England

Objective 1: The data presented in chapter four presents the results of a randomised trial to understand the influence of bassinet allocation on parent-infant postnatal behaviour. The primary outcome of this analysis was to compare the effect of providing an in-bed bassinet versus a standalone bassinet on the total duration of breastfeeding in the in-patient postnatal period. The data presented in chapter 4 showed that the duration of breastfeeding did not significantly differ by randomly allocated bassinet type. There was also no observed difference in breastfeeding frequency or rate per hour during the analysed 7-hour period. There was also no significant difference between caregiver-infant holding, staff presence, maternal sleep and infant location.

Unfortunately, given the high proportion of women breastfeeding until 6-8 weeks it was not possible to compare the effect of providing an in-bed bassinet versus a standalone bassinet on breastfeeding outcomes at 6-8 weeks after birth. The high duration of breastfeeding within the study may be due to selection bias in the sample, which resulted in the recruitment of a high proportion of people with a high likelihood of continuing to breastfeed, mitigating the effect of bassinet allocation. Alternatively volunteer bias may have influenced the results, with those who participated in the trial continuing to breastfeed because they knew that their breastfeeding duration was being measured. But most likely it was to do with lack of power due to much smaller sample size that intended, therefore this can only be considered an exploratory study.

Objective 2: The acceptability of the bassinet allocated was assessed using compliance to the randomly allocated condition and via postnatal feedback interviews conducted with families. The results in chapter 4 indicate that there was no significant difference in the proportion of time that infants spent in an in-bed bassinet versus a standalone bassinet, indicating that compliance with the intervention was as good as the control group, however some families who were allocated an in-bed bassinet did use a standalone bassinet for some or all of their postnatal stay.

Chapter 5 presents feedback from the postnatal interviews, demonstrating that responses to the in-bed bassinet were mixed. Families appreciated the increased closeness with their infant, the ability to attentively

observe their newborn to learn their cues and ensure that they were healthy and safe. The in-bed bassinets were, however bulky and when used in the bed reduced the ability of families to comfortably rest and recover from birth. The utilitarian design of the bassinets was off-putting for some families and there were associated risks related to the use of in-bed bassinets, namely bassinets tipping on the unstable sofa beds causing infants to roll onto their sides.

Objective 3: Chapter 6 considered the experiences of those receiving in-patient postnatal care in a UK alongside birth centre, exploring how postnatal amenities, partner presence, autonomy and safety, visiting and staff engagement influence the patient experience. The birth centre environment did not support maternal recovery following birth, presenting barriers to breastfeeding initiation such as frequent disruptions through unlimited visiting and uncomfortable furniture.

7.2 Implications of study findings

The findings of this study demonstrate the complexity of the in-patient postnatal environment and the importance of ensuring that when setting up in-patient environments the needs and priorities of families are given precedence. There is a large emphasis within research and standards that focus on the birth experience, whilst overlooking that insufficient in-patient postnatal can severely impact the intrapartum experience, even for those who have uncomplicated physiological births. The recommendations presented at the end of this chapter offer a starting point in which to develop optimal standards for birth centre postnatal care.

The design of future interventions that aim to promote close mother-infant contact in the postnatal period should consider both the needs of the mother and the infant. Previous interventions have focused on changing the infant location in order to make them more accessible to their mothers. This study highlighted that if the mother does not have an adequate space to rest and recover following birth the impact of proximity to their infant may not overcome trade-offs associated with breastfeeding initiation.

7.3 Directions for future research

The findings from this study present a number of useful avenues for further research. This research was done within one alongside birth centre in the North East of England, given the diversity in birth centre provision across the UK it would be valuable to explore the experiences of families who give birth within both free standing and alongside midwifery-led units in order to develop understandings of the diversity of experiences within different contexts. Although the methods used in this thesis provided valuable insights into the experiences of families receiving postnatal care within a UK alongside birth centre, a replication of this study within alternative contexts would not be optimal, given the methodological issues noted. In future studies it would be valuable to explore in depth family experiences and motivations related to the most notable behaviours observed. One way this could be explored is by reviewing video footage prior to interviews and using video footage as a tool for interview elicitation. Additionally, it would be interesting to understand the experiences of those who were having subsequent babies in order to determine how their

needs may differ and how those needs can be supported in the in-patient period. The sample included a large proportion of people with a high level of education and moderate to high desire to breastfeed, it would be interesting to understand the influences of using an in-bed bassinet for those who had a weak desire to breastfeed or for those families who bottle feed their infants in hospital.

The postnatal interviews were short and were specifically aiming to generate feedback around the intervention. Given the outcomes of this study, further targeted research that aims to understand the needs of families in the in-patient postnatal period, would be valuable. It would also be useful to understand staff perceptions of the intervention as well as including the opinions and experiences of staff caring for postnatal women in future research that explores the experiences and needs of families within the in-patient postnatal period.

It was hoped that the video recordings would allow for an analysis of parent-infant cue and response interactions. Examining more detailed cue-response behaviours between parents and infants would provide a more detailed understanding of the relationship between parent-infant closeness and responsive caregiving. A triadic analysis of family behaviour within postnatal settings would also further understandings of the influence of fathers, partners and other primary caregivers on postnatal behaviour.

7.4 Concluding remarks

Systemic issues in the provision of maternity care in UK results in the deprioritisation of postpartum and postnatal care, which can lead to early cessation of breastfeeding and infant and maternal morbidities. This thesis has demonstrated the importance of defining the institutional appropriateness of the postnatal environment, ensuring environments are created that support the families that they are intended for. In particular the use of sofa beds described within this research demonstrate an example of inappropriate provision that has the capacity to harm families. There is thus a key opportunity to establish the concept of midwife-led postnatal care that upholds the values of family-centred biopsychosocial health and incorporates an evolutionary perspective. It has been accepted that birth centre environments are distinct from technocratic postnatal environments and require unique standards that uphold their philosophy. These standards should cover the entire perinatal period including the in-patient postnatal period. Based on the results of this research, the following suggestions for midwifery-led postnatal standards are proposed:

1) Ensure that environments support rest and recovery following birth including comfortable beds that allow for partners to stay and that facilitate safe co-sleeping.

Parents who are recovering from birth should be able to rest and recover in a supportive and comfortable environment. The environment should support perineal recovery whilst allowing parents to stay close to their infant for breastfeeding initiation and cue-based care.

2) Families should be provided with infant sleep spaces that promote easy access and/or unrestricted contact between mother and infant

Unrestricted contact between parent and infant will promote frequent feeding and the hormonal control of breastfeeding. Easy access to the infant will decrease the burden of infant care and allow parents to allocate resources to more intensive activities such as breastfeeding.

3) The postnatal stay must be long enough to ensure that parents are getting appropriate specialist support (eg. perineal and episiotomy recovery, breastfeeding support, infant care support)

Ensuring the postnatal stay is adequate is a cost-effective strategy to prevent readmission. It is also important to ensure that patients are not being discharged to inadequate community setting without appropriate support.

4) Partners/other primary caregivers should be able to be present throughout the postnatal stay, in a way that complements specialist staff support but does not replace it

Allowing partners and/or other primary caregivers to stay throughout the in-patient period is crucial for the transition to parenting and the creation of a family unit. Partners and other primary caregivers can also provide mothers with key practical support throughout the postnatal period, however it should be acknowledged that specialist, professional support is integral to establishing breastfeeding and other key aspects of infant care. It should be emphasised that the needs of the mother-infant dyad are at the forefront of postnatal care.

5) Visiting from extended family networks throughout the in-patient period should be limited or restricted, in order to ensure that the needs of the mother-infant dyad are prioritised

Visiting can be positive in providing social support to new families, however frequent interruptions can hinder breastfeeding success and undermine the feeding experience. Limiting or restricting visiting from extended family/friends throughout the in-patient stay allows mothers to build feeding self-efficacy and confidence within a calm and supportive setting with limited disruptions.

6) Fathers/partners and close family members should be educated about appropriate strategies to support a new mother with infant caregiver and breastfeeding

The in-patient postnatal period is a key time for providing guidance and information to new families. This period can be a key time to provide education to fathers, partners, and close family members about providing appropriate support to a new mother, such as how to support the breastfeeding experience.

1) Ensure that environments support rest and recovery following birth including comfortable beds that allow for partners to stay and that facilitate safe co-sleeping.
2) Families should be provided with infant sleep spaces that promote easy access and/or unrestricted contact between mother and infant
3) The postnatal stay must be long enough to ensure that parents are getting appropriate specialist support (eg. perineal and episiotomy recovery, breastfeeding support, infant care support)
4) Partners and/or other primary caregivers should be able to be present throughout the postnatal stay, in a way that complements specialist staff support but does not replace it
5) Visiting from extended family networks throughout the in-patient period should be limited or restricted, in order to ensure that the needs of the mother-infant dyad are prioritised
6) Fathers/partners and close family members should be educated about appropriate strategies to support a new mother with infant caregiver and breastfeeding

Figure 7.1. Suggestions for midwifery-led postnatal standards

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9 Appendix

Appendix A – Participant information sheet

Newcastle Birthing Centre

Postnatal Infant Care (PInC) Trial

Information for parents planning on giving birth in Newcastle Birthing Centre

- We would like to invite you to take part in our research study.
- Joining the study is entirely up to you, this booklet will help you to understand why the research is being done and what it would involve for you.
- Please read this information booklet to help you decide if you may want to take part and if you have any questions.
- We suggest that it should take about 15 minutes.
- Please feel free to get in touch if have any questions or discuss the study with your midwife and other family members if you wish. You can find the contact details at the back of this booklet.

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Durham University

The Newcastle Upon Tyne Hospitals NHS Foundation Trust

Version 4 Participant Information Sheet 16/10/2019 IRAS Project ID: 237597

Aims

- We are trying to find out how parents look after their new-born babies in Newcastle Birthing Centre and how we might make this easier.
- In order to find out how parents care for their babies in the Birthing Centre we would like to record video and sound of parents looking after their babies after they've given birth. We are interested in looking at behaviours such as: feeding, sleeping , touching and crying.
- We would also like to find out whether using an in-bed cot or a standalone cot affects the way parents look after their babies in the Birthing Centre.
- Anyone who is suitable to receive postnatal care in Newcastle Birthing Centre and has some intention of trying to breastfeed is able to take part in the study. If you sign up for the study but are not suitable to receive postnatal care in the Birthing Centre, you will be automatically withdrawn and your personal details destroyed.

Overview of the study

If you agree to take part in the study and will be receiving postnatal care in Newcastle Birthing Centre you will be provided with either:

An in-bed cot for your baby (figure 1)

OR

A standalone cot for you baby (figure 2)

It doesn't matter which cot you are given the care that you receive will be **exactly the same**.

After you have given birth, you will be asked to turn on the video camera so that we may record how you care for your baby in the Birthing Centre. We would like you to keep the camera on for the whole time you are in the Birthing Centre however you will be able to turn the camera on and off if you wish throughout your stay. The video we collect will only be seen by the research team. The trial fits in with your normal care, so there are no extra hospital visits and the care you receive will be exactly the same whether you take part in the study or not.

Figure 1. In-bed cot

Figure 2. Standalone cot

Eligibility

In order to be able to take part in this study you must:

Be suitable to receive postnatal care in Newcastle Birthing Centre

Be planning to give birth for the first time

Have some intention to try and breastfeed your baby

This study is being run in Newcastle Birthing Centre, so you will only be able to take part if you will be receiving postnatal care there. Please discuss your birth options with your midwife and decide if giving birth in Newcastle Birthing Centre is an option for you.

What does taking part involve?

1. If you decide that you want to take part you will need to fill in a consent form saying that you are happy to participate in the study. You should find a copy of the consent form in this booklet.
2. You will need to discuss participation in the study with the person who will be staying in the Birthing Centre after birth with you to see if they are happy to take part as well, they will need to sign a consent form too.
3. Once you've signed the consent form you should put it in your personal maternity record so that we can collect it when you are in labour. Don't worry if you lose or forget your consent form we can send you a new one or give you another one when you come into Newcastle Birthing Centre.

Study Participation:

Stage 1 - Immediately after birth

- After you have given birth you will be randomly given either a standalone cot **or** an in-bed cot for your baby.
- When you are ready you can turn the camera on and you can leave it recording for the rest of the time that you are in Newcastle Birthing Centre.
- Information about your birth and the postnatal period is routinely collected by midwives, with your permission we will access your maternity record to find out some of this information. We do this so we do not have to disturb you whilst you are staying in the Birthing Centre.

Stage 2 - Up to 1 week after your Birthing Centre stay

- A researcher will come and visit you before you are discharged from the Birthing Centre to ask you a few questions about your experience staying in the Birthing Centre.
- If it is not possible to visit you in the Birthing Centre then you will be contacted by phone to complete the interview about your experiences.
- This interview will be recorded by the researcher using a Dictaphone.

Stage 3 - 6-8 weeks after birth

- As part of your routine care a health visitor will visit you to check up on your baby at around 6-8 weeks after birth. Upon receipt of full consent, we will use this data to find out how your baby is fed.

You can stop taking part in the study at any time, without giving a reason.

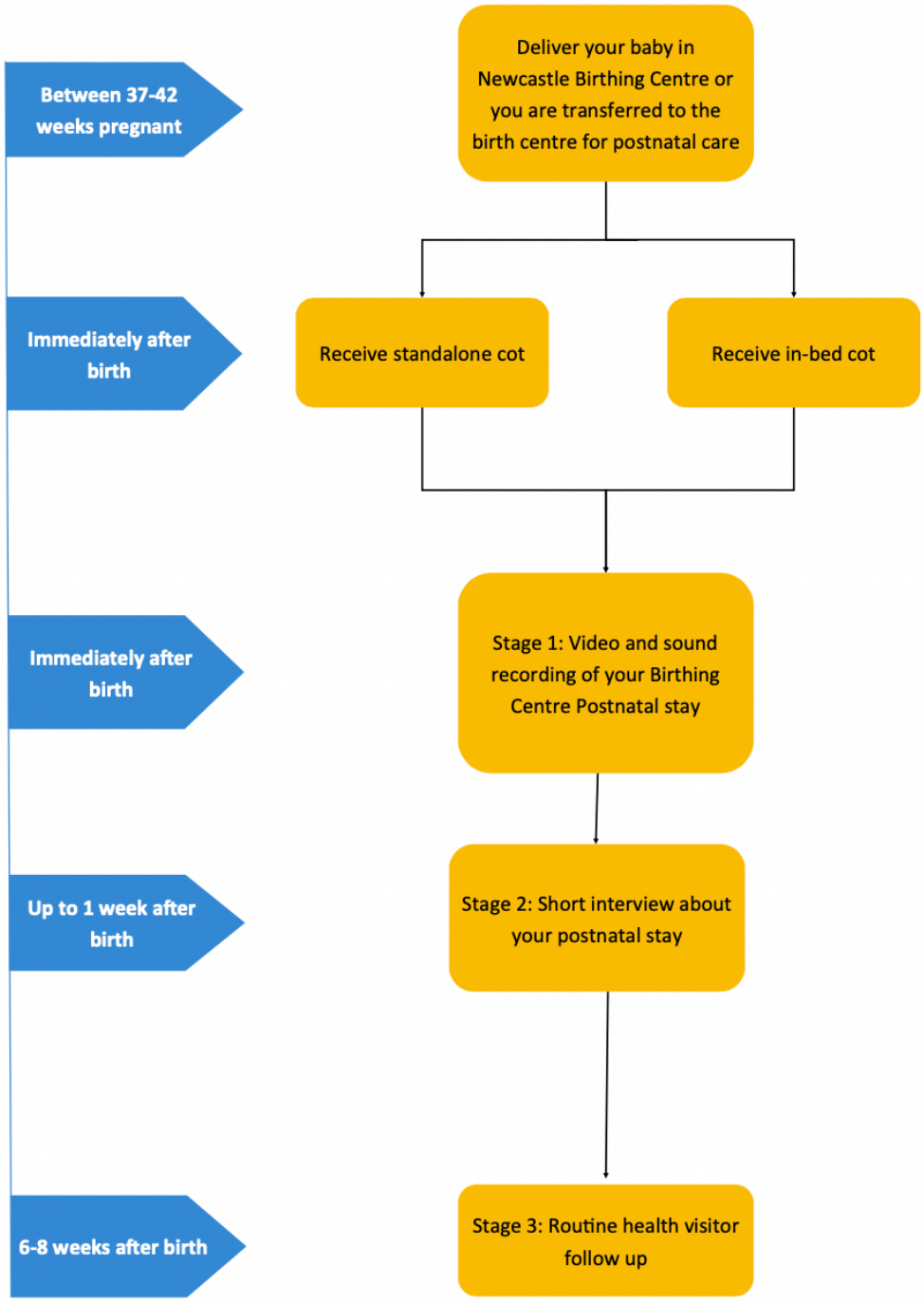


Figure 3. Timeline of your participation in the study

Why do we use video and sound recording?

Using video and audio to record behaviour can be useful because it allows us to see what people are actually doing rather than relying on what they can remember when they are tired after birth. Previously, video studies have been useful in understanding how people look after their babies, enabling health professionals to support parents where they really need it.

Using video as a research tool means that we can understand how you and your baby are behaving without having to disrupt you in an important time. It also helps us to understand how you and your baby behave when you are sleeping. We record sound so that we can hear the noises that your baby makes, such a fussing, crying and suckling.

Figure 3. The camera that we use is a small CCTV camera which is attached to the ceiling in Newcastle Birthing Centre.

What do we do with your video and sound recordings?

If you wish you will be able to watch your video and you may ask for sections to be removed if you do not want them to be included in the study. If you feel like you are not happy with your video being used in the study at all you can withdraw your consent at any time and we will delete your video from our records.

Once we've recorded your video it will be stored on secure password-protected Durham University computers and they will be analysed using computer software. After the study has ended your personal data will be destroyed however anonymised video data will be retained for the purposes of possible further analyses by our research team for up to 10 years.

We may use still images from your video recording in publications or presentations but all images will be fully anonymised, with faces blurred and covered to ensure that you or your baby cannot be identified. We will also ask if you would be happy with us using small clips from your video in scientific presentations. This is entirely up to you and if you do not want us to show anyone your video clips we will **never** show them. This is not a requirement of participating in the study and if you do not want us to show them in presentations you can still take part in the study.

We will also be recording the sound from your postnatal interview, this means that the researcher doesn't have to make lots of notes whilst you are talking. The recordings will be transcribed and written quotes from your interview may be used in published material. All quotes will be anonymised and no personally identifiable quotes will be used.

Benefits and risks of talking part in the study

+ Taking part in the study provides you with the chance to influence how postnatal care is provided at Newcastle Birthing Centre and you can help improve the experience for future users.
- The risks of taking part in the study are very low. Some people may find the use of video intrusive. We are hoping by using video to collect data we can minimise the disruption to you and your baby after you have given birth. You will be told how to turn the cameras on and off and you will be able to stop taking part at any time.

Confidentiality

Your confidentiality is very important to us. All information we collect will be stored safely and will not be shared with anyone. We will not identify you or your baby in any publications. In any reports we may write, information will be summarised so you cannot be identified.

The information that you share with us will be kept confidential, unless we receive information that we believe indicates someone is at risk. If you or your baby is thought to be at risk, then we are legally obliged to inform your midwifery staff, health visitor, and/or GP so that they may be of assistance.

Data Protection

Durham University is the sponsor for this study based in the United Kingdom. We will be using information from you and your medical records in order to undertake this study and will act as the data controller for this study. This means that we are responsible for looking after your information and using it properly. Durham University will keep identifiable information about you until the study has finished.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. If you withdraw from the study, we will keep the information about you that we have already obtained. To safeguard your rights, we will use the minimum personally-identifiable information possible.

You can find out more about how we use your information by contacting Alice Keegan.

Durham University will keep your name and contact details confidential and will not pass this information to anyone else. The study team will use this information as needed, to contact you about the research study, and make sure that relevant information about the study is recorded for your care, and to oversee the quality of the study. Certain individuals from regulatory organisations may look at your research records to check the accuracy of the research study. These organisations will only receive information without any identifying information. The people who analyse the information will not be able to identify you and will not be able to find out your name or contact details. Durham University will keep identifiable information about you from this study until this study has finished.

How do I take part?

If you are interested in taking part in the study please complete the consent form inside this booklet and put it in your maternity record book. We will collect it when you come into the Birthing Centre for labour.

It is important that anyone staying with you in the Birthing Centre after you have given birth is also happy to be involved in the study, so please share this with your partner.

Who is organising and funding the research?

This is a PhD research project led by Alice Keegan of Durham University and supervised by Professor Helen Ball and Dr Nick Embleton (Consultant Neonatal Paediatrician). This project has been approved by the NHS Research Ethics committee. This research is funded by the Economic and Social Research Council (ESRC) and sponsored by Durham University.

Thank you

As a thank you for taking part in this research you will be provided with a participation certificate. If you wish, we can produce a photo book with still images or a short video compilation from your observation footage.

What if there is a problem?

If you wish to withdraw from the study you can contact Alice Keegan the study co-ordinator (details below)

Complaints: If you wish to complain, you can contact the Patient Advice and Liaison Service (PALS). This service is confidential and can be contacted Freephone: 0800 032 0202.

Harm: Durham University insurance covers claims of non-negligent harm.

How to contact us

If you have any questions about this study or would like to take part, please get in touch with Alice Keegan, the study co-ordinator:

Alice Keegan

PhD Candidate & Study co-ordinator

Tel: 07828743146

Email: pinc.trial@durham.ac.uk

Results from this study can be found on the study webpage when they become available:

https://www.dur.ac.uk/disc/current/pinc

You can register your interest for the study at: https://durham.onlinesurveys.ac.uk/pinc-trial

Appendix B – Consent form

The Newcastle Upon Tyne Hospitals NHS Foundation Trust

Participant study ID:

Postnatal Infant Care (PInC) Trial

Participant Consent form

Please read the statements below and mark sign your initial in each box. If you have any questions or feel like you need any more information, please get in touch.

It is important to get consent from everyone who will be staying in the birthing centre so please ensure that everyone who will be staying in the birthing centre completes a consent form.

Initial each box

I confirm that I have read and understood the participant information sheet version ___ dated _____ for the above study	
I have been given opportunities to ask questions about the research and these have been answered satisfactorily	
I understand that my participation is voluntary and that if I take part, I can withdraw from the study at any time, without having to give a reason and without my medical care or legal rights being affected.	
I understand that any information that may potentially identify me will not be used in published material	
I understand that anonymity and confidentiality may not be maintained in situations where infants and/or vulnerable adults are seen to be at risk	
I give my permission for audio and visual recording equipment to be used in the project as a research aid, to be only viewed by researchers involved with the study	
I give my permission for my maternity records to be accessed by members of the research team	
I understand that the information collected may be used to support further research in the future and may be shared anonymously with other researchers or health professionals for research and education	
I agree for my baby to participate in this study and for their child health records to be accessed by members of the research team	
I agree to participate in this study	
Optional: I consent to extracts from my recording to be used in conference presentations and/or for instructional purposes	

Name of participant	Date	Signature
Name of person taking consent	Date	Signature

Version 1.2. PInC Trial Participant consent form IRAS Project ID: 237597 July 2018

Appendix C – Midwife information sheet

The Newcastle Upon Tyne Hospitals NHS Foundation Trust

Postnatal Infant Care (PInC) Trial

Information for Midwifery Staff

Participant name:_____

Study ID:_____

is enrolled in the PInC trial and has been randomly assigned to the

in-bed cot / standalone cot group

The PInC trial aims to understand how cot type influences postnatal parental caregiving in Newcastle Birthing Centre. There are two types of cot used in this study; an in-bed cot and a standalone cot (below).

Figure 1: In-bed cot

Figure 2: Standalone cot

All pregnant women booked to give birth to their first baby in Newcastle Birthing Centre from January 2019 until January 2020 are eligible for recruitment.

Inclusion criteria:

- Primiparous
- Have an antenatal intention to try and breastfeed after birth
- Have provided written informed consent from all adults staying in the birthing centre

Exclusion criteria:

- No prenatal intention to breastfeed
- Participation in any other trials that may influence breastfeeding outcomes

Pregnant women have been screened either at their 20-week anomaly scan or antenatal education classes and have been provided with full study information. Individuals interested in participating have been asked to bring a consent form with them for then they come into the Birthing Centre in labour.

Postnatal protocol

- Once the labour is over, the placenta has been delivered and the baby has undergone all necessary checks then the allocated cot will be provided to the participant by a member of the research team.
- Participants will also be shown how to turn the camera on/off and recording will commence when the participant is ready.
- There will be a sign on the door indicating that the camera is recording, so please be aware of this.
- When participants are undergoing examinations please turn the camera off and turn it back on again once you have finished.
- Participation in the video section of the trial will end either when participants are discharged from the Birthing Centre or 24 hours after they have begun recording, whichever is sooner.
- When families time in the Birthing Centre is coming to an end and they are preparing to be discharged please ensure that they have turned the camera off.

If necessary, you can turn the camera on/off by flicking the switch on the back of the recording device:

If you have any questions or need to get in touch with the study team at any time please contact Alice Keegan, the study co-ordinator on 07398122110.

NEWCASTLE BIRTHING CENTRE
POSTNATAL INFANT CARE (PInC) TRIAL
VOLUNTEERS NEEDED

Are you considering giving birth in Newcastle Birthing Centre?

Will this be the first child that you give birth to?

If so then you may be able to take part in our research study!

What is the project about?
We are trying to find out how parents care for their babies in Newcastle Birthing Centre and how we can make it easier for parents to care for their babies after birth.

What is involved?
Parent's who sign up for the study and give birth in Newcastle Birthing Centre will be provided either a standalone cot or an in-bed cot. We would then like to record video and sound of parents to understand how parents look after their babies with these different cot types.

Who can take part?
At the time of enrolment into the project you must be eligible to give birth to your first baby in Newcastle Birthing Centre and you must be intending to try and breastfeed your baby after birth. If you have not decided where you will give birth yet, that doesn't matter, you can still sign up.

How can I find out more?
For more information please visit https://www.dur.ac.uk/disc/current/pinc/ or email the project lead, Alice Keegan on pinc.trial@dur.ac.uk

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Durham University

The Newcastle Upon Tyne Hospitals NHS Foundation Trust

Postnatal Infant Care (PInC) Trial

Camera instructions

1. There are two parts to the camera: the camera and the recording device

Camera

Recording device

2. To start recording you flick the switch at the back of the recording device and it will start recording

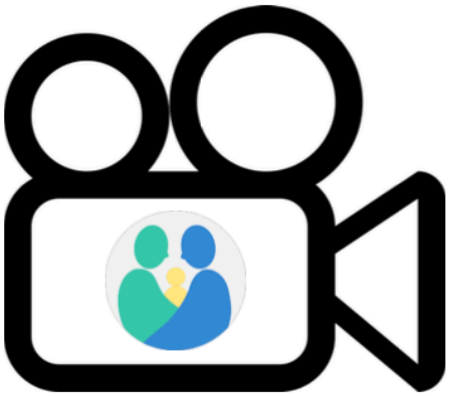
3. If you want to stop recording you just flip the switch off, you can flip the switch on if you want to start recording again

4. When you are packing up and leaving the Birthing Centre you just need to make sure that you stop the recording by putting the switch into the 'off' position

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Durham University

The Newcastle Upon Tyne Hospitals NHS Foundation Trust



NOTICE OF FILMING

The individuals in this room are taking part in the PInC Trial which involves recording video and audio

By entering the room you consent to be captured on film, if you would like to enter but would not like to be captured on film, please ask for the camera to be turned off before entering.

Version 1.1 Notice of filming July 2018 IRAS Project ID: 237597

Appendix G – Data tables

Table 9.1 Description of participant characteristics (Per protocol sample) by treatment condition allocations

	Both groups n=27	Standalone bassinet n=16	In-bed bassinet n=11
	N (median/%)	*N (median/%)*	*N (median/%)*
Age (years)	30 (18-41)	31 (19-41)	28 (18-34)
Marital status			
Living with partner	10 (37%)	5 (31%)	5 (45%)
Married/civil partnership	15 (56%)	10 (63%)	5 (45%)
Prefer not to say	1 (4%)	0 (0%)	1 (9%)
Single	1 (4%)	1 (6%)	0 (0%)
Breastfeeding intention			
Strong intention	15 (56%)	10 (63%)	5 (45%)
Moderate intention	12 (44%)	6 (37%)	6 (55%)
Ethnicity			
African	1 (4%)	0 (0%)	1 (9%)
Any other ethnic group	1 (4%)	1 (6%)	0 (0%)
Any other mixed background	1 (4%)	1 (6%)	0 (0%)
Any other white background	1 (4%)	0 (0%)	1 (9%)
White British	20 (74%)	13 (81%)	7 (64%)
Chinese	2 (8%)	0 (0%)	2 (18%)
White and Asian	1 (4%)	1 (6%)	0 (0%)
Education			
Degree and above	21 (78%)	13 (81%)	8 (73%)
Below degree	5 (19%)	3 (19%)	2 (18%)
Not provided	1 (4%)	0 (0%)	1 (9%)
Skin to skin contact within the first hour			
Yes	27 (100%)	16 (100%)	11 (100%)
Baby delivered in water			
Yes	8 (30%)	4 (25%)	4 (36%)
No	19 (70%)	12 (75%)	7 (64%)
First feed			
Maternal breastmilk	27 (100%)	16 (100%)	11 (100%)
Discharge feed			
Maternal breastmilk	26 (96%)	15 (94%)	11 (100%)
Mixed (breastmilk and formula)	1 (4%)	1 (6%)	0 (0%)
Breastfeeding status at 6-8 weeks			
Breastfeeding	21 (78%)	12 (75%)	9 (82%)
Bottle feeding	3 (11%)	3 (19%)	0 (0%)
Supplemented breastfeeding	2 (7%)	0 (0%)	2 (18%)
Data unavailable	1 (4%)	1 (6%)	0 (0%)

Table 9.2. The median time that infants spent in each location throughout the sampling period in minutes for the intention to treat group indicates significant differences (p=<0.05)*

	Median (25th percentile, 75th percentile)			
Location	All data (n=31)	Standalone bassinet (n=17)	In-bed bassinet (n=14)	p-value

Time infant spent in any cot	157 (111,252)	139 (108,236)	160 (118, 269)	0.49
Time infant spent in standalone bassinet	92 (0,163)	139 (108,236)	0 (0,26)	-
Time infant spent in in-bed bassinet	0 (0,126)	-	145 (91,228)	-
Time infant spent on parent	160 (98,242)	170 (96,242)	136 (100, 237)	0.78
Time infant spent on visitor	0 (0,28)	0 (0,3)	1 (0,29)	0.52
Time infant spent in other* locations	0 (0, 1)	0 (0,5)	0 (0,0)	0.03*

** On the bed, on a pillow, in a car seat*

Table 9.3. Percent of the sampling period that the infant spent using their allocated bassinet and the percent of the sampling period the sampling period whilst the baby was not being held that infants used their allocated bassinet

	% of total sampling period		% of sampling period baby not held	
Ppt ID	**In-bed bassinet**	**Standalone bassinet**	**In-bed bassinet**	**Standalone bassinet**
3	-	27	-	100
6	-	47	-	100
7	-	63	-	97
12	23	-	67	-
14	4	-	28	-
15	51	-	100	-
16	-	56	-	100
17	64	-	100	-
18	-	23	-	100
19	67	-	100	-
20	38	-	100	-
21	-	0	-	0
22	-	27	-	92
23	35	-	95	-
24	0	-	0	-
25	-	91	-	100
27	-	22	-	74
28	-	62	-	100
29	85	-	100	-
30	-	42	-	98
31	-	12	-	100
32	-	78	-	100
33	-	77	-	100
34	92	-	100	-
35	24	-	100	-
36	0	-	0	-
37	-	38	-	57
38	58	-	100	-
39	-	40	-	95
40	-	33	-	100
41	35	-	89	-
Average	**41**	**43**	**77**	**89**

Table 9.4. Total time spent breastfeeding, number of attempted breastfeeding bouts and average length of breastfeeding bout for the intention to treat group

	Median (25th percentile, 75th percentile)			
	All data n=31	**Standalone bassinet n = 17**	**In-bed bassinet n = 14**	**p-value**

Total time spent breastfeeding (mins)	59 (46,88)	65 (52,109)	53 (44,63)	0.204
Number of attempted breastfeeding bouts	4 (2,5)	5 (3,6)	3 (2,4)	0.159
Average length of breastfeeding bout (mins)	15 (12,17)	16 (12,23)	15 (12,28)	0.842
Rate per hour of breastfeeding	0.57 (0.34,0.85)	0.71 (0.43,0.98)	0.50 (0.33, 0.61)	0.27

Table 9.5. Total time spent breastfeeding, number of attempted breastfeeding bouts and average length of breastfeeding bout for the per protocol group

	Median (25th percentile, 75th percentile)			
	All data n = 27	Standalone bassinet n = 16	In-bed bassinet n =11	Mann Whitney-U p-value
Total time spent breastfeeding	60 (50,100)	68.5 (54,117)	53 (37,74)	0.195
Number of attempted breastfeeding bouts	4 (2,5)	5 (3,6)	2 (2,4)	0.089
Average length of breastfeeding bout	16 (12,30)	15 (12,25)	16 (12,30)	0.980
Rate per hour	0.57 (0.34, 0.92)	0.74 (0.43,0.98)	0.43 (0.30,0.64)	0.166

Table 9.6. Parent-Infant contact for the intention to treat group

	Median (25th percentile, 75th percentile)			
Participants	All data n=31	Standalone bassinet n=17	In-bed bassinet n=14	p-value
Amount of time baby held by mother	46 (13,69)	46 (14,57)	44 (7,76)	0.860
Amount of time baby held by other	30 (11,55)	30 (12,46)	32 (10,70)	0.691
Amount of time baby touched by mother	16 (5,32)	9 (4,17)	25 (14,37)	0.036
Amount of time baby touched by other	12 (6,32)	16 (7,34)	11 (6,30)	0.570

Table 9.7. Parent-Infant contact for the per protocol group

	Median (25th percentile, 75th percentile)			
Participants	All data n=27	Standalone bassinet n=16	In-bed bassinet n=11	P-value
Amount of time baby held by mother	34 (11,69)	47 (14,62)	28 (4,72)	0.61
Amount of time baby touched by mother	16 (5,36)	11 (4,19)	35 (18,39)	**0.05***
Amount of time baby held by other	35 (12,55)	33 (12,48)	44 (11,65)	0.79
Amount of time baby touched by other	15 (7,32)	16 (6,34)	12 (8,23)	0.64

Table 9.8. Duration of staff presence (intention to treat)

	Median (range)			
Participants	All data n=31	Standalone bassinet n=17	In-bed bassinet n=14	Mann Whitney-U p-value
Staff presence (mins)	24.9 (10,42)	24 (4,53)	37 (10,36)	0.812

Table 9.9. Duration of staff presence (per protocol)

	Median (range)			
Participants	All data n=27	Standalone bassinet n=16	In-bed bassinet n=11	Mann Whitney-U p-value
Staff presence (mins)	24.9 (10,39)	24 (12,36)	37 (0,42)	0.729