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THE INFLUENCE OF SKIN-TO-SKIN CONTACT ON BONDING AND TOUCH

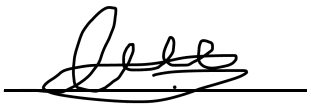
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A dissertation submitted to the Faculty of Health Sciences, School of Therapeutic Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science in Occupational Therapy.

Johannesburg 2017

Declaration

I, Karen Louise Potgieter hereby declare that this dissertation is my own work. It is being submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science in Occupational Therapy. It has not been submitted before for any degree or examination at this or any other university.



09 June 2017

Presentations arising from the thesis

The bodies and Minds of Babies in Relationship: Dialogues in a Multidisciplinary Context. Hosted by the Gauteng Association for Infant Mental Health, October 2015.

Presentation: The instinctual behaviour of newborn infants and the importance of early skin-to-skin contact.

Abstract

Early skin-to-skin contact is a biological need of newborn infants (Bergman & Bergman, 2013). Preliminary research informs us that this contact directly and indirectly influences the mother-infant relationship. This relationship in turn forms the basis of the infant's social-emotional development (Phillips, 2013). This study investigated South African mother-infant dyads with and without early skin-to-skin contact and the influence on bonding and touch. Contact over the first 24 hours and bonding were measured within one week postpartum. Tactile interactions in daily routine, touch during face-to-face interaction as well as a repeat of the bonding assessment were completed at six to eight weeks postpartum. No correlation was found between skin-to-skin contact and bonding within one week postpartum. A positive correlation was identified between skin-to-skin contact and bonding as well as an increase in touch in daily living at six to eight weeks postpartum. This was substantiated by an increase in touch during face-to-face interaction. Further more stringent research is however required to confirm these findings.

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Operational definitions

Activity of daily living

Routine tasks and activities that people do every day that are aimed at taking care of oneself (The American Occupational Therapy Association, 2014a).

Affectionate touch

Gentle touch that does not have a functional purpose but is rather used to express affection. Examples include: stroking, kissing, hugging or light pokes (Feldman, 2004).

Attachment

The affectionate and emotional tie from an infant to a caregiver (Kennell & McGrath, 2005).

Bonding

The affectionate and emotional tie from a caregiver to an infant (Kennell & McGrath, 2005).

Co-occupation

A highly interactive activity or task involving two or more individuals with shared intention and meaning (Pierce, 2009; The American Occupational Therapy Association, 2014a).

Dose-response

Change in effect caused by different levels of exposure (Moore, Anderson, Bergman & Doswell, 2012).

Dyad

A dyad is something consisting of two parts. In this study, it is used in reference to mothers and infants regarded as a pair.

Early Skin-to-skin contact

The contact between a newborn infant and an adult when the infant is placed in a prone position (naked or wearing only a diaper) onto the adult's bare chest directly after birth (Anderson, Moore, Hepworth & Bergman, 2007).

Instrumental activity of daily living

An activity that requires more complex interaction than an activity of daily living and that helps to support daily life within the family, home and community (The American Occupational Therapy Association, 2014a) .

Kangaroo mother care

A form of infant care involving skin-to-skin contact, exclusive breastfeeding and support to the mother-infant dyad (Bergman, 2013b).

Maternal-infant touch

The tactile interactions that take place between a mother and her infant.

Maternal mental health

The psychological and emotional well-being of mothers during the antenatal, intrapartum and postpartum periods (World Health Organization, 2008).

Self-attachment

A newborn infant's instinctual ability to locate and move towards his/her mother's breast, latch onto the breast and start to suckle independently (Phillips, 2013).

Social-emotional development

An infant or child's awareness, management and expression of feelings and emotions and the ability to establish and manage relationships with others (Goleman, 1995).

Abbreviations

AOTA	American Occupational Therapy Association
BHFI	Baby Friendly Hospital Initiative
MDG4	Millennium Development Goal 4
UNICEF	United Nations Children's Fund
WHO	World Health Organization

CHAPTER 1

INTRODUCTION TO STUDY

1.1 Introduction

Early contact with others is a basic biological need of infants (Bergman & Bergman, 2013). This contact is essential for infants and young children's social-emotional development (Phillips, 2013). One of the earliest forms of contact for a new born infant is skin-to-skin contact with their mother directly after birth. This form of contact can be considered as one of the earliest instrumental activities of daily living between mothers and infants (also called a dyad) as well as a co-occupation (Pierce, 2009; The American Occupational Therapy Association, 2014a).

Skin-to-skin contact was initially used as an alternative means of care for preterm infants in hospital settings where technology and resources were lacking. This form of care unexpectedly resulted in better outcomes for these premature infants and the mother-infant dyad as a whole. These outcomes included a positive effect on infants' physiological, immunological and later motor and cognitive developmental outcomes (Feldman, Eidelman, Sirota & Weller, 2002; Venancio & de Almeida, 2004; Ludington-Hoe, 2013). These positive effects could be partly attributed to improved breastfeeding outcomes for the dyad (Venancio & de Almeida, 2004). Skin-to-skin contact also had a positive influence on bonding and attachment between the dyad (Feldman *et al.*, 2002). Taking into account the improved outcomes, skin-to-skin contact was recommended globally for use as an intervention for this vulnerable population of preterm infants (Venancio & de Almeida, 2004).

Skin-to-skin contact was later promoted as one of the 10 steps to successful breastfeeding in the Baby Friendly Hospital Initiative (BFHI) (World Health Organization, 1998). This initiative encourages practices that promote and support breastfeeding which in turn can help reduce the rates of infant morbidity and mortality (United Nations Children's Fund & World Health Organization, 2009). The BFHI is especially relevant in South Africa, where the infant mortality rates remain unacceptably high, as highlighted in the 2011 Tshwane declaration in

support of breastfeeding (National Department of Health, 2011). The Tshwane declaration, drawn up by the Department of Health together with World Health Organization (WHO), specifically stresses the need for implementation of the BFHI into all public and private hospitals and health facilities in South Africa to help address the high rate of infant mortality and morbidity (National Department of Health, 2011). One of the key components of the initiative is the recommendation that infants be placed and remain in immediate skin-to-skin contact on their mother's chest directly after birth until the first breastfeed or for at least two hours after birth (Moore & Anderson, 2007; United Nations Children's Fund & World Health Organization, 2009). This two hour period after birth is considered to be a sensitive period whereby infants are specifically primed to initiate breastfeeding (Bergman & Bergman, 2013). This is also a very important time for the development of a bond between mothers and infants (Kennell & McGrath, 2005).

In contrast, some authors have focussed less on the two hour period after birth and more on the dose-response of skin-to-skin contact. Dose-response refers to the change in effect caused by different levels of exposure (Moore, Anderson, Bergman & Doswell, 2012). Researchers such as Bramson, Lee, Moore, Montgomery, Neish, Bahjri and Melcher (2010) and Bigelow, Littlejohn, Bergman and McDonald (2010) have found that a longer duration of skin-to-skin contact in the first few days, correlates with a greater positive effect on breastfeeding and bonding in comparison to shorter duration of skin-to-skin contact.

Skin-to-skin contact influences the mother-infant relationship both directly and indirectly. It has a direct effect through the release of hormones which positively influences maternal mood and behaviour. This enhancement of feelings that mothers have for their infants helps to strengthen the bond between them (Bigelow & Power, 2012).

Skin-to-skin contact also indirectly influences the mother-infant relationship through breastfeeding and touch. There is a large body of evidence that supports the suggestion that skin-to-skin contact positively influences breastfeeding (World Health Organization, 1998; United Nations Children's Fund & World Health Organization, 2009; Moore *et al.*, 2012). This is of importance because breastfeeding is a key contributor to infants' health and survival (Mason, Rawe & Wright, 2013). Breastfeeding also acts as an enhancer of the mother-infant relationship. Similar to skin-to-skin contact, breastfeeding has a psychobiological influence

on maternal behaviour (Kim, Feldman, Mayes, Eicher, Thompson, Leckman & Swain, 2011). It also has a positive influence on infants' development and alertness (Feldman & Eidelman, 2003a). The effect that breastfeeding has on both mothers and infants contributes to its overall impact on the mother-infant relationship.

Similarly, touch is also considered an important contributor to the mother-infant relationship. Preliminary research has found that early skin-to-skin contact can positively influence the amount of affectionate touch that mothers provide to their infants *(Moore et al.,* 2012). A mother's touch is a central feature of responsive daily caregiving routine that helps to nurture an infant's sense of trust. Positive maternal touch, especially affectionate touch, promotes infant's social and cognitive development and aids the connection between mothers and infants (O'Brien & Lynch, 2011).

Skin-to-skin contact is however not the only factor found to have an influence on the mother-infant relationship. Maternal mental health has also been highlighted as being strongly associated with mothering (Meintjes, Field, van Heyningen & Honikman, 2015). Maternal mental health conditions, such as mood and anxiety disorders, can result in adverse consequences for infants including higher rates of morbidity and mortality as well as poorer physical, cognitive, behavioural and social-emotional developmental outcomes. Furthermore poor maternal mental health can affect maternal behaviour and sensitivity. This can lead to dysfunctional infant caregiving which interferes with the mother-infant relationship and in turn has long lasting negative psychological effects on the infant (World Health Organization, 2008). It is thus important to consider maternal mental health as a possible confounding variable when studying influencers of the mother-infant relationship.

Bonding and the mother-infant relationship have a lifelong effect on the developing infant, especially their social-emotional development. In the early stages of infancy, social-emotional development can only be viewed in the context of relationship. As aptly described by Guedeney *"A baby alone does not exist"* (Guedeney, 1997: 339). Infants do not develop social-emotional skills in isolation but rather within a reciprocal relationship with their caregivers (Zero to Three, 2010). This relationship is centred around the bonding and attachment that takes place between an infant and their caregivers (The Early Childhood Direction Center, 2009). Furthermore social-emotional development is important because it

lays the foundation for infants' cognitive and language development as well as adaptive life skills (Greenspan, Wieder & Simons, 1998).

Interventions that influence the mother-infant relationship and the development of social-emotional skills are of particular relevance for populations of vulnerable infants. It has been documented that vulnerable infant populations, such as those living in socially adverse conditions as well as high risk infants or infants born with a disability, are more prone to having suboptimal mother-infant relationships and poor social-emotional development (Malekpour, 2007; Cooper, Tomlinson, Swartz, Landman, Molteno, Stein, McPherson & Murray, 2009; Case-Smith, 2013). Occupational therapists are particularly well suited to address these issues because of their understanding of disability and social-economic contextual impact on participation in meaningful life roles and occupations (The American Occupational Therapy Association, 2014a).

This is of particular relevance to the South African setting where there is a need to investigate interventions that can help address suboptimal mother-infant relationships. This is highlighted by Cooper *et al.* (2009) who explain that populations of the developing world, like South Africa, are more prone to poverty and adverse mental health that negatively impact on this crucial relationship and therefore recommend further research into intervention.

It is however important to first gain a better understanding of the influence of skin-to-skin contact with a population of low risk mothers and infants, so that this information can be used to support or oppose the use of skin-to-skin contact as an intervention strategy for those at risk (Bigelow & Power, 2012). This is reiterated by O'Brien and Lynch who stated that "I*t is important to study typical interactions to understand how compensatory methods develop in atypical situations*" (O'Brien & Lynch, 2011: 130).

1.2 Problem statement

The over-riding problem that this study aims to address is the lack of understanding of whether early skin-to-skin contact influences mother-infant bonding and touch with a population of South African mothers and infants. This is due to a lack of research, within the context of South Africa as well as within the field of occupational therapy, exploring skin-to-

skin contact as a means of intervention to directly and indirectly enhance the maternal-infant relationship.

Furthermore, it is important to gain a better understanding of whether the time frame of skin-to-skin contact after birth is of particular importance to the outcome measures of touch and bonding. There is a contrast in literature, some of which signifies the first two hours after birth as being of particular importance whereas other literature denotes an overall dose-response of skin-to-skin contact as being most relevant.

Lastly, there is a lack of research examining the associations between skin-to-skin contact and touch in daily routine, including both objectively assessed tactile interactions and self-report mother-infant touch.

1.3 Purpose of the study

The purpose of this study is to explore whether skin-to-skin contact has an influence on the mother-infant relationship, with a population of South African mothers and infants, by examining direct and indirect influencers including bonding and mother-infant touch.

1.4 Research question

Does early skin-to-skin contact influence bonding, touch in daily routine and tactile interactions between mothers and infants?

1.5 Aim

To investigate the influence of early skin-to-skin contact on bonding, touch in daily routine and tactile interactions between South African mothers and infants.

1.6 Objectives

1. To determine the amount of skin-to-skin contact between mothers and infants over the first 24 hours after birth.
2. To investigate the influence of early skin-to-skin contact on bonding within the first week after birth.
3. To investigate the influence of early skin-to-skin contact on bonding six to eight weeks after birth.
4. To investigate the influence of early skin-to-skin contact on touch in daily routine when the infant is six to eight weeks old.

5. To investigate the influence of early skin-to-skin contact on tactile interactions between mothers and infants, six to eight weeks after birth.

1.7 Null-hypothesis

There will be no difference in bonding, touch in daily routine or tactile interactions between mother-infant dyads that had immediate skin-to-skin contact for two hours or more after birth and mother-infant dyads that did not have skin-to-skin contact for at least two hours after birth.

1.8 Justification of the Study

This study will help develop a better understanding of the correlations between early skin-to-skin contact, bonding and touch with a population of South African mothers and infants. The results of this research add to the literature on skin-to-skin contact and can be used to guide occupational therapists when formulating social-emotional intervention strategies for at risk or atypical mother-infant dyads.

It is important to gain a better understanding of the influence of early skin-to-skin contact on bonding, touch in daily routine and tactile interactions between mothers and infants as these are important elements of the mother-infant relationship. Enhancement of the mother-infant relationship is especially important for infants and young children as this serves as the basis of their social-emotional development (Case-Smith, 2013).

Preliminary research has identified some positive associations between skin-to-skin contact and breastfeeding, mother-infant bonding and touch. Several of these studies, especially those examining bonding and touch, do however have inconsistent findings, variable methodology and many are dated. There is thus a lack of more current research firmly establishing whether associations exist between early skin-to-skin contact and the aforementioned outcome measures.

In addition to a lack of general research on skin-to-skin contact and the influence on bonding and touch, there has been a specific appeal to do more research on skin-to-skin contact in the context of occupational therapy (Case-Smith, 2013). Skin-to-skin contact has been highlighted by the American Occupational Therapy Association (AOTA) as a priority research area because there is a lack of research to provide sufficient evidence for its use as an

occupational therapy therapeutic intervention (The American Occupational Therapy Association, 2014b).

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to review prior literature and research that has taken place in relation to the concepts of this study and in order to support the purposes of the study. The flow diagram below (Figure 2.1) presents the main concepts of the study and the relationships between, namely: skin-to-skin contact, breastfeeding, maternal-infant relationship, maternal-infant touch, maternal mental health and social-emotional development in infants.

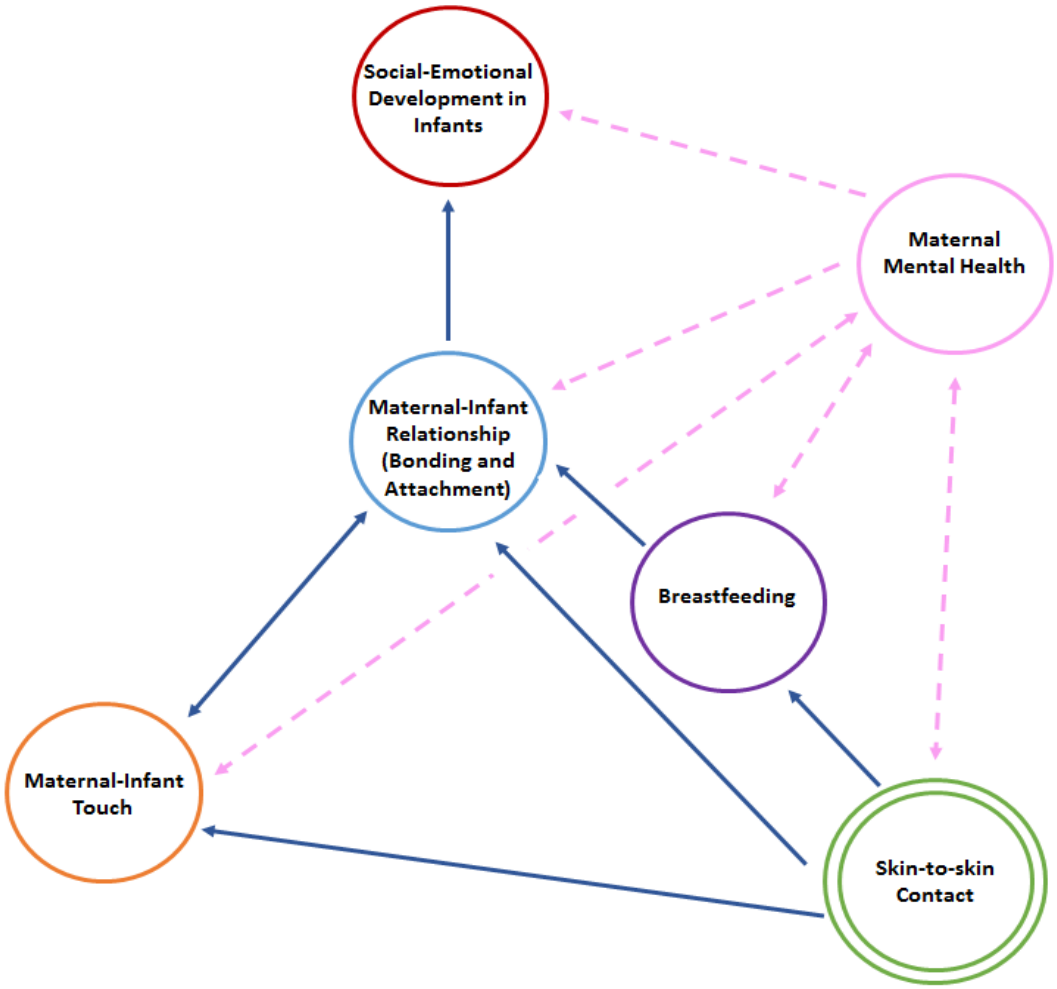


Figure 2.1 Main concepts of the study and the relationships between them.

This literature review firstly explores skin-to-skin contact and then looks at its influence on breastfeeding, maternal-infant touch and the maternal infant-relationship. Furthermore the relationships between breastfeeding and maternal-infant relationship as well touch and the maternal-infant relationship are also explored. Additionally, maternal mental health, as an alternative influencer to maternal-infant relationship is also discussed. Finally the literature review looks at the importance of the maternal-infant relationship to social-emotional development in infants and the relevance to the practice of occupational therapy.

2.2 Skin-to-skin contact

2.2.1 The definition of skin-to-skin contact

Skin-to-skin contact refers to the contact between an infant and an adult when the infant is placed in a prone position (naked or wearing only a diaper) onto an adult's bare chest (which in this study will focus on the mother) (Anderson, Moore, Hepworth & Bergman, 2007). Skin-to-skin contact is one of three components involved in kangaroo mother care. The other two components are exclusive breastfeeding and support to the mother-infant dyad (Bergman, 2013b).

2.2.2 Skin-to-skin contact and the practice of occupational therapy

The use of skin-to-skin contact in the practice of occupational therapy is not well-defined. There is thus a lack of literature on skin-to-skin contact within the field of occupational therapy. This is however with the exception of literature on the use of skin-to-skin contact as a means of intervention in neonatal intensive care units with high risk infants used to address infants' physiological needs, promote development and reduce pain (Vergara, Anzalone, Bigsby, Gorga, Holloway, Hunter, Laadt & Strzyzewski, 2006; Holsti, 2012; Case-Smith, 2013). The use of skin-to-skin contact with full term healthy infants as a health promoting intervention does however not traditionally fall within the scope of occupational therapy. The majority of literature reviewed on skin-to-skin contact does therefore not originate from occupational therapy scholars but rather literature from the field of medicine, nursing and psychology.

2.2.3 The history of skin-to-skin contact

The practice of skin-to-skin contact originated in Columbia in the 1970s. The method was implemented by Edgar Rey Sanabria and Hector Martinez at the Maternal Child Institute in Bogotá, Colombia, as a means to achieve early hospital discharge for low birth weight infants. This was necessary because of a lack of incubators, high neonatal mortality rates, infant abandonment, early weaning and cross infection that the institute was experiencing (Venancio & de Almeida, 2004). Skin-to-skin contact with low birth weight infants was found to positively influence infant temperature regulation, heart rate, blood pressure, breathing stabilisation, immunological protection, breastfeeding, weight gain, arousal regulation, neurobehaviour and reduce stress reactions (Venancio & de Almeida, 2004; Bergman, 2012; Ludington-Hoe, 2013). This method of care was a cost effective means of reducing low birth weight infant mortality rates and improving developmental outcomes. It was thus implemented into neonatal intensive care units around the world (Venancio & de Almeida, 2004).

2.2.4 An introduction to skin-to-skin contact with healthy full term infants

Skin-to-skin contact was also identified as being an appropriate intervention for use with healthy, full term infants as it supported an easier transition from intrauterine to extrauterine life as well as promoted the initiation of breastfeeding (Bystrova, Widström, Matthiesen, Ransjö-Arvidson, Welles-Nyström, Wassberg, Vorontsov & Uvnäs-Moberg, 2003). Early skin-to-skin contact forms part the BFHI, which is supported by the United Nations International Children's Fund (UNICEF) and the WHO. One of the key aspects of the BFHI is to keep mothers and newborn infants in early, uninterrupted skin-to-skin contact until the infant's first feeding. Since 1991, this initiative has been implemented in 152 countries around the world (United Nations Children's Fund & World Health Organization, 2009). There is a structured process that maternity facilities have to follow in order to become certified as BFHI compliant. Firstly the facilities undergo a self-appraisal to review their practices and policies that either promote or hinder breastfeeding as well as ensure staff receive specialised training. Secondly, the hospital undergoes an external assessment conducted by a multi-disciplinary external assessment team to assess whether the appropriate practices and policies are in place (United Nations Children's Fund & World Health Organization, 2009).

Skin-to-skin contact is reportedly beneficial for full term infants with no adverse effects (Anderson *et al.*, 2007). The benefits include: improves physiological stability for both mother and infant, enhances attachment and bonding behaviours, protects against the harmful effects of maternal neonatal separation, supports optimal brain development and social-emotional intelligence for the infant as well as promotes the initiation and duration of breastfeeding (Henry, Richard-Yris, Tordjman & Hausberger, 2009; Bergman, 2013a; Phillips, 2013). The concepts most relevant to the study will now be discussed in greater detail. This discussion will firstly introduce the following concepts: breastfeeding, mother-infant bonding and touch and then examine the existing literature on the relationship between skin-to-skin contact and these concepts.

2.3 Breastfeeding

2.3.1 An introduction to breastfeeding in the context of South Africa

Breastfeeding refers to the feeding of an infant or a young child from a woman's breast. Breastfeeding together with early skin-to-skin contact is considered a suitable and cost-effective means of reducing infant mortality and morbidity and supporting infant development (Moore *et al.,* 2012). This is especially relevant within the South African context where infant and child mortality rates remain unacceptably high (National Department of Health, 2011).

South Africa has one of the world's lowest exclusive breastfeeding rates, estimated to be around 8% of infants that are exclusively breastfed for at least six months (United Nations Children's Fund, 2012, 2013). A number of reasons for the low exclusive breastfeeding rates have been highlighted in the literature. This includes of a lack of understanding of the essential benefits of breastfeeding, fear of HIV transmission and misinformation of current guidelines, a perception of insufficient milk, marketing of breastmilk substitutes and breastfeeding problems. Furthermore, it has been reported that there is insufficient support and guidance from health care personnel as well as a lack of supportive structures in place in order for breastfeeding to be maintained when mothers return to full time employment (United Nations Children's Fund, 2012; National Department of Health, 2013).

The Healthy People 2010 Goals for Breastfeeding recommend rates of 50% for some breastfeeding at six months and 17% for exclusive breastfeeding at 6 months (Bartick & Reinhold, 2010). Internationally the recommendation of exclusive breastfeeding for at least six months is supported by various medical and health organisations including WHO, UNICEF and the American Academy of Pediatrics (Pitonyak, 2014). The Millennium Development Goal 4 (MDG4) also recommended breastfeeding as a strategy towards reducing the under-five mortality rate by two-thirds between 1990 and 2015 (United Nations Children's Fund & World Health Organization, 2015).

South Africa has made commitments to support and promote breastfeeding rates in order to reduce child mortality and morbidity, as in line with the MDG4, by means of the Tshwane Declaration of support for breastfeeding in South Africa and the Infant and Young Child Feeding Policy (National Department of Health, 2011, 2013). One clarification highlighted in both of these documents is the recommended practice of breastfeeding in light of HIV. In agreement with the 2010 WHO guidelines on HIV and infant feeding, it is recommended that all HIV-infected mothers should be provided with antiretroviral drugs and exclusively breastfeed their infants for at least six months. Complementary feeding can be started after six months but breastfeeding should continue until 12 months (World Health Organization, 2010; National Department of Health, 2011, 2013).

Despite the commitments made in these guidelines, South Africa's exclusive breastfeeding rates remain low. These low rates account for approximately 47000 deaths of children under the age of five (Child Mortality Estimates, 2015). South Africa has thus failed to fully achieve the MDG4 (Statistics South Africa, 2013).

2.3.2 Breastfeeding and the role of occupational therapy

The role of occupational therapy in dealing with breastfeeding is scantily described in the literature (Pitonyak, 2014). This is because addressing breastfeeding it is not traditionally considered to be within the scope of occupational therapy (Visser, Nel, la Cock, Labuschagne, Lindeque, Malan & Viljoen, 2016). This is somewhat surprising as occupational therapists work towards the promotion of health and well-being through participation in occupations and breastfeeding is considered to be an important co-occupation (Esdaile & Olson, 2004; The American Occupational Therapy Association, 2014a). Zemke and Clarke

(1996) consider the act of infant feeding as an activity that involves active engagement of both the infant and caregiver. Breastfeeding can thus be referred to as a co-occupation as this inherently implies the active and reciprocal involvement of two or more individuals with shared intention, emotion and meaning (Esdaile & Olson, 2004; Pickens & Pizur-Barnekow, 2009; Pitonyak, 2014; The American Occupational Therapy Association, 2014a).

Breastfeeding has also recently been defined as an "*instrumental*" activity of daily living (The American Occupational Therapy Association, 2014a: S19). This refers to a "*child rearing*" activity of daily living involved with "*Providing care and supervision to support the developmental needs of the child*" (The American Occupational Therapy Association, 2014a: S19).

Despite the historical lack of involvement in breastfeeding, occupational therapists are well positioned as health professionals to become more involved in supporting, protecting and promoting breastfeeding as a co-occupation between mothers and infants (Visser *et al.*, 2016).

This sentiment is echoed in the work of Pitonyak (2014) who also believes that occupational therapists should be more involved with addressing breastfeeding. Pitonyak (2014) explains that current occupational therapy practice focuses on addressing difficulties with initiating and maintaining breastfeeding as an eating and feeding activity. Breastfeeding should however be viewed in a broader sense as a mothering co-occupation, taking into account the societal context, and a form of care that has long lasting effects on the infant (Pitonyak, 2014).

Visser *et al.* (2016) recommended that occupational therapists receive training at an undergraduate level on national and international guidelines relating to infant feeding practices. The University of the Free State has, for example, already implemented a 24-hour breastfeeding course (Visser *et al*., 2016). Alternatively, therapists can receive additional training on breastfeeding by attending a UNICEF designed lactation management training workshop run by La Leche League South Africa (La Leche League International, 2017).

Even though occupational therapists are well-positioned to address breastfeeding, there is inadequate research and literature on the subject (Pitonyak, 2014). In the context of South

Africa, only one article written by occupational therapy scholars on breastfeeding could be found in the last 13 years. There is thus a need to conduct further research on breastfeeding within the field of occupational therapy.

The literature pertaining to the benefits of breastfeeding will now be discussed in more detail.

2.3.3 Infant health benefits of breastfeeding

Breastfeeding has well documented benefits for infants including: nutritional, immunological and developmental benefits (Pitonyak, 2014). Breastmilk protects infants from various diseases because of its immunological and anti-inflammatory properties (Sears & Sears, 2003). Studies have also found that exclusive breastfeeding provides better protection against respiratory tract infections, sepsis in premature infants, otitis media, gastroenteritis, diarrhoeal disease, asthma, diabetes, obesity in childhood, sudden infant death syndrome and morbidity and mortality in general (Gdalevich, Mimouni & Mimouni, 2001; Sears & Sears, 2003; Chen & Rogan, 2004). Early initiation of breastfeeding is also important. It is reported that 22% of neonatal deaths could be prevented if breastfeeding is initiated within the first hour after birth (Mason *et al*., 2013). This is supported by the finding that an infant fed breastmilk within the first hour postpartum is three times more likely to survive than an infant breastfed a day later (Mullany, Katz, Li, Khatry, LeClerq, Darmstadt & Tielsch, 2008).

Breastfeeding may also influence a child's mental health. Oddy, Kendall, Li, Jacoby, Robinson, de Klerk, Silburn, Zubrick, Landau and Stanley (2010) found that a shorter duration of breastfeeding (less than six months compared to six months or longer) was an independent predictor of adverse mental health outcomes through childhood and adolescence. Adverse mental health outcomes were measured using the Child Behaviour Checklist. They looked at factors such as: withdrawal, anxiety, depression, somatic complaints, social problems, thought problems, attention problems, aggressive behaviour and delinquent behaviour (Oddy *et al.*, 2010). Kramer (2010) did however warn that other studies have not identified this same effect and thus further experimental research is needed to better understand the behavioural consequences of infant feeding.

Several large scale studies have identified an association between being breastfed and achieving higher scores on childhood, adolescent and adult intelligence tests (Mortensen, Michaelsen, Sanders & Reinisch, 2002; Feldman & Eidelman, 2003a). These findings have however been criticized by some researchers who identified socio-demographics (such as parental age, education and support network) associated with breastfeeding as being the more pertinent variables relating to the infant's later cognitive outcome (Gale & Martyn, 1996; Jacobson, Chiodo & Jacobson, 1999; Feldman & Eidelman, 2003a).

A study conducted in Spain, with 504 mother-infant dyads, examined the correlations between breastfeeding, maternal education, social class and intelligence on the infants' later psychomotor development as assessed using the Bayley Scales of Infant Development at 14 months of age. The study found a positive correlation between breastfeeding and child mental development, which could only partially be attributed to maternal education, social class and intelligence. Children who received colostrum and were breastfeed for a longer duration were found to score significantly higher than children that were breastfed for shorter periods or did not receive colostrum (Guxens, Mendez, Molto-Puigmarti, Julvez, Garcia-Esteban, Forns, Ferrer, Vrijheid, Lopez-Sabater & Sunyer, 2011).

In a large scale randomised trial in Belarus, the largest ever conducted in the field of human lactation, the promotion of breastfeeding in accordance with the BFHI was examined. A total of 13 889 healthy breastfeeding infants were enrolled and followed up again at six and a half years old. Children were assessed using the Wechsler Intelligence Scale as well as rated by their teachers on their academic performance. This study concluded that strong evidence exists that exclusive and prolonged breastfeeding results in improved cognitive outcome in children even when parental socio-demographics were accounted for (Kramer, Aboud, Mironova, Vanilovich, Platt, Matush, Igumnov, Fombonne, Bogdanovich, Ducruet, Collet, Chalmers, Hodnett, Davidovsky, Skugarevsky, Trofimovich, Kozlova & Shapiro, 2008).

Quinn, O'Callaghan, Wiliams, Najman, Andersen and Bor (2001) proposed two potential mechanisms by which breastfeeding results in better intelligence and cognitive outcomes. The first mechanism is the nutritional content of breastmilk and its direct effect on complex neural functioning. The second mechanism addresses the positive effect that breastfeeding has on the mother-infant relationship (Feldman & Eidelman, 2003a). Whilst several studies

have examined the nutritional aspect of breastfeeding, limited research has been conducted on the contribution of breastfeeding to the mother-infant relationship (Golding, Rogers & Emmett, 1997; Else-Quest, Hyde & Clark, 2003).

2.3.4 Breastfeeding and the mother-infant relationship

Else-Quest *et al.* (2003) investigated the role of bottle-feeding versus breastfeeding on bonding and the mother-infant relationship with 570 dyads, measured at 12 months. The results showed that breastfeeding dyads displayed marginally higher quality relationships. It was noted however that bottle-fed dyads did not show precarious or poor quality relationships and that confounding variables such as level of education were not accounted for (Else-Quest *et al.*, 2003).

Feldman and Eidelman (2003a) researched the direct and indirect effects of breastmilk on premature infants (mothers' own breastmilk fed to infants via nasogastric tube or bottle). Their study found that mothers that gave substantial amounts of breastmilk to their infants provided more frequent affectionate touch to their infants and talked less to them. A dose-response pattern was identified as mothers that gave only minimal amounts of breastmilk to their infants, provided the least amount of affectionate touch to their infants as well as talked the most to their infants. Infants that received more breastmilk were also found to show more alertness than infants that received only small amounts of breastmilk. Mothers that gave more breastmilk also had lower rates of maternal depression. Maternal affectionate touch, infant alertness and positive maternal mood are considered to be important aspects of optimal mother-infant interaction. Infants in the high breastmilk group also showed better neurodevelopmental maturation at 37 weeks gestation (assessed using the Neonatal Behavioural Assessment Scales) as well as higher mental and psychomotor scores at six months of age (as assessed using the Bayley Scales of Infant Development). This study demonstrated that breastmilk provides both direct (nutritional) and indirect (influences maternal mood and behaviour including positive touch behaviours) effects that both support infant neuro-, cognitive and motor development (Feldman & Eidelman, 2003a). The results of this study cannot however be generalised to the South African population as only eighty six mother-infant dyads took part. The study also took part in Israel which has a significantly higher rating on the human development index indicating considerably better

health, education and personal income in comparison to South Africa (One World Nations Online, 2016).

It has also been suggested that breastfeeding increases mothers' responsiveness to her infant's cues during feeding (Brandt, Andrews & Kvale, 1998; Kim *et al.,* 2011). Similarly, it may facilitate more optimal maternal-infant interaction resulting in possible higher cognitive outcomes (Feldman & Eidelman, 2003a). Both prolactin and oxytocin, which are involved in the production and release of breastmilk, are known to influence a range of maternal behaviours including maternal sensitivity and stress modulation as well as reduce depression and anxiety. This provides a psychobiological theory to explain the influence of breastfeeding on maternal behaviour (Newton, 1992; Carter & Altemus, 1997; Feldman, Gordon & Zagoory-Sharon, 2011; Kim *et al.,* 2011).

In summary, there are several studies that suggest that breastfeeding has a positive influence on the mother-infant relationship but there is inadequate conclusive evidence to explain exactly what the influence is and to what extent it has a positive impact.

2.3.5 Maternal health benefits of breastfeeding

Breastfeeding has both short and long term health benefits specifically for mothers (Labbok, 2001). Some of the short term benefits include: decreases postpartum bleeding and improves uterine involution, decreases the risk of developing postnatal depression and anxiety, reduced stress and faster postpartum weight loss. Long term benefits include: less risk of developing osteoporosis, breast, uterine and ovarian cancer, diabetes, cardiovascular disease as well as assists with natural child spacing (Sears & Sears, 2003; Afshariani, 2014). The discussion will now move from the benefits of breastfeeding to the influence of skin-to-skin contact on breastfeeding.

2.3.6 The influence of skin-to-skin contact on breastfeeding

As previously mentioned, skin-to-skin contact is very closely associated with breastfeeding. It thus forms part of BFHI approach to support the initiation of breastfeeding within the first two hours after birth (Moore & Anderson, 2007; United Nations Children's Fund & World Health Organization, 2009). It has been suggested that the first two hours following birth are

a sensitive period for newborn infants (Finigan & Davies, 2004; Moore & Anderson, 2007). As described by Phillips and Shonkoff: "*Sensitive periods can be defined as unique episodes in development when specific structures or functions become especially susceptible to particular experiences in ways that alter their structure or function*" (Phillips & Shonkoff, 2000: 195).

This period allows for the establishment of skills that are able to enhance the survival of infants. Newborn infants are born with a specific set of instinctual behaviours that lead to the initiation of breastfeeding (Bergman & Bergman, 2013). These instinctual behaviours can only occur if the infant is in the correct place, namely in skin-to-skin contact with their mother (Winberg, 2005; Moore & Anderson, 2007; Henderson, 2011; Bergman, 2013a). This instinctual behaviour is thought to be elicited by the infant's exposure to the olfactory, tactile and thermal cues that skin-to-skin contact provides during the sensitive period after birth (Moore *et al.,* 2012; Bergman & Bergman, 2013). When placed in skin-to-skin contact on their mother's trunk or chest directly after birth, an unmedicated infant is able to locate and move towards the breast. The infant then initiates breastfeeding by self-attaching for the first breastfeed (Kennell & McGrath, 2005; Henderson, 2011; Phillips, 2013). As previously mentioned, this early initiation of breastfeeding is important in safeguarding against infant mortality and morbidity (Mullany *et al.*, 2008; Mason *et al.*, 2013).

Self-attachment usually occurs within 55 minutes after birth (Bergman & Bergman, 2013). Other reports however state that it can take up to two hours (Widström, Aaltomaa-Michalias, Dahllöf, Lintula & Nissen, 2011; Phillips, 2013). Infants that initiate breastfeeding in this way are more likely to breastfeed effectively (Carfoot, Williamson & Dickson, 2005; Winberg, 2005; Moore & Anderson, 2007; Bramson *et al.,* 2010; Henderson, 2011; Karimi & Khadivzadeh, 2012). This is supported by the finding that skin-to-skin contact helps to resolve breastfeeding latching difficulties (Svensson, Velandia, Matthiesen, Welles-Nyström & Widström, 2013).

Assisting an infant to breastfeed in the early postpartum period is not recommended. It is reported that if infants are forced to try and latch and breastfeed before they are ready that they can developed an aversion to the breast which negatively influences breastfeeding success (Widström *et al.*, 2011).

Skin-to-skin contact is also reported to positively influence breastfeeding duration. Bramson *et al.* (2010) conducted a study on 21 842 mother-infant dyads, from a variety of racial and ethnic backgrounds, examining the effect of early skin-to-skin contact on breastfeeding during the postnatal hospital stay. This study found a positive dose-response relationship between early skin-to-skin contact and exclusive breastfeeding during maternity hospitalization taking other possible confounding variables into account (socio-demographics, infant feeding method intention and intrapartum variables) (Bramson *et al.*, 2010).

A systematic review on skin-to-skin contact with healthy newborn infants found mixed results for outcomes related to breastfeeding exclusivity and duration (Moore *et al.,* 2012). Of the studies reviewed, there was no significant difference between skin-to-skin and non-skin-to-skin dyads with regards to breastfeeding exclusivity when discharged from hospital but a significant difference was identified at three to six months post birth. Infants that had experienced skin-to-skin contact also breastfed for an average of 42.55 days longer (Moore *et al.,* 2012).

More specifically, Moore and Anderson (2007) studied the effect of early skin-to-skin contact versus an infant being swaddled on breastfeeding status up to one month postpartum. Early skin-to-skin contact was found to enhance the success of breastfeeding in the early postpartum period. This is likely due to the additional olfactory, tactile and thermal cues that skin-to-skin contact provides (Moore *et al.,* 2012). There was however, no significant difference between the two groups with regards to breastfeeding problems or exclusivity at the one month follow-up. Unexpectedly, the study found infant sucking competence to be related to nipple protractility. The researchers cautioned that these findings should not be generalised due to the small sample size (23 mother-infant dyads) as well as the fact that the characteristics of the mothers were very similar: primiparous, very motivated to breastfeed, mostly Caucasian, married and college educated (Moore & Anderson, 2007).

A similar study conducted by Carfoot *et al.* (2005) found that at least 45 minutes of early skin-to-skin contact, as opposed to infants being swaddled, had a significant difference on the success of the first breastfeed whilst there were no significant differences at four months post birth. Moore *et al.* (2012) report that skin-to-skin contact appears to have a

lesser effect when compared to swaddled/clothed dyads that are given the opportunity to breastfeed soon after birth than when compared to separated mother-infant dyads (separation for 12 to 24 hours after birth). This highlights the negative impact of maternal-infant separation that is still practised in some maternity institutions (Mizuno, Mizuno, Shinohara & Noda, 2004; Moore *et al.,* 2012).

In summary there have been several studies conducted on the influence of skin-to-skin contact on breastfeeding yet the findings are variable. Overall, there appears to be adequate evidence to say that skin-to-skin contact has a positive influence on breastfeeding but the exact timing and duration of skin-to-skin contact after birth as well as the outcome measures (breastfeeding success versus breastfeeding duration) and outcome timeframe (short term versus long term) are inconclusive. The literature review will now shift focus and look at mother-infant touch and its relationship to bonding and skin-to-skin contact.

2.4 Touch

2.4.1 Introduction

Touch refers to the sensory (tactile) stimuli that is received through the skin (Lombard, 2015). Receptors in the skin directly process both pleasurable and nociceptive stimuli thus touch is very closely linked to emotion (Hertenstein & Campos, 2001). This sense physically connects us to the world and is considered an essential element in human interaction (O'Brien & Lynch, 2011). More specifically, this tactile interaction plays a key role in the development of interactive relationships between infants and caregivers and subsequently contributes to several aspects of child and infant development (Koester, Brooks & Traci, 2000). Muir (2002) and Gallace and Spence (2010) report that despite the significance of interpersonal touch in everyday interaction, only a small amount of scientific research has been conducted on the topic. In agreeance with this notion, several authors have also noted that touch is one of the lesser researched elements of the mother-infant relationship and that further exploration of touch is needed (Koester *et al.,* 2000; Hertenstein & Campos, 2001; Feldman, Weller, Sirota & Eidelman, 2003).

2.4.2 The importance of touch to infant development

The somatosensory system (tactile and kinaesthetic processing) is the first sense to develop in a fetus and one of the most advanced senses of the newborn infant (Koester *et al.,* 2000; Faure & Richardson, 2007). The skin of a newborn is thinner and contains more somatosensory nerve endings than an adult's skin. A newborn is thus particularly receptive to tactile input especially as a means of communication (Koester *et al.*, 2000).

Tactile stimulation helps infants to develop an awareness of themselves and their environment, which is important for later motor and perceptual skills as well as body image (Koester *et al.,* 2000; Faure & Richardson, 2007). Tactile interaction is also an essential component to the development of a bond between mothers and infants and it is a central feature of attending to infants' everyday needs and routine (O'Brien & Lynch, 2011). This tactile interaction contributes to infants' social- emotional and communication development (Koester *et al.,* 2000; Faure & Richardson, 2007).

More specifically maternal affectionate touch reportedly leads to an increase in infant smiling and vocalisations (Stack & Muir, 1992; Ferber, Feldman & Makhoul, 2008). Affectionate touch is defined as a type of touch that does not have a functional purpose but rather is used to display affection. Examples of affectionate touch include stroking, hugging, kissing and light poking (Feldman, 2004). Affectionate touch has also been found to predict neurobehavioural and cognitive development in infants (Feldman & Eidelman, 2003a; Ferber & Makhoul, 2004; Ferber *et al.,* 2008). On the other hand, Hertenstein and Campos (2001) and Field (2002) report that the use of negative touch is associated with later behavioural and emotional problems.

Negative touch and deficits in touch may have significant effects on children's development, growth and emotional well-being (Field, 1999). Children that receive inadequate or inappropriate sensory stimulation (such as a deprivation of mechanosensory stimulation) may present with developmental delay (Ardiel & Rankin, 2010). In early studies conducted on touch with young children, it was found that infants had a significant reduction in regurgitation after receiving 10 minutes of additional handling per day and that orphaned children that received 20 minutes of additional tactile stimulation per day for 10 weeks scored higher on later developmental assessments (Ardiel & Rankin, 2010). Several studies

have since documented that growth and development can be facilitated by mechanosensory stimulation in infants that are deprived of normal sensory stimulation, such as in the premature infant population (Ardiel & Rankin, 2010). The use of touch as an intervention will be further explored later in this section. Firstly though, the connection between touch and the mother-infant relationship will be discussed.

2.4.3 Touch and the mother-infant relationship

Touch is integral to the formation of a bond between mothers and infants (O'Brien & Lynch, 2011). Yet despite the importance of touch, several authors have noted that touch is one of the lesser researched elements of the mother-infant relationship (Koester *et al.,* 2000; Hertenstein & Campos, 2001; Feldman *et al.,* 2003).

Touch is a central feature of the responsive and available caregiving environment necessary for nurturing an infant's sense of trust and security (Field, 1996; O'Brien & Lynch, 2011). Historically, John Bowlby was the first to say that infants seeking maternal proximity was an important component of the attachment system and that physical contact was integral to an infant's sense of safety (Weiss, Wilson, Hertenstein & Campos, 2000).

More recently, Weiss *et al.* (2000) have said that the amount of touch that a mother provides to her infant is often an indication of her maternal availability. This is supported by Feldman *et al.* (2003) who found an association between reduced parental affectionate touch and family intrusiveness. They also stated that the amount of affectionate touch provided to an infant was predictive of family cohesiveness (Feldman *et al.*, 2003). Conversely, it has been noted that a decrease in positive maternal contact may be an indication of difficulties within the dyadic relationship as well as maternal depression and intrusiveness (Weiss *et al.*, 2000; Feldman *et al.*, 2003).

Positive maternal-infant touch is important because it promotes infants' cognitive and social development as well as improves the moods of mothers and aids the emotional connection they feel towards their infants (O'Brien & Lynch, 2011). Mothers of securely attached infants use more affectionate and tender touch whereas abrupt, rejecting and angry touch is more prominent in insecure avoidant or disorganised attachment (Weiss *et al.,* 2000). This is also important because, as previously mentioned, different forms of touch predict either positive

or negative infant outcomes (Feldman & Eidelman, 2003a; Ferber & Makhoul, 2004; Ferber *et al.,* 2008). Field (1999) reports that negative forms of touch and non-affectionate touch are more commonly used by mothers who are depressed or stressed in comparison to non-depressed mothers.

According to Field (2002), Ed Tronick was the first to document the different types of touch that naturally take place between a mother and infant during interaction. It was found that holding, stroking and rhythmical touching occurred most frequently followed by kissing and tickling. Pinching and poking input occurred rarely (Field, 2002). Pelaez-Nogueras, Field, Gewirtz, Cigales, Gonzalez, Sanchez and Richardson (1997) studied infant behaviour in response to stroking versus tickling and poking. Their study found that infants vocalised and smiled more when stroked as opposed to when they were tickled or poked. Similarly, Field (2002) found that infants kicked more in response to stroking input rather than poking or tickling input in a kicking paradigm.

Koester *et al.* (2000) studied deaf mothers' tactile contact with their infants during the still-face paradigm (a face-to-face interaction task which includes a period of maternal blunted affect and non-responsiveness) in comparison with hearing mothers. Their study found that deaf mothers were especially responsive to the tactile needs of their infants during the paradigm. Touch in a deaf mother and infant dyad plays an important role in maintaining contact, eliciting visual attention, alerting an infant about impending signed communication and in assisting the infant with emotional regulation (Koester *et al.*, 2000). In the case of deaf infants, for whom the auditory sensory channel is deficient, they may be more responsive to other sensory modalities such as touch (Koester *et al.*, 2000). Koester *et al.* (2000) are not the only authors that associate touch with communication and social exchange. Feldman *et al.* (2003) specifically relate active affectionate touch to social exchange whereas they relate full-body yet passive touch, such as carrying an infant in the arms, to periods of reduced active social exchange. It has also been suggested that social maturation comprises of a shift from full body contact, in the first few weeks postpartum, to interactions that rely more on tactile, visual and affect synchrony of the dyad that emerges later (Feldman *et al.*, 2003).

Touch also appears to help attenuate the stress of mother's non-responsiveness during the still-face paradigm. Usually infants' smiling and gazing decreases during the non-responsive phase of the paradigm yet if the adult maintains tactile engagement with the infant, this response is substantially reduced and the infant's affect and attention remains unchanged (Stack & Muir, 1992; Stack & Arnold, 1998). More specifically, Stack and Muir (1992) report that active rather than passive touch is required to maintain infants' gaze and positive affect (smiling) whilst the mothers vocalizations and affect are precluded.

Stack and Muir (1990) identified that mothers touch their infants over 65% of the time during normal episodes of parent-infant interaction. However, Jean and Stack (2012) later explained that touch takes places between 55 and 99% of the time during parent-infant face-to-face interaction. The frequency of this touch indicates its importance to maternal-infant interaction (Koester *et al.*, 2000). There have however been no large scale cross-sectional or longitudinal studies conducted on tactile interactions between adults and infants during face-to-face interactions thus no norms for tactile interactions exist (Muir, 2002).

It is also reported that a high frequency of touch as well as inappropriate touch can have a negative impact on attachment (Weiss *et al.*, 2000). Historically, Lewis and Feiring (1989) made a link between insecure attachment and excessively stimulating or intrusive caregiving approaches that are inappropriate to the needs of the infant. In contrast, a more moderate amount of stimulation is related to better attachment outcomes (Weiss *et al.,* 2000).

When examining mother-infant touch, there are a variety of components that need to be taken into consideration. This is important because, as already mentioned, different types of touch have a unique influence on infant development (Ferber *et al*., 2008). Firstly it is important to consider the quantitative and qualitative dimensions of touch as well as the context in which the touch takes place (Muir, 2002). Koester (1995) describes the sub-types of touch as being either active, passive, a combination of active and passive or touch that facilitates movement. Feldman (2004) categorises parent touch as follows: affectionate touch, touch of the extremities, functional touch, proprioceptive touch and stimulatory touch.

In summary, several authors have suggested the means by which touch influences the mother-infant relationship as well as highlighted the importance of touch to the mother-infant relationship. This literature is however mostly based on descriptive research and is not substantiated by more rigorous research. Further research into touch is therefore required.

Caregiving maternal-infant touch is used in a variety of routines and activities of daily living. Touch in the context of some of these areas including: proximity, infant crying and carrying as well as massage will now be discussed.

2.4.4 Proximity and infant crying

In the 1970's, Bell and Ainsworth (1972) very aptly described the relationship between infant crying, seeking proximity and attachment. They explained that mammalian infants make use of two main types of attachment behaviours. Firstly, they actively seek proximity and maintain contact with a caregiver. Secondly, they signal to their caregivers in order for them to respond and come into closer proximity. Human infants lack the ability to actively seek proximity because of their physical immaturity at birth. They are however well equipped with crying as a signaling behaviour as a means to elicit a response from a caregiver and gain proximity (Bell & Ainsworth, 1972).

Proximity seeking behaviours begin soon after birth. Until the umbilical cord is cut, mother and infant are a "*Single biological organism*" (Phillips, 2013: 68). For several months after birth, the pair can also be described as a "S*ingle psychobiological organism*" (Phillips, 2013: 68). This is fittingly described by Gallagher:

> "*Mother and off-spring live in a biological state that has much in common with addiction. When they are parted the infant does not just miss its mother; it experiences a physical and psychological withdrawal from a host of her sensory stimuli not unlike the plight of a heroin addict who goes cold turkey" (*Gallagher, 1992: 13)*.*

From the infant's perspective, being separated from their place of warmth, nutrition and protection can be life threatening. There appears to be a universal response to this separation, firstly protest and then despair. Initially the infant will try and get the mother's attention by protesting with loud crying and increased activity. If these cries are not answered and the separation is prolonged, the infant will enter a state of despair. Crying and

increased activity will stop and the infant will become still (in other mammals this is understood to be a means of trying to avoid the attention of potential predators). During this state of despair, several of the bodily systems will slow down including the heart rate and metabolism and temperature will be lowered (Phillips, 2013). There are also potential long term, negative consequences of early separation, for example: reduced weight gain in early infancy, increased stress, suppression of the immune system, insecure attachment, social withdrawal, less play and more aggression (Feldman *et al.,* 2003; Phillips, 2013).

Research has found that, in the early postpartum period, infants separated from their mothers cry 10 times more frequently and have 40 times longer duration of crying than infants kept in skin-to-skin contact. Although crying may seem to be a norm for infants, frantic crying can be harmful. Separation can also result in other medical complications for infants, such as hypothermia, bradycardia, hypoglycaemia and hypoxemia (Henry et al., 2009; Phillips, 2013).

Not only is the infant's proximity seeking behaviour important but also the mother's responsiveness to this behaviour. A mother's responsiveness to her infant's cries has been specifically associated with positive infant developmental outcomes (Del Vecchio, Walter & O'Leary, 2009). Other authors have also agreed that it is preferable for mothers to be responsive to their infants' crying whereas allowing an infant to cry can be harmful (Sears & Sears, 2003; Narvaez, 2011).

In opposition to these views, others encourage the practice of controlled crying as a means to influence infant crying and sleeping behaviour (D'Agostino & Waldrop, 2014). Some authors also consider that there is some benefit in using discrepancy when responding to infant's cries. Del Vecchio *et al.* (2009) believe that one can shape an infant's behaviour by consistently responding to distressed infant cries and by ignoring (as opposed to reinforcing) non-distressed cries. This is considered an effective means of teaching an infant to cry when necessary but to rather use other more positive means of signalling in order to solicit social interaction (Hubbard & van Ijzendoorn, 1991; Del Vecchio *et al.*, 2009).

A different view comes from the Riem, Bakermans-Kranenburg, Pieper, Tops, Boksem, Vermeiren, van Ijzendoorn and Rombouts (2011) who studied the role of oxytocin and mothers' responses to infant crying. Oxytocin is known to positively influence maternal

sensitivity. It also enhances the way in which mothers respond to infant crying because it helps modulate the neural circuits that are involved in the perception of these cries (Riem *et al.*, 2011). Specifically, Oxytocin causes an increase in activation of the areas of the brain that are involved with empathy. On the other hand, it decreases activation of areas involved with anxiety and aversion (Gamer, Zurowski & BÜchel, 2010). This reduced activation of the anxiety and aversion centers influences mothers' behaviour by preventing them from over-reacting to their infant's crying (Riem *et al.*, 2011).

Oxytocin is not the only influencer of mothers' behaviour. Culture can also play a big role in maternal behaviour in relation to infant crying and proximity. A cross-cultural survey on maternal-infant interaction has identified touch, gaze and vocalisations as three components that are universal across different cultures. Traditional societies were found to use more tactile contact during interaction whereas Western societies made use of more distal means of co-regulation (Richter, 1995). In the !Kung San culture, mothers continuously carry their infants in skin-to-skin contact, co-sleep with their infants and feed them regularly. In European and North American cultures, caregiving involves more separation and delayed response in attending to infant crying (Phillips & Shonkoff, 2000).

A recent study was done comparing caregiver-infant dyads using proximal care routines versus those providing less contact to their infants. The study found that dyads using less contact stopped breastfeeding earlier, their infants cried 50% more at two and five weeks of age but their infants woke up less at night time in comparison to the proximal care dyads (St James-Roberts, Alvarez, Csipke, Abramsky, Goodwin & Sorgenfrei, 2006).

In summary, the literature on mother-infant proximity is mostly based on descriptive studies and there are conflicting views on infant crying and maternal responsiveness. This highlights the need for further research of these factors. The review will now examine proximity and infant carrying more closely.

2.4.5 Proximity and infant carrying

There are several ways in which infants are carried by their mothers. Some means increase maternal proximity such as holding in the arms or in a sling or soft carrier. Other means of carrying are more distal, such as carrying an infant in a baby seat.

Anisfeld, Casper, Nozyce and Cunningham (1990) conducted a randomised control study on the influence of close physical contact, by means of carrying infants in a soft carrier versus carrying infants in an infant seat, on maternal sensitivity and attachment. The study found that mothers who carried their infants in closer physical proximity were more responsive to their infants' vocalisations at three and a half months. Furthermore, these infants were more securely attached to their mothers at 13 months of age when compared to infants that received less physical closeness (carried in infant seats) (Anisfeld *et al.*, 1990). It should be noted that this study was conducted more than 20 years ago and has not since been repeated.

The findings are however supported by literature on baby wearing. Baby wearing, using a tool such as a sling or soft carrier, uses 16% less physical exertion than holding an infant in the arms (Wall-Scheffler, Geiger & Steudel-Numbers, 2007). It is reported that baby wearing has several benefits for infants. This means of carrying helps with infant weight gain, enhances speech, cognitive and social communication, improves regulation as well as reduces infant crying and colic (Sears & Sears, 2003).

An underlying reason for this may be found in the historical work of James Prescott (1975) who was the first to report the significance of touch and motion for "*normal neurointegration of the cerebellum-limbic-prefrontal cortex*" (Phillips, 2013: 69). Prescott (1975), in addition to his own research, also examined data from anthropological studies, detailing the practices of 49 primitive cultures. Prescott (1975) discovered that peacefulness versus violence was closely associated to maternal practices. Cultures, in which infants were carried on their mothers' bodies for the first 12 months of life, were found to be more peaceful cultures than those where mothers did not carry their infants. A link was also made between a longer duration of breastfeeding (more than two and a half years) and a very low or absent rate of suicide. Prescott (1975) surmised that movement and touch are vital and serve a protective function against depression and violence. It is also believed that direct body contact and infant carrying are essential for normal development (Phillips, 2013).

A study has also compared the effects of infant holding versus infant carrying (mother holding the infant while moving). They found that infants under the age of six months being carried exhibited less voluntary movement, less crying and a rapid reduction in heart rate

when compared to infants that were held by a mother that was sitting. The researchers explained that infants are wired to stop crying whilst being carried. This calming response of being carried is due to central, motor and cardiac regulations and appears to be "A *conserved component of mammalian mother-infant interactions*" (Esposito, Yoshida, Ohnishi, Tsuneoka, del Carmen Rostagno, Yokota, Okabe, Kamiya, Hoshino, Shimizu, Venuti, Kikusui, Kato & Kuroda, 2013: 739). The calming response is dependent on tactile and proprioceptive input and is mediated by the cerebellum and the parasympathetic nervous system (Esposito *et al.*, 2013).

In summary, studies on proximity and infant carrying are few and far between. There is a lack of current, rigorous research clearly defining optimal mother-infant carrying and proximity behaviours. The review will now shift focus from infant carrying to another important form of touch, infant massage.

2.4.6 Infant Massage

Infant massage is an alternative therapy and an important source of nurturing touch between infants and caregivers (Field, 2014). The benefits of infant massage have been well established (Field, 2014). Massage can be used as a means of intervention or treatment. It has been found to help improve weight gain, increase alertness and activity as well as result in early discharge from hospital in a population of premature infants (Field, 2014). Similarly, in a population of cocaine-exposed and HIV-exposed infants, massage therapy resulted in a reduction of stress behaviours, improved weight gain and superior performance on the Brazelton Neonatal Behavioural Assessment Scales than the control group counterparts (Field, Grizzle, Scafidi, Abrams, Richardson, Kuhn & Schanberg, 1996; Ireland & Olson, 2000; Diego, Field & Hernandez-Reif, 2014).

Massage is also valuable for healthy full-term infants. In a study examining the influence of massage on infants born to depressed mothers, it was found that infants receiving massage demonstrated less crying, signs of reduced stress, improved weight gain and spent more time in interactive alert states (Field *et al.*, 1996). These infants also showed greater improvement on sociability, emotionality and soothability temperament factors (Field *et al.*, 1996). It has also been suggested that massage may be a helpful intervention to use with

infants who have a deficit with another sensory channel (such as a hearing or visual impairment) as these infants may be especially responsive to touch (Koester *et al.*, 2000).

Infant massage is also beneficial for mothers. It can assist in improving maternal sensitivity, decreasing maternal depression and anxiety and positively influencing the mother-infant relationship (Onozawa, Glover, Adams, Modi & Kumar, 2001; Feijo, Hernandez-Reif, Field, Burns, Valley-Gray & Simco, 2006; Bennett, Underdown & Barlow, 2013).

The review will now examine the existing literature on how early skin-to-skin contact influences mother-infant proximity and touch.

2.4.7 The influence of skin-to-skin contact on mother-infant proximity and touch

It has been suggested that skin-to-skin contact has a positive influence on maternal-infant tactile interactions. Anderson, Chiu, Dombrowski, Swinth, Albert and Wada (2003) report that skin-to-skin contact increases mothers desire to hold their infants. This is supported by the descriptive findings of Finigan and Davies (2004) who examined women's lived experience of skin-to-skin contact after birth with their infants. They found that mothers that experienced early skin-to-skin contact with their infants felt a desire to touch and stroke their infants as well as did not want to let their infants go (Finigan & Davies, 2004). Similarly, in studies conducted on early contact and infant abandonment in maternity wards, it was found that skin-to-skin contact, early suckling and rooming-in significantly reduced the rate of infant abandonment in countries such as Thailand, Russia, Costa Rica and the Phillipines (Buranasin, 1991; Kennell & McGrath, 2005). The International Childbirth Education Association (2015) also report that mothers that experience skin-to-skin contact after birth request less time for their infants to be cared for in the nursery in comparison to dyads that did not experience early skin-to-skin contact. This is supported by a randomized control study by Widström, Wahlberg, Matthiesen, Eneroth, Uvnäs-Moberg, Werner and Winberg (1990). They compared mothers of infants that had experienced early skin-to-skin contact together with touch or licking of the mother's breast (within 30 minutes after birth) and mothers that did not have this early contact. They found that skin-to-skin mothers left their infants in the nursery for a significantly shorter time, over the duration of their hospital stay,

in comparison to non-skin-to-skin mothers. This study is however based on population of first world mothers and infants and has not been substantiated by more current research.

Skin-to-skin contact does not only appear to influence maternal-infant proximity but also maternal-infant touch. Feldman *et al.* (2002) found that mothers that had experienced skin-to-skin contact with their premature infants tended to touch them more than mothers who did not experience skin-to-skin contact (Feldman *et al.*, 2002).

This is supported by another study that examined the influence of maternal-infant skin-to-skin contact on family interaction and touch with a population of preterm infants at three months corrected age. It was found that early skin-to-skin contact resulted in less intrusiveness, higher sensitivity and parent-infant reciprocity, less negative emotion in infants and more parent-to-infant affectionate touch (Feldman *et al.*, 2003).

Some research has also focused on the influence of skin-to-skin contact on later maternal touch behaviours with full term infants. This research started in the 1970s when Hales, Lozoff, Sosa and Kennell (1977) examined the touch behaviours (at 36 hours postpartum) of various mother-infant dyads from impoverished backgrounds. Some of the dyads experienced immediate skin-to-skin contact and others were separated after birth. The study found a statistically significant effect of early skin-to-skin contact on affectionate touch, proximity maintaining and care-taking behaviours. These findings were supported by a study that looked at affectionate touch during feeding, also within 36 hours postpartum, that resulted in comparable outcomes to Hales' study (Anisfeld & Lipper, 1983).

On the contrary, Svejda, Campos and Emde (1980) also examined affectionate touch, proximity maintaining and care-taking behaviours at 36 hours postpartum and only found marginal differences in favour of skin-to-skin dyads in comparison to dyads that had been swaddled after birth. This was similar to Curry (1979) who also found no significant difference between affectionate touch during feeding on day two postpartum between skin-to-skin dyads and dyads in which infants were swaddled.

A possible dose-response relationship is suggested in the systematic review by Anderson *et al.* (2007). They concluded that the effects of skin-to-skin contact on positive maternal touch

behaviours were more significant when compared to dyads that were separated after birth than dyads that were swaddled but still held after birth (Anderson *et al.*, 2007).

The review also suggests that the effects of skin-to-skin contact on touch behaviours attenuated over time with less significant results at three months postpartum (De Chateau & Wiberg, 1977; Curry, 1979; Anderson *et al.*, 2007). They do however caution not to draw definite conclusions from these studies because of the variability in intervention, comparison and outcomes measures (Anderson *et al.*, 2007). It should also be noted that many of these studies are dated and that there is a lack of more current research on the influence of skin-to-skin contact on maternal touch behaviours.

In summary, some evidence exists to say that skin-to-skin contact positively influences maternal touch behaviours but this evidence is variable and dated. There was also no literature found on the influence of skin-to-skin contact on touch in daily living including self-report proximity and touch behaviours as well as factors such as infant carrying and massage.

2.5 Maternal-infant bonding

2.5.1 An introduction and historical view of the mother-infant relationship (bonding and attachment)

A bond is considered to be ‘‘A *close emotional relationship between two persons, characterised by mutual affection and a desire to maintain proximity’’* (Shaffer, 2002: 388). In this review the focus is on the bond between a mother and her infant. The mother-infant relationship begins in early infancy and is affected by various factors (Spinner, 1978). Insel and Young describe this relationship as being “*intrinsically important*” as well as “*intrinsically difficult to study*” (Insel & Young, 2001: 129).

Psychologist, Harry Harlow, was one of the first researchers to investigate bonding and attachment. His work established that various sensory, motor and cognitive processing was involved in the formation of bonds. This multi-sensory processing included predominately olfactory and visual stimuli. Motor responses comprised of defensive behaviours, proximity seeking and nurturing responses. Cognitive factors included functions that linked sensory

input and motor output including memory, attention, social recognition and motivation (Insel & Young, 2001).

At a similar time to Harlow's research, John Bowlby was commissioned by the WHO to research the mental health of European homeless children following the widespread social displacement after the Second World War (World Health Organization, 2004). Following his initial research, Bowlby concluded that in order for infants and young children to develop good mental health they required a warm and continuous relationship with their mothers (or primary caregiver) in which both experienced satisfaction. Bowlby conceptualised that this primary relationship was as important for the child's survival and development as the provision of food, physical care and stimulation (World Health Organization, 2004).

The work of Harlow and Bowlby laid the foundation of understanding of mother-infant bonding. More recent literature helps us understand the importance of this relationship.

2.5.2 The importance of the mother-infant relationship for infants

The development of an early, positive attachment relationship has both short and long term benefits for infants. In childhood, the quality of this early relationship is integral to a child's socio-emotional, cognitive and language development as well as the child's future mental health (Parfitt, Pike & Ayers, 2013). In adulthood, it is associated with lower rates of physical and mental health problems as well as better lifestyle practices (in relation to drug use, smoking and high risk sexual behaviour) (Ranson & Urichuk, 2008; Cooper *et al.,* 2009). Ranson and Urichuk (2008) do however point out that many of the studies examining the short and long term outcomes of early positive attachment do not control for other variables such as stress or changes in life circumstances. The WHO also reports a lack of research conducted on the association between early childhood relationships and survival, growth and physical health outcomes thus indicating a need for more conclusive evidence (World Health Organization, 2004).

2.5.3 The influence of skin-to-skin contact on the mother-infant relationship

The first research linking skin-to-skin contact and the mother-infant relationship took place in the 1970's. It was suggested by Kennell, Jerauld, Wolfe, Chester, Kreger, McAlpine, Steffa and Klaus (1974) that the maternal-infant bond as well as infants' overall development may

be influenced by early and extended contact directly after birth. Kennell *et al.* (1974) conducted a study which found that mothers who had longer periods of contact with their newborn infants were more attentive and responsive to their infants at one month, in comparison to mothers who were separated from their infants after birth. It was also thought that disruption of the bonding process, such as early separation between mother and infant, may negatively influence bonding and result in emotional distress in later adulthood (Klaus, Jerauld, Kreger, McAlpine, Steffa & Kennell, 1972). The findings by Klaus *et al.* (1972) and Kennell *et al.* (1974) were however refuted by several other authors over the next few years (Lamb, 1982; Goldberg, 1983; Myers, 1984). These authors stated that mother-infant contact after birth did not have a significant effect on bonding (Lamb, 1982; Goldberg, 1983; Myers, 1984; Eyer, 1994).

Kennell and McGrath (2005), later said that the establishment of a bond between mother and newborn is essential for the infant to thrive and grow in their mother's care. They believe that hospital staff can promote the formation of this bond by providing support during labour, placing the infant in skin-to-skin contact on the mother's trunk directly after birth until the first breastfeed, encouraging the mother and infant to stay together in the first few days after delivery and by promoting continuous breastfeeding (Kennell & McGrath, 2005). Once again in the current literature, separation of mothers and infants has been highlighted as potentially harmful. Bergman and Bergman (2013) report that mother-infant separation, in the early postpartum period, disrupts crucial infant brain development required for bonding. Separation also causes stress hormone levels to rise in the infant which in turn can cause physiological instability (Phillips, 2013).

Bystrova, Ivanova, Edhborg, Matthiesen, Ransjő-Arvidson, Mukhamedrakhimov, Uvnäs-Moberg and Widström (2009) conducted a randomised study on the influence of skin-to-skin contact on mother-infant interaction. They found that immediate skin-to-skin contact for 25 minutes to two hours after birth together with early suckling resulted in improved maternal sensitivity as well as better dyadic reciprocity and mutuality at one year after birth when compared to dyads that were separated after birth. There was however no statistical significance when the skin-to-skin dyads were compared to dyads that were dressed or swaddled and held after birth. The study also found that other forms of support to the

dyadic relationship, such as roooming-in, did not compensate for the effects of two hours of separation for the dyads from the separation after birth group. The authors felt that this finding supported the notion of a sensitive period after birth whereby close contact between mothers and infants may have a positive long-term effect on their relationship (Bystrova *et al.*, 2009).

Previous research has also found that the first two hours after birth are an especially sensitivie period for mothers and infants (Insel & Young, 2001; Moore & Anderson, 2007; Caruana, 2008). There are however several other authors that refute this notion (Svejda *et al.,* 1980; Herbert & Sluckin, 1982; Goldberg, 1983; Eyer, 1994).

Other studies have focused less on the first two hours after birth and more on the total amount of skin-to-skin contact in the postpartum period as well as the effect of the dose-response of skin-to-skin contact. In this regard, Bigelow *et al.* (2010) conducted a randomised control study and found that the amount of skin-to-skin contact in the first 24 hours after birth was positively correlated with later maternal sensitivity at one year after birth assessed using two different meaures. They also identified a positive correlation between the amount of time spent in skin-to-skin contact over the first 24 hours after birth and the the amount of time spent in skin-to-skin contact in the first month after birth (Bigelow *et al.*, 2010).

Similarly, Bigelow and Power (2012) also studied the effects of extended skin-to-skin contact beyond the newborn period, specifically focussing on infants' social-emotional development in the context of mother-infant interaction. They compared the responses of infants that had either had over 4000 minutes (experimental group) or less than 4000 minutes (control group) of skin-to-skin contact over the first month postpartum during the still-face paradigm. They found that the experimental infants showed an awareness of changes in their mother's affect during the still-face phase at one month whereas infants from the control group only did so at two months. At three months, only the experimental group increased vocalisations during the still-face phase indicating the use of socially bidding as a means to re-engage their unresponsive mothers. They concluded that early skin-to-skin contact facilitated infants' sensitivity and responses to their mothers, as well as expectations for her behaviour (Bigelow & Power, 2012).

Bigelow and Power (2012) suggest two reasons for why skin-to-skin contact may enhance bonding, attachment and infants' social-emotional development in the context of the mother-infant relationship. Firstly they state that skin-to-skin contact helps to promote the quiet alert state in the early postpartum period. This is an important state for taking in information from the outside world and thus promoting cognitive and social-emotional development. Secondly, skin-to-skin contact stimulates the release of oxytocin in mothers and infants. Oxytocin promotes positive maternal mood states and facilitates maternal affiliate behaviours which results in more frequent and positive mother-infant interaction which in turn supports both bonding and attachment (Bigelow & Power, 2012). Winberg (2005) reports that studies examining positive influences on maternal behaviour, in both the short and long term, are especially relevant in high risk situations as they may help to reduce parenting failures especially in vulnerable families.

In summary, there is some evidence to say that skin-to-skin contact enhances the mother-infant relationship yet the methodology and outcome measures of the studies are very variable.

2.5.4 Other factors that influence the early mother-infant relationship

There are several factors related to the mother and/or infant that can influence the bonding process. This includes mother-infant touch and mother's well-being and mental health (Spinner, 1978). Touch and the mother-infant relationship have already been discussed. This review will now shift focus to the influence of maternal mental health on the mother-infant relationship.

Maternal mental health and the mother-infant relationship

Maternal mental health refers to psychological well-being of mothers during pregnancy, childbirth and the postpartum period (World Health Organization, 2008). Maternal mental ill-health does not only affect mothers, it also affects their children and society in general (World Health Organization, 2008; Meintjes, Field, Sanders, van Heyningen & Honkiman, 2010).

This is of particular importance to the South African context where levels of maternal mental ill-health are higher than in more developed countries and other developing nations

(Tomlinson, Grimsrud, Stein, Williams & Myer, 2009; Meintjes *et al.,* 2010). Common mental disorders such as depression and anxiety are prevalent in informal and low-income settings (Saxena, Thornicroft, Knapp & Whiteford, 2007). In South Africa, these rates are estimated to be as high as 35% in a peri-urban area and 41% in a rural setting (Cooper, Tomlinson, Swartz, Woolgar, Murray & Molteno, 1999; Rochat, Richter, Doll, Buthelezi, Tomkins & Stein, 2006).

The are several negative effects of maternal mental ill-health including a higher incidence of preterm deliveries, caesarean-section deliveries and prolonged labour, delayed initiation or early discontinuation of breastfeeding as well as reduced sleep and appetite and self-medication with drugs and alcohol (World Health Organization, 1998; Cooper *et al.,* 1999; Rahman, Iqbal, Bunn, Lovel & Harrington, 2004; Lusskin, Pundiak & Habib, 2007; Medhin, Hanlon, Dewey, Alem, Tesfaye, Lakew, Worku, Aray, Abdulahi, Tomlinson, Hughes, Patel & Prince, 2010; Meintjes *et al.,* 2010).

Infants of mothers affected by mental ill-health may also be more at risk. These mothers are less likely to access health care services timeously if their infants are ill thus leading to higher rates of infant mortality and loss of development potential (Medhin *et al.*, 2010; Meintjes *et al.*, 2010). Mothers with mental health difficulties are also more likely to have delayed initiation and early discontinuation of breastfeeding which may result in neonatal mortality, increased rates of infant diarrhoea and impaired mother-infant bonding which can affect infants' self-regulation of emotion and behaviour (World Health Organization, 1998; Medhin *et al.,* 2010; Meintjes *et al.,* 2010).

In the long term, maternal mental health difficulties may affect childrens' motor skills, cognitive development, language development, memory and adaption to stress (Price & Proctor, 2009; Meintjes *et al.*, 2010). These children are also more likely to develop asthma, alcohol addiction, schitzophrenia, attention deficit and hyperactivity disorder and anti-social behaviour (Meintjes *et al.*, 2010).

Maternal mental health has also been highlighted as an integral factor in mother-infant bonding (Taylor, Atkins, Kumar, Adams & Glover, 2005). Pre- and posttnatal depression is associated with long term reduced maternal responsivess as well as suboptimal mother-

infant interaction and attachment (Pearson, Melotti, Heron, Joinson, Stein, Ramchandani & Evans, 2012; Meintjes *et al.,* 2015). Even unrecognized and mild depressive symptoms within the first four months postpartum have been found to negatively influence bonding (Moehler, Brunner, Wiebel, Reck & Resch, 2006). Similarly, stress and anxiety have also been found to negatively impact bonding (Ranson & Urichuk, 2008; Feldman, 2012a; Muzik, Bocknek, Broderick, Richardson, Rosenblum, Thelen & Seng, 2013).

The WHO advise that specific interventions are needed to address adverse maternal mental health to prevent dysfunctional caregiving and poor long term infant outcomes (World Health Organization, 2008). One such intervention is early skin-to-skin contact. As previously discussed, skin-to-skin contact can positively influence maternal mental health by promoting maternal mood, perceptions of infants and maternal sensitivity (Dalbye, Calais & Berg, 2011; Bigelow, Power, MacLellan-Peters, Alex & McDonald, 2012).

Bigelow *et al.* (2012) conducted a study on the effects of skin-to-skin contact on postpartum depression symptoms. The results showed that mothers that had experienced daily skin-to-skin contact had significantly lower scores on the depression scales at one week, marginal lower scores at one month and no significant difference in scores at two and three months postpartum in comparison to mothers that provided little or no skin-to-skin contact (Bigelow *et al.*, 2012).

In contrast, Bigelow *et al.* (2010) found that skin-to-skin contact in the first 24 hours after birth had a significant positive influence on later maternal sensitivity (between three and eleven months after birth). In contrast, an association has also been identified between reduced maternal psychological well-being and delayed contact between mothers and infants after birth (Rowe-Murray & Fisher, 2002).

In summary, the literature demonstrates that poor maternal mental health can have a negative impact on the mother-infant relationship as well as infant developmental outcomes. There is some evidence to say that skin-to-skin contact may positively influence maternal mental health but once again the literature is limited and very variable. The review will now look at how the mother-infant relationship is associated with infant's social-emotional development.

2.6 Social-emotional development in infants

Social-emotional skills include awareness of self and others (identifying and understanding feelings), mood management, self-motivation, empathy and the management of relationships (Goleman, 1995). Greenspan *et al*., (1998) believe that social-emotional development forms the foundation for the development of cognitive, language and adaptive life skills. Social-emotional skills also help equip individuals to deal with stress and persevere through difficult situations as adults (The Early Childhood Direction Center, 2009). Schore explains that early social interaction is integral to the development of social-emotional skills. He stated the following: "*The infant's transactions with the early socio-emotion environment indelibly influence the evolution of brain structures responsible for the individual's socio-emotional functioning for the rest of the life span*" (Schore, 1994: 10).

Insel and Young (2001) relate this early social interaction to continuous parental care, which they understand to be essential to infants' survival and psychosocial development. Similarly, Case-Smith (2013) relates the development of social-emotional skills to the formation of a bond between an infant and their caregivers. In this early social relationship, the infant communicates their needs and the caregiver comforts and meets these needs by feeding, touching, rocking and soothing (Case-Smith, 2013). Social-emotional skills in this early age are thus synonymous with caregiver-infant bonding. To support the development of social-emotional skills parents should provide their infants with responsive, predictable and consistent care that is affectionate and nurturing (Zero to Three, 2010; O'Brien & Lynch, 2011).

2.6.1 Social-emotional development in a high risk population

Infants that do not receive consistent and responsive care may be at risk for delayed or impaired acquisition of social-emotional skills. Contextual factors influencing the care that caregivers provide thus impacts on the child's social-emotional development (Bigelow & Power, 2012). These contextual factors include social adversity and maternal mental health. Cooper, Landman, Tomlinson, Molteno, Swartz and Murray (2014) report that there is extensive evidence demonstrating the harmful effect that social adversity and poor maternal mental health have on the mother-infant relationship, and thus the development of infants'

social-emotional skills. Furthermore, infants with disabilities are also at risk for poor social-emotional development (Case-Smith, 2013; Schein & Langlois, 2015).

More specifically, infants and young children with disabilities may be delayed in their ability to display attachment related behaviours (such as smiling and vocalisations) which can adversely affect their mothers' behaviour towards them. This cycle can have a negative influence on the bonding and attachment process which in turn disrupts the development of social-emotional skills (Malekpour, 2007). Schein and Langlois (2015) have also found that atypical and unattractive infant faces elicit more negative affect from adults. Attractive infants tended to elicit more protection reactions from adults whereas mothers used less smiling and decreased vocalisations with infants with craniofacial anomalies. Thus infants with atypical facial features may be at risk for poor bonding with caregivers (Schein & Langlois, 2015).

According to Field (1995) and Bigelow and Power (2012), research investigating interventions to help reduce the impact of disability or contextual factors on infants' social-emotional development typically involve using high risk populations. It is however crucial to firstly ascertain whether a proposed intervention can help facilitate early social-emotional development in low-risk infants (Bigelow & Power, 2012). In agreeance with this, O'Brien and Lynch (2011) have also stated that it is important to study interactions in typical situations in order to understand how compensatory methods work in atypical situations.

The WHO has reported a lack of research on the development of social-emotional skills within developing countries (World Health Organization, 2004). Research on the development of social-emotional skills is also lacking more specifically in the field of occupational therapy. Case-Smith (2013) conducted a systematic review of articles on occupational therapy interventions used to promote young children's social-emotional development. She examined 23 studies that covered the following intervention themes: touch based interventions, relationship based interventions, joint attention interventions, naturalistic preschool interventions and instruction based interventions. Of these different interventions, only touch and relationship based interventions were appropriate for use with infants under the age of 12 months. Case-Smith (2013) identified merely two randomised

control trials and one non-randomised control trial that supported the effectiveness of touch based interventions on infants. Low positive effectiveness was found across four studies that examined relationship based interventions. Case-Smith concluded that further research into these interventions by occupational therapy scholars was needed (Case-Smith, 2013). The AOTA has also specifically highlighted skin-to-skin contact, a touch and relationship based intervention, as a priority research area as further evidence is required to support its use as an intervention method (The American Occupational Therapy Association, 2014b).

In summary, further research into interventions that support mother-infant bonding and thus the development of social-emotional skills is required.

2.7 Conclusion

In conclusion, this literature review has established preliminary research to say that early skin-to-skin contact positively influences breastfeeding, mother-infant bonding and positive touch behaviours between mothers and infants. A link was also established between touch and the mother-infant relationship. Much of this research is however inconclusive due to the variability of the studies and because many of the studies are dated. There is also a lack of research within the South African context.

Further research into interventions supporting the mother-infant relationship is important in the field of occupational therapy because it will help broaden the knowledge of how to positively impact on infants' social-emotional development. This study will therefore be examining skin-to-skin contact as a means of intervention to support the mother-infant relationship within a typical context.

This information can then be applied to atypical contexts, such as: a mother experiencing difficulties with her mental health or an infant born with a disability. In these types of contexts, it has been established that infants are especially susceptible for poor bonding with caregivers and suboptimal social-emotional development.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter reports on the methodology used to conduct the study. This includes the research design, the study population, sampling, data collection tools, procedure, data analysis and the chapter concludes with the ethical considerations and logistics of the study. This chapter also considers the decisions that were made in order to ensure rigour.

3.2 Study design

A quantitative correlational study design was used to address the research question.

This study explored the relationship between variables without manipulation; therefore a quantitative correlational study design was used. Correlational research tests for a statistical relationship between different variables that are not manipulated by the researcher (Thompson, Diamond, McWilliam, Snyder & Snyder, 2005). In this study, the relationship between early skin-to-skin contact for at least two hours and the following variables were examined: breastfeeding, bonding, touch in daily routine and tactile interactions. A control group that did not experience early skin-to-skin contact for two hours was also examined. Although correlational research is able to detect a relationship between variables as well as allow for general predictions, it cannot determine with certainty, the direction of the relationship or identify the cause and effect (Waters, 2015). This type of research also needs to be interpreted with caution because identifying a correlation does not necessarily imply that a causal relationship has been found (Waters, 2015). A null hypothesis (Section 1.7) was also tested for statistical significance (McCrum-Gardner, 2010).

3.3 Selection of participants

3.3.1 Study population

The study population consisted of mother-infant dyads within the private health care sector in Gauteng, South Africa. The private health care sector was deemed most appropriate as

there were maternity facilities both with and without BFHI status that were accessible to the researcher. Facilities with BFHI status have undergone and passed an external assessment to ensure that their policies and practices support early skin-to-skin contact after birth, as one of the ten steps of the BFHI (United Nations Children's Fund & World Health Organization, 2009). In hospitals that did not have BFHI status, it was an indication that skin-to-skin contact was not necessarily part of the hospitals' daily practices. Recruitment from hospitals with and without BFHI status was done to increase the likelihood of obtaining dyads for both the experimental and control groups of the study.

Dyads that experienced at least two hours of skin-to-skin contact directly after birth formed the experimental group whereas dyads that did not experience skin-to-skin contact for two hours formed the control group. Facilities with BFHI status where early skin-to-skin contact was standard practice allowed for the recruitment of dyads for the experimental group. Facilities without BFHI status where early skin-to-skin contact was not standard practice allowed for the recruitment of dyads for the control group.

3.3.2 Sampling method

Recruitment of maternity facilities

In order to recruit participants, the researcher first had to recruit maternity facilities where participants would be giving birth. A convenience, purposive sampling method was used to recruit maternity facilities to take part in the study (Kielhofner, 2006). Facilities were chosen according to their accessibility as well as their BFHI status.

Recruitment of participants

The researcher acquired a convenience sample by recruiting participants (mother-infant dyads) that met the inclusion criteria of the study and were accessible to the researcher (Kielhofner, 2006).

3.3.3 Sampling procedure

Six maternity facilities were approached, five of which operate under hospital organisations. This included two facilities with BFHI status and four facilities without BFHI status. Only three of the facilities granted permission to be a part of the research. This included one facility with BFHI status and two without.

There were two different recruitment procedures followed for the different participating maternity facilities. This was dependant on the ethical permission obtained; which is detailed under Ethics (Section 3.7).

In the first procedure, for the two facilities (without BFHI status) that fell under a hospital organisation, consent was required prior to hospital admission. Participants were therefore invited to take part in the study during their attendance at the maternity facility antenatal class. The researcher presented a brief outline of the study during the antenatal class. In this outline, participants were informed that the study was examining mother-infant interaction (including contact after birth and interaction at the 6 to 8 week follow up) as well as mothers' feelings towards their infants. Participants were not informed that the exact duration of skin-to-skin contact that took place after birth or the amount and type of touch during the face-to-face interaction was of particular importance. This was done in order to avoid potential behavioural bias and ensure that natural interactive behaviour could be examined.

Furthermore the researcher was available in a private area during the tea time break for potential participants, of their own volition, to sign up or ask any questions as well as receive written information about the study. The researcher remained in contact with the participants that had signed up for the study and with their prior consent, visited them during the latter part of their postnatal stay or at home if discharge had already taken place.

In the second procedure, for the independent maternity facility (with BFHI status), consent was not required prior to hospital admission. Participants were therefore invited to take part in the study during their postnatal stay at the maternity facility. Potential participants were approached privately and provided with verbal and written information regarding the study and invited to participate. Potential participants were not approached within at least the first 24 hours after birth to ensure adequate recovery time, as specifically requested by the facility manager.

3.3.4 Inclusion and exclusion criteria

The inclusion and exclusion criteria requirements for selection of participants were as follows:

Inclusion criteria:

- Primiparous and multiparous mothers who gave birth to healthy full term infants at private maternity facilities
- Vaginal and caesarean section deliveries
- Mothers who did not have to return to work for at least two months after giving birth and who intended to be their infant's main caregiver over this period.

Exclusion criteria:

- Mothers with infants that were born prematurely or with a low birth weight (of less than 2.5 kg)
- Mothers and/or infants who required emergency medical treatment before or after birth or suffered from a significant illness in the first two months after birth
- Mothers who had given birth to multiple infants e.g. twins or triplets.

3.3.5 Sample size

This study made use of a total sample size of 41 participants. A power calculation was done in order to determine the required sample size. This took into account three factors, namely: the significance level, power and effect size. Power gives the probability of rejecting the null hypothesis when the alternate hypothesis is true (McCrum-Gardner, 2010).

A sample size of at least 20 participants per group (a total of at least 40 participants) with a confidence interval of +/- 0.46 was calculated. This calculation was based on information from previous research. The alpha score was set at 5% and the power score set at 80%, which is considered to be the minimum acceptable level (McCrum-Gardner, 2010). The standard deviation score of 2 was taken from a study conducted by Bystrova *et al.* (2009). This study examined the influence of skin-to-skin contact versus separation after birth on mother-infant interaction. A difference of 1.3 in means (used as the desired effect to be detected in the power calculation) was identified in a study examining the influence of skin-to-skin contact versus standard contact with healthy infants on affectionate touch between mothers and infants (Anderson *et al.,* 2007). The correlation with covariate score of 0.69 was taken from a study by Bigelow *et al.* (2010) examining the correlations between skin-to-skin contact and scores from the Maternal Behaviour Q sort test.

3.4 Data collection tools

Data collection tools were chosen and/or developed according to their ability to gather the data required to achieve the aim and objectives of the study. This included the following:

1. Contact questionnaire developed by the researcher in order to gather self-report information regarding the quantity and quality of mother-infant contact after birth (Appendix A1).

2. Tactile questionnaire developed by the researcher including a section of the Maternal-Infant Touch Survey (MITS) by D'Agostino and Waldrop (2012) to gather self-report information regarding mother-infant touch in daily routine (Appendix B1).

3. Mother-to-Infant Bonding Scale (MIBS) by Taylor *et al.* (2005) to gather data regarding mother-infant bonding (Appendix C1).

4. Mother-infant interaction task (Koester, 1995; Feldman, 2004) for observational data of mother-infant touch (Appendices D1 and D2).

See Figure 3.1 for an overview of the points of contact with participants, the data collection instruments used and how these relate to the study objectives.

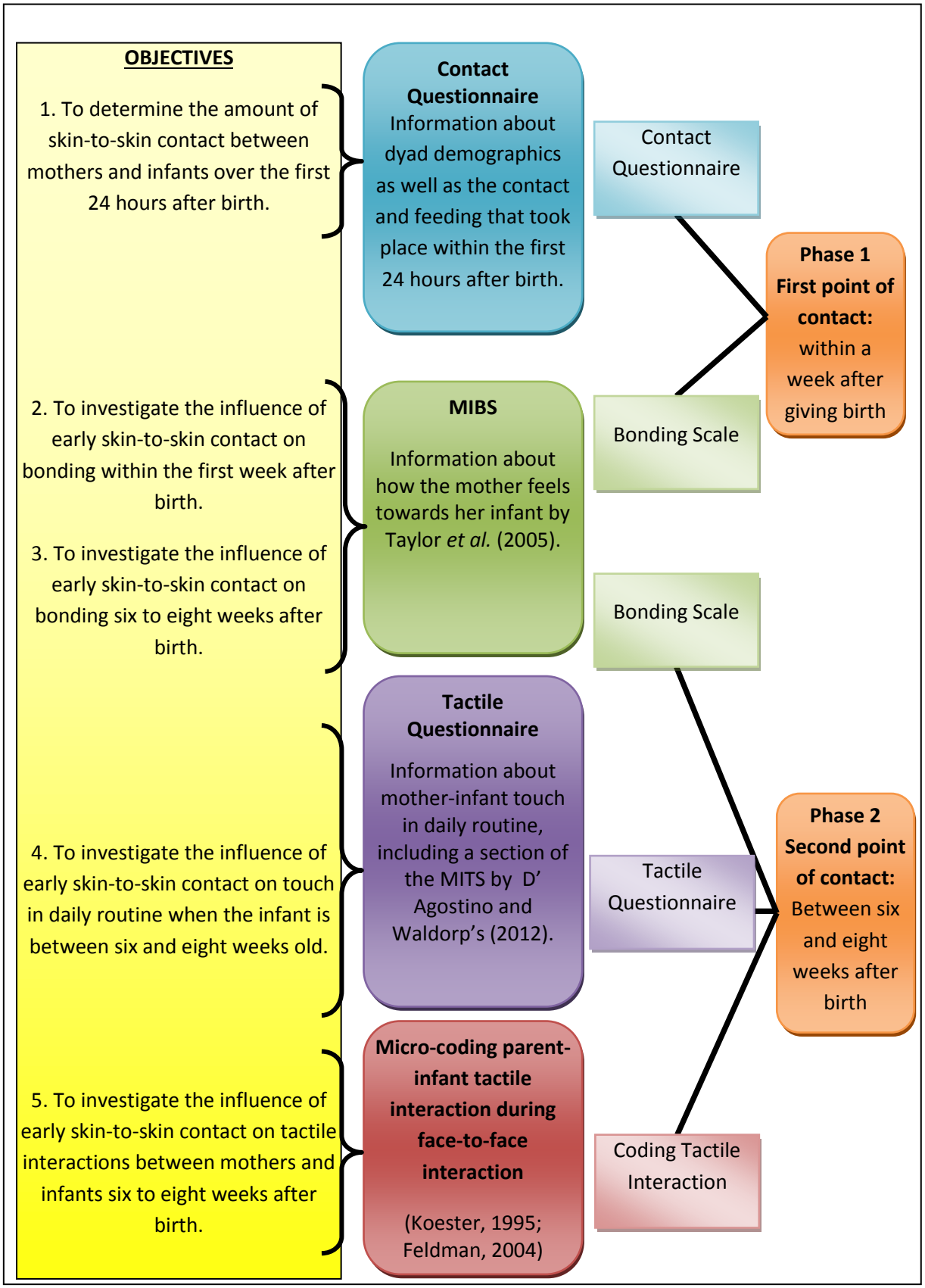


Figure 3.1 Flow diagram indicating the data collection instruments and how these relate to the study objectives and points of contact with participants.

3.4.1. The contact questionnaire (researcher developed; Appendix A1)

The contact questionnaire was developed by the researcher because no pre-existing measure could be found, during an extensive literature review, to meet the requirements of the first and second objectives of the study. The contact questionnaire was thus specifically designed to gather information for these objectives of the study.

Development of the contact questionnaire

The contact questionnaire underwent several stages of development. This included:

- Phase one: determining the purpose of the questionnaire and deciding on the content of the questionnaire through consultation with a subject specialist and review of the literature (Rattray & Jones, 2007).
- Phase two: questionnaire development including deciding on the types of scales to use and generating items for the questionnaire (Rattray & Jones, 2007).
- Phase three: review of the questionnaire by a panel of professionals, piloting of the questionnaire and checking reliability and validity (Rattray & Jones, 2007).

Each phase of development will now be explained in greater detail:

Phase one

A subject specialist (a leading researcher on skin-to-skin contact and an author of over 10 peer reviewed articles on the topic) was consulted via email during the research proposal phase of the study. He advised the following regarding questionnaire content and development:

- **Use different hospitals** where the post birth routine or attitude towards skin-to-skin contact is variable to prevent getting a sample that is homogenous.
- **Try and capture the total amount of skin-to-skin contact** in enough detail to tease out which is the most important part. If possible, compare no skin-to-skin to some skin-to-skin. Bramson *et al.* (2010) found a dose response in their study on skin-to-skin contact.

- **Collect as much accurate and extensive data regarding contact over the first 24 hours** as was done in the study by Bigelow *et al.* (2010). In this way the data can then be analysed to see whether separation negated the effects of skin-to-skin contact.

- **Gather information about the first suckling** at the breast.

- **Log the total time the infant spent in the nursery as well as visitors and contact with others**. This information can be used for further analysis to see if it predicted a poorer outcome (Subject specialist 2014, personal communication, 7 June).

Furthermore the researcher conducted a literature review which helped to inform the purpose of the questionnaire and what specific information needed to be gathered by the questionnaire. The following research was used to help guide the development of specific questions:

- **Parity of the mother** which is considered to be an important factor when examining the influence of skin-to-skin contact (Feldman *et al.,* 2002; Bystrova *et al.,* 2009; Chiu & Anderson, 2009; Widström *et al.,* 2011; Svensson *et al.,* 2013). Ferber (2004) also identified that parity can affect touch interactions between mothers and infants. It was found that multiparous mothers provided a greater variety of touch in comparison to primiparous mothers (Ferber, 2004).

- **Immediate skin-to-skin contact** which was highlighted by the evidence for the ten steps to successful breastfeeding (World Health Organization, 1998). Immediate skin-to-skin following birth has also been highlighted by several authors as well as is a main feature in studies on skin-to-skin contact (Kennell & McGrath, 2005; Mörelius, Theodorsson & Nelson, 2005; Dalbye *et al.,* 2011; Widström *et al.,* 2011; Phillips, 2013; Svensson *et al.,* 2013).

- **Skin-to-skin contact for at least two hours after birth** which is considered the optimal time for infants to initiate breastfeeding behaviours after birth (Gomez Baiges, Batiste, Marca, Nieto & Closa, 1998). This two hour time frame has also been used in several studies on skin-to-skin contact and early mother-infant bonding (Insel & Young, 2001; Moore & Anderson, 2007; Caruana, 2008).

- **Overall time spent in skin-to-skin contact over the first 24 hours after birth as well as general contact versus separation.** Obtaining this information was also advised by the subject specialist. A look at total skin-to-skin time was used in studies conducted by Anderson *et al.* (2003), Mizuno *et al.* (2004), Bigelow *et al.* (2010), Bigelow and Power (2012) and Bigelow *et al.* (2012)**.**

- **Number of persons that held the infant during the first 24 hours:** also advised by the subject specialist as well as recommended as an area of further research by Feldman *et al.* (2002) and Henry *et al.* (2009).

- **Infant feeding after birth:** Widström *et al.* (2011) identified early suckling at the breast soon after birth as an important part of establishing breastfeeding. Kennell and McGrath (2005) also discussed the correlation between an infant touching their mother's breast within an hour after birth and the mother choosing to keep her infant in the room with her for 100 minutes longer during her hospital stay when compared to mothers that did not have early contact with their infants.

- **Intent to feed:** As previously mentioned the literature leads us to believe that early contact and suckling leads to better establishment and outcomes of breastfeeding thus the researcher wanted to investigate at this point what the mother's plan was for infant feeding and whether skin-to-skin contact was related to this. Bramson *et al.* (2010) also highlighted intent to feed as a confounding variable to breastfeeding outcomes.

Phase two

Following consultation with the subject specialist and review of the literature, the researcher started constructing the content of the questionnaire. It was decided to use a self-report approach to gather the information. Some of the advantages of self-reporting are that it is quick, easy and inexpensive which was required for the scope and time frame of the study. Some of the disadvantages, which need to be considered when interpreting the results, include problems with over or under-estimating, recall bias and social desirability bias (The National Collaborating Centre for Primary Care, 2009).

The questionnaire followed a logical order starting with basic maternal demographic information including age, ethnicity, employment status, planned length of maternity leave (which forms part of the inclusion criteria) and parity of the mother. It then looked at questions regarding infant demographics (date of birth, gender and birth weight), pregnancy and birthing history including questions relating to the inclusion and exclusion criteria of the study (emergency medical treatment required before, during or after birth).

Next the questionnaire looked more closely at the skin-to-skin contact, feeding and separation over the first 24 hours after birth. Participants were asked to complete a dichotomous question asking whether they had experienced immediate skin-to-skin contact after birth. A contingency closed format question with multiple choice answers linked to the previous question requested mothers to estimate the time they had spent in skin-to-skin contact directly after birth. These two questions were used to place the dyads in either the experimental or control groups.

The questionnaire included another six closed format multiple choice questions focusing on the following:

1. Time spent in skin-to-skin contact over the first 24 hours after birth
2. Who held the infant during the first 24 hours after birth
3. Time the infant spent in the nursery over the first 24 hours after birth
4. Type of infant feeding over the first 24 hours after birth
5. Time taken to latch for the first breastfeed
6. Plan to feed over the following two months.

Two Likert scale items were also included. One focused on the frequency of the infants' whereabouts over the first 24 hours after birth and the other on the infant's sleeping whereabouts over the first 24 hours.

The layout was designed in a simple and sequential manner to make it user-friendly and easy to complete.

Phase three

After completion of the first draft of the questionnaire, reliability and validity needed to be established before it could be used to collect data (Kielhofner, 2006). Split-half reliability is often used to establish the reliability of a questionnaire. This was however not a suitable measure for the contact questionnaire because of the nature of the questions examining different constructs (Kielhofner, 2006). Furthermore inter-rater reliability was not tested as the researcher was the sole person administering the questionnaire. Instead, the questionnaire was reviewed by a panel of experts and a pilot study was then conducted.

Firstly, the first draft of the questionnaire together with the study objectives were sent to a panel of professionals including the subject specialist and two of the researcher's colleagues (occupational therapists) that specialise in paediatrics and early intervention. Both of the occupational therapists are certified Ayre's Sensory Integration ® trained therapists, and one has achieved her masters in early childhood development.

Each professional was requested to examine both the content and formatting of the questionnaire, including the following:

- Ensure the language was clear and unambiguous
- Ensure the questionnaire was comprehensive in collecting the required information
- Ensure that the questionnaire was measuring what it was intended to measure to ensure the study objectives were met
- Ensure that it had a logical order that was easy to follow (Kielhofner, 2006; Radhakrishna, 2007).

The panel reviewed and made comments on the first draft of the questionnaire (Appendix A2). The following changes were implemented:

- Demographic information: Ethnicity and employment details (other than information regarding maternity leave) were removed as they were found to be irrelevant to the purpose of the study.

- To meet ethical requirements, the questionnaire was coded and the identifying information was placed on the first page so that it could be removed and stored separately.
- The questionnaire was redesigned to ensure less clutter and a more user-friendly layout.
- The parity question was simplified.
- Questions were rephrased to capture mothers' perceptions.
- A question was added to gather more information about feeding within the first 24 hours after birth.

After a further review of the literature, the researcher identified maternal mental health as an alternative factor that could have a significant impact on the mother-infant relationship (Coplan, O'Neil & Arbeau, 2005; McGrath, Records & Rice, 2008; Meintjes *et al.,* 2010). The researcher therefore included three Likert scale questions for mothers to complete regarding their mental health.

The researcher identified three main themes that were repeatedly referred to in the literature reviewed on maternal mental health, namely: stress and anxiety, sadness and hopelessness and little pleasure or interest in doing things (World Health Organization, 2004; Olson, Dietrich, Prazar & Hurely, 2006; McGrath *et al.,* 2008; World Health Organization, 2008). The researcher thus developed a simple series of questions based on these themes (Appendix A1).

Once amendments to the questionnaire had been implemented, a pilot study was conducted whereby a small sample of the population (four mothers) completed the questionnaire. Pilot studies can help address several logistical issues. A sample size of 10-20% of the total study sample size should be used and participants should be requested to evaluate the comprehensiveness and wording of the measurement instrument (Simon, 2011). For this pilot study, mothers were asked to critically evaluate the items included in the questionnaire and comment on their relevance. They were also asked to evaluate the comprehensiveness

of the questionnaire and report on any difficulties they experienced when completing the questionnaire. Their feedback was as follows:

- Layout is too cluttered
- Spacing was too small
- There was a lack of clarity between the questions regarding immediate skin-to-skin contact and length of time in skin-to-skin contact
- Wording of question regarding infant whereabouts during the first 24 hours was confusing
- Increase the font size.

Following the mothers' feedback, the researcher amended the spacing and layout as well as increased the font size. Wording of the questions regarding length of time in skin-to-skin and infant whereabouts were also adapted.

Validity

Validity had to be established before the questionnaire could be used to collect data (Kielhofner, 2006; Radhakrishna, 2007). There are several types of validity but the two that fell within the domain of the study were face and content validity. Face validity refers to the subjective view of the instrument's ability to measure what it is supposed to measure. Content validity refers to subject matter specialists' review of the extent to which a measurement instrument covers all facets of what it is intended to measure (Heale & Twycross, 2015).

Consultation with professionals working in the field of early intervention, the skin-to-skin contact subject specialist and researcher together with a sample of the study population (mothers with young infants) helped to establish face and content validity of the questionnaire as a measurement tool.

In summary, the contact questionnaire was developed in order to gather information about mother-infant contact and feeding over the first 24 hours after birth. This information was necessary in order to achieve the aim and objectives of the study.

3.4.2 The tactile questionnaire (including a section from the MITS; Appendix B1)

The tactile questionnaire was developed by the researcher and made use of a section from the MITS (D'Agostino & Waldrop, 2012) to meet the requirements of the fourth study objective. The background and development of the questionnaire will now be discussed.

Development of the tactile questionnaire

During the research proposal phase literature review, the researcher sought out data collection instruments that gathered self-report information about tactile interactions in daily routine between mothers and infants. The only measurement that was identified as being suitable was a section from the self-report MITS developed by D'Agostino and Waldrop (2012). The aim of this survey is to examine the associations between maternal resiliency, perception of personal touch and reports of infant touch. The survey consisted of four sections namely: demographic information, reports of mother-infant touch, perceptions of personal touch and maternal resiliency. The section on mother-infant touch served as an appropriate means to address the fourth study objective (investigating touch in daily routine). The remainder of the questionnaire used by D'Agostino and Waldrop (2012) fell outside the scope of the present study and was thus excluded. Data from the different sections of the MITS were examined independently, so use of the mother-infant touch section did not affect the integrity of the questionnaire. Permission to make use of the questions relating to touch in daily routine was granted (Appendix B2).

Additions made to the mother-infant touch section of the MITS

The MITS included the following four items: the length of the infant's bathing time, rating the frequency of holding, covering or placing an infant in their cot for feeding, frequency of varying responses to an infant when fussy and the frequency of varying responses to an infant when crying (see Appendix B3).

Furthermore, the literature review highlighted specific areas of touch that were not addressed by the questions obtained from the MITS. It was thus decided to add additional questions based on the literature review findings. Following the MITS format and using the same rating scale, an additional question was added regarding infant carrying which is highlighted by Sears and Sears (2003) as an important activity of daily living between

mothers and infants. A question specifically pertaining to affectionate touch during various activities of daily living was also added. Affectionate touch was identified as being an outcome measure used in several different studies looking at the influence of skin-to-skin contact and breastfeeding on later maternal behaviour (Feldman & Eidelman, 2003a; Anderson *et al.,* 2007; Chiu & Anderson, 2009). Again, following the same format as the MITS bathing time question, a question was added regarding time spent doing baby massage. Baby massage has been found to positively influence the maternal-infant relationship and thus seemed to be an important factor for consideration (Onozawa *et al.*, 2001; Feijo *et al.*, 2006). In addition, items were also added in relation to the inclusion and exclusion criteria of the study namely: infant's health status since birth and with whom the infant spends the most time. A question concerning infant feeding (rate of exclusive breastfeeding) since birth was also included.

The questions regarding maternal mental health that were completed at the same time as the contact questionnaire were again completed together with the follow-up tactile questionnaire.

Validity

This questionnaire together with the maternal mental health questions were reviewed by the same two occupational therapists that reviewed that contact questionnaire. Due to the very similar nature of the MITS questions and the researcher's additional questions, no significant recommendations or changes were suggested by the expert panel.

Reliability

Reliability refers to the consistency of a measurement tool (Heale & Twycross, 2015). Cronbach's alpha is a common objective measure used to test reliability of an instrument. A low alpha score ($\leq$ 0.50) indicates possible poor interrelatedness between questions or mixed constructs whereas a high alpha score ($\geq$ 0.90) may be due to redundancies or the length of the instrument (Heale & Twycross, 2015). The MITS survey has only been used once previously and was found to have a Cronbach's alpha score of 0.421 (D'Agostino & Waldrop, 2014). The alpha score for the tactile questionnaire with the additional questions added was 0.399. The low score may be due to the small sample size as well as the test length being short (Heale & Twycross, 2015).

3.4.3 Mother-to-Infant Bonding Scale (MIBS)(Appendix C1)

The MIBS, developed by Taylor *et al.* (2005), is a quick and easy to use self-report tool designed to assess the feelings that a mother has towards her infant. This tool was used to assess mothers' perceptions of bonding with their infants within the first week after birth (referred to as MIBS 1) and again six to eight weeks after birth (referred to as MIBS 2) to meet the second and third objectives of the study. Permission to use this tool was obtained from the authors (Appendix C2).

The eight items of the MIBS were scored from 0 to 3, with a total score ranging from 0 to 24. A high score indicated a possible disturbance in the mother–infant bond whereas a low score indicated no disturbances.

The MIBS was found to have adequate construct validity as well as an alpha score of 0.71, indicating reasonably good internal reliability (Taylor *et al.,* 2005).

3.4.4 Coding of tactile interaction (Appendix D1-2)

In order to meet the fifth objective of the study, an observational measurement tool examining touch interactions was required. After extensive research, two appropriate tools were identified. The first tool was the Face-to-Face Interaction Touch Coding Manual developed by Koester (1995). This tool examines the location, type and duration of mother-infant touch during face-to-face interaction. It was developed in order to explore the nature of touch between mothers and infants. See Appendix D1 for Koester's (1995) definition and further explanation of these classifications. This coding guide has been used successfully in previous studies. In a study by Koester *et al.* (2000) on maternal-infant touch interaction with hearing impaired and non-hearing impaired dyads, it was found to have an inter-rater reliability of 84.7% for type of contact and 97.8% for location. This tool is also suitable for use for first-time coders because of the extensive instructions and guide included in the manual (Koester, 1995). Permission to use this tool was obtained from the author (Appendix D3).

One area not covered in Koester's (1995) Face-to-Face Interaction Touch Coding Manual was affectionate touch. This was an important factor to examine as preliminary research has identified that early skin-to-skin contact can have a positive influence on maternal

affectionate touch (Moore *et al.,* 2012). The researcher thus contacted Ruth Feldman to request permission to make use of the Parent-Touch section of Feldman's (2004) Micro-Coding Parent-Infant Interactions guide as this specifically looked at affectionate touch. Other categories of touch included: touch of extremities, functional touch, proprioceptive touch, stimulatory touch and no touch. Only the affectionate touch and no touch categories fell within the scope of the current study and thus the other factors are not reported on or discussed further. See Appendix D2 for Feldman's (2004) definition of categories of touch. This coding guide has also been used successfully in several previous studies. In a study by Feldman *et al.* (2003) on the contribution of skin-to-skin contact on later interaction, the coding was found to have a reliability score exceeding 87%. Permission to use this tool was obtained from the author (Appendix D4).

Coding procedure

The recommended set up for the two assessment tools was the same. A quiet, private room with adequate lighting and low noise was used. Infants were placed in an infant chair, provided by the researcher, positioned on a flat surface and the mothers were seated so that their faces were 30 -50 cm from the infant's face (Jean & Stack, 2009). The set up for each dyad's interaction was the same to ensure consistency (Stack & Arnold, 1998). Mothers were given the same instruction, to engage in typical interaction with their infant, prior to commencement. The interaction was then videotaped. One minute of the video clip was later coded in Adobe Premier Pro CS5 at the recommended 30 frames per second (Koester, 1995). Coding consisted of recording the duration and type of each interaction onto an Excel spreadsheet. The different categories of touch were then summated to give a total time for each category.

It should be noted that due to the nature of the study and the resources available to the researcher, it was not possible to acquire the services of a research assistant to assist with coding, thus inter-rater reliability could not be tested for. Similarly, it was not possible to ensure observer-blind coding thus possible observer bias needs to be taken into consideration when reviewing the study results.

3.5 Data collection procedure

The first point of data collection was within one week after birth but not earlier than 24 hours after birth to ensure adequate recovery time. All participating mothers were requested to complete the contact questionnaire and the MIBS at this first point of contact. Based on the information obtained in the contact questionnaire, participants were placed in either the experimental or control groups. If mothers were found to meet the exclusion criteria of the study, the researcher explained to them why but still offered to visit them at the scheduled six to eight week follow-up (as detailed under Section 3.7).

At the end of the contact questionnaire, participants were asked to indicate their preferential choice for the second meeting being at the Baby Therapy Centre (the researcher's place of work), at their six week clinic appointment (if this is to take place at the hospital where they have given birth) or at their personal residence. Mothers were contacted approximately four weeks after the first point of contact to arrange the second meeting. At the second point of contact, the participants were asked to complete the tactile questionnaire and repeat the MIBS. Participating dyads were then videotaped during face-to-face interaction. After this, the researcher made herself available to answer any questions that the participants had regarding the study or their child's development. Data from the data collection instruments was captured onto Excel spreadsheets and then analysed using the relevant statistical tests. Data was collected over a period of 10 months until there were at least 20 participants in both the experimental and control groups and to cover the six to eight week follow-up period.

3.6 Data analysis

3.6.1 Data capturing and preparation for data analysis

The study data was initially captured onto Excel spreadsheets before being entered into Statistica 13.0 for further quantitative analysis.

3.6.2 Descriptive statistics

Descriptive statistics were used to analyse the study data. For nominal data, this included frequency and percentages. In addition to these, the median, lower and upper quartiles

were used for ordinal data. Lastly, ratio data was analysed using all of the above mentioned factors as well as the mean and standard deviation.

3.6.3 Inferential statistics

Non-parametric statistical tests were used to further analyse the study data. This was due to the use of ordinal scales and the small sample size whereby no assumptions could be made regarding the probability distributions of the study variables that were being assessed (Bailey, 1997; Hole, 2015).

Pearson's chi-square test was used to analyse nominal data which included named categories and unordered data. The significance level for the chi-square test was set at 0.05. The Mann Whitney U test (with continuity correction) was used to analyse ordinal and ratio data which included either ordered or continuous categories (Bailey, 1997). With α set at 0.5, statistical significance was thus when $p \leq 0.05$ and highly statistical significance when $p \leq 0.01$.

A significant *p* value identifies the occurrence of something non-random yet it does not inform us of the clinical significance of such an occurrence. The *p* value may also be affected by sample size with larger sample sizes yielding more significant *p* values. This value also gives a measure of a Type I error. This refers to the probability of incorrectly identifying a change or difference between two interventions when in actual fact none exists. A Type II error on the other hand, refers to the inability to detect a significant difference when one does exist (McGough & Faraone, 2009). To test for clinical significance and avoid Type II errors, effect size calculations were also used as part of the statistical analysis.

Cohen's *d* effect size calculation was used to analyse data on a continuous scale which in the case of this study was the ratio data. Cohen's *d* considers $d \geq 0.2$ as a small, $d \geq 0.5$ as a medium and $d \geq 0.8$ as a large effect size (McGough & Faraone, 2009). This calculation makes use of the mean score thus it was not appropriate for use with ordinal data whereby the mean score is irrelevant. Thus an alternative effect size calculation examining *r* value was used. In this calculation $r \geq 0.1$ is considered a small effect size, $r \geq 0.3$ is considered a medium effect size and $r \geq 0.5$ is consider a large effect size (Fritz, Morris & Richler, 2012).

3.7. Ethical considerations

Ethical approval for this study was obtained from the University of Witwatersrand Human Research Ethics Committee (Clearance certificate number No. M140867; see Appendix E1). Prior to this, the researcher had obtained consent from the managers of the maternity facilities, the hospital organisation's research committee and the Baby Therapy Centre (Appendices F1-F6). The individual participant consent required differed for the different maternity facilities involved in the study. For the independent maternity facility, consent was granted for the following:

Potential participants were approached and invited to participate in the study during their postnatal hospital stay. These mothers were approached within one week after their infant's birth but were not approached on the day of their infant's birth to allow for adequate recovery time (as requested by the facility manager). Mothers that were approached were provided with verbal and written information about the purpose, procedure and ethical considerations pertaining to the study and they were invited to participate (Appendix G1). If mothers agreed to participate, they were asked to complete an informed consent form (Appendix G2).

In contrast to the independent maternity facility, the other two facilities which fell under an organisation's research committee granted permission on condition that the researcher acquired consent to visit participants during their postnatal hospital stay prior to their admission to hospital. In order to do this, the researcher obtained permission from the respective clinics that ran the antenatal classes at the different facilities (Appendices H1-2).

The researcher then made information about the study available at the participating facilities' antenatal classes. This information specified that the researcher would be required to visit the participating mother-infant dyads during their postnatal hospital stay (Appendix I1). If mothers were interested in taking part in the study, they were asked to sign a consent form (Appendix I2) which specified consent for this postnatal visit. The procedure from this point onwards is the same as for the independent maternity facility (as specified above).

Mothers and infants are considered to be vulnerable subjects. This population do however need to be represented in research (Schwenzer, 2008). Careful consideration was thus taken

to ensure their ethical inclusion in the research study. This included no use of undue influence (coercion, manipulation or persuasion) (Schwenzer, 2008). Furthermore, all participants were informed that there were no risks associated with taking part in the study and that participation or non-participation in the study would not affect the care they received during their hospital stay. The researcher also explained that if, during the course of the study, a problem was identified (for example: developmental delay, severe bonding/attachment difficulties or a problem with the infant and/or mother's physical or psychological health) that a referral to an appropriate health professional would be made (see distress protocol Appendix J1).

Participants were also requested to complete a second informed consent form (before or at the second point of contact) specifically relating to the video recording of themselves and their infants during face-to-face interaction (Appendix K1).

The first pages of the contact and tactile questionnaires included identifying information as well as the questions that lead to inclusion or exclusion into the study. Questionnaires were therefore coded so that the first page could be removed and stored in a secure location, thus the remainder of the questionnaires were anonymous. Maternity facilities included in the study as well as the subject specialist advisor and professional review panel were also anonymised. Participating facilities were coded and their names were excluded from the study report as per their request. A Turnitin assessment was also completed to ensure originality of the study write up and to avoid plagiarism (see Turnitin digital receipt Appendix L1 and Turnitin originality report Appendix L2).

3.8 Logistics

This section outlines the foreseen timeline of the study (Table 3.1).

Table 3.1 Timeline

Task	**Time Frame**
Proposal complete (first hand in)	July 2014
Internal review	July 2014
External review	August 2014

Final Proposal hand-in	November 2014
Ethical clearance	December 2014
Obtain study participants	January 2015 until n $\geq$ 20 per group
Data collection	January 2015 until n $\geq$ 20 per group (estimated September 2015)
Data analysis	October– December 2015
Write up introduction and methodology	January 2016 – March 2016
Write up results	March- May 2016
Write up discussion	May 2016 – July 2016
Implement corrections	August – October 2016
Complete dissertation and hand in first draft	October 2016
Implement corrections	December 2016 – January 2017
Hand in dissertation for examination	February 2017

3.9 Conclusion

In conclusion, the researcher made use of research methodology that ensured the study objectives would be achieved. This methodology and research procedure is described in enough detail in order for the study to be replicated.

A quantitative correlational study design was the best suited to the purposes of the research. The researcher also made use of sampling methods that helped achieve data collection requirements within the designated time frame. Data collection tools were developed and/or selected based on previous research and literature regarding the research topics. Methods of data analysis were also best suited to the research methodology and type of data that was collected.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter examines the results of the data obtained from the participating mother-infant dyads from the first and second points of contact.

The study sample was made up of a total of 41 mother-infant dyads. Twenty eight of the participating mothers signed up at the antenatal classes, 10 took part in the study from the independent maternity facility and three were referred by other participants.

During the researcher's visits to antenatal classes, a total number of 44 women signed up to take part in the study. Of these 44 women, 28 went on to participate in the study. Of the remaining 16 that did not participate, six infants met the exclusion criteria. This included three that were born prematurely and another three that had to be hospitalized due to illness. The remaining 10 could not be reached or did not respond to the researcher's attempts to contact them.

Of the total number of participating dyads, all 41 completed the first half of the study (contact questionnaire and MIBS 1). Twenty one dyads formed the control group and 20 formed the experimental group. This division will be further discussed in Section 4.3.1.

Thirty-seven of the initial 41 dyads completed the second half of the study (tactile questionnaire, MIBS 2 and tactile interaction video). Thus four dyads (three from the control group and one from the experimental group) did not complete the second half of the study. One of these participating mothers chose to not to continue with the study. One was out of town during the follow-up period and the remaining two could not be reached by the researcher. Of the 37 dyads that did complete the second half of the study, videos could not be taken for five dyads. This was due to the infants not being in an appropriate state of arousal to take part in face-to-face interaction during the researcher's follow-up visit.

4.2 Demographics of the sample

The demographics of the participating dyads are presented in terms of the experimental group and the control group.

4.2.1 Maternal demographics

Forty one mothers took part in the study. The age of the mothers ranged from 22 to 41 years with the average age being 30 years. The majority of the mothers (73%) were primiparous and the minority (27%) was multiparous. The experimental and control groups were comparable in terms of age (p= 0.79) and parity (p= 0.06) (Table 4.1).

Table 4.1 Maternal demographics (n=41)

Variable	**Experimental Group (n=20)**	**Control Group (n=21)**	**Experimental Group (n=20)**	**Control Group (n=21)**	**p Value**
	Median (Lower and Upper Quartile)		**Mean (SD)**		
Age	31 (27.5-32)	29 (27-32)	30.35 (4.42)	29.90 (3.45)	0.79
	n(%)		**Chi Sqaure Statistic**	**df**	**p Value**
Parity Primiparous Multiparous	12 (60%) 8 (40%)	18 (86%) 3 (14%)	3.45	1	0.06

$p \leq 0.05$ Statistical significance*
$p \leq 0.01$ High statistical significance**

4.2.2 Infant demographics

Forty one infants took part in the study.

Table 4.2 Infant demographics (n=41)

Variable	Total Group (n=41)	Frequency		Chi Square Statistic	df	p Value
		Experimental Group (n=20)	Control Group (n=21)			
	n(%)					
Gender						
Male	17 (41%)	7 (35%)	10 (48%)	0.67	1	0.41
Female	24 (59%)	13 (65%)	11 (52%)			
Delivery						
Vaginal	22 (54%)	13 (65%)	9 (43%)	2.02	1	0.16
Caesarean Section	19 (46%)	7 (35%)	12 (57%)			
BFHI						
Yes	10 (24%)	8 (40%)	2 (10%)	5.16	1	0.02*
No	31 (76%)	12 (60%)	19 (90%)			

	Experimental Group (n=20)	Control Group (n=21)	Experimental Group (n=20)	Control Group (n=21)	p value
	Median (Lower and Upper Quartile)		Mean (SD)		
Weight (kg) Infant birth weight	3.33(3.14-3.71)	3.2(2.9-3.42)	3.41 (0.44)	3.18 (0.43)	0.17

$p \leq 0.05$ Statistical significance*

$p \leq 0.01$ High statistical significance**

Table 4.2 shows the breakdown of participating infants between the experimental and control groups in terms of gender, type of delivery, type of maternity facility where they were born and birth weight. In the total study sample, twenty four (59%) were female and 17 (41%) were male. Nineteen (46%) were born via caesarean section and 22 (54%) were born via vaginal delivery. The experimental and control groups were comparable in terms of gender (p= 0.41), type of delivery (p= 0.16) and birth weight (p= 0.17). There was however a statistically significant difference between the two groups with regards to infants being born in maternity facilities with BFHI status versus facilities without this status; χ^2 (1, N= 41) = 5.16, p= 0.02.

4.3. Results of the contact questionnaire

The contact questionnaire answered the first objective of the study. This questionnaire also divided the study population into the experimental and control groups as it established the amount of skin-to-skin contact that the dyad experienced immediately after birth. Within this section the participants reported on:

- Immediate skin-to-skin contact after birth
- Length of time spent in skin-to-skin contact after birth
- Length of time spent in skin-to-skin contact during the first 24 hours after birth
- Infant whereabouts during the first 24 hours after birth
- Who held the infant in the first 24 hours after birth
- Infant sleeping whereabouts during the first 24 hours after birth
- Hours the infant spent in the nursery in the first 24 hours after birth
- Feeding over the first 24 hours after birth
- Infant feeding intent.

4.3.1 Contact questionnaire: skin-to-skin contact

Participants specified the length of time that they spent with their infants in skin-to-skin contact immediately after birth. Of the total sample, 20 (48%) maternal-infant dyads experienced immediate skin-to-skin contact for at least two hours after birth and thus formed the experimental group. Twenty one (52%) maternal-infant dyads did not experience immediate skin-to-skin or they did not experience immediate skin-to-skin contact for a minimum of 2 hours and thus formed the control group.

Within the control group, eight dyads (38%) did not experience immediate skin-to-skin contact and 13 dyads (62%) did. Of the 13 dyads that did experience skin-to-skin contact, three dyads did so for less than 10 minutes, four dyads for 10 to 30 minutes and six dyads for 30 to 60 minutes.

There was a highly statistically significant difference between the experimental and control groups with regards to whether they had experienced immediate skin-to-skin contact after birth. This was confirmed using a Chi-squared test (χ^2 (1, N= 41) = 9.47, p= 0.003). Similar

significance was found in terms of the length of time in skin-to-skin contact immediately after birth (p= 0.000) and skin-to-skin contact over the first 24 hours after birth (p= 0.009). Both these results were supported by large effect sizes (r= 0.85 and r= 0.61 respectively) (Table 4.3 a and b).

Table 4.3a Immediate skin-to-skin contact (n=41)

Variable	Frequency		Chi Square Statistic	df	p Value
	Experimental Group (n=20)	Control Group (n=21)			
Skin-to-skin immediately after birth					
Yes	20 (100%)	13 (62%)	9.47	1	0.003**
No	0 (0%)	8 (38%)			

$p \leq 0.05$ Statistical significance*
$p \leq 0.01$ High statistical significance**

Table 4.3b Length of time of skin-to-skin contact results (n=41)

Variable	Frequency		p Value	Effect Size (r)
	Experimental Group (n=20)	Control Group (n=21)		
	n(%)			
Length of time in skin-to-skin immediately after birth		Of the n= 13(62%) that did have skin-to-skin:		
Less than 10 mins	0 (0%)	3 (23%)		
10 to 30 mins	0 (0%)	4 (31%)	0.000**	0.85•••
30 to 60 mins	0 (0%)	6 (46%)		
1 to 1½ hours	0 (0%)	0 (0%)		
2 or more hours	20 (100%)	0 (0%)		
Length of time in skin-to-skin over the first 24 hours after birth				
8 hours or more	9 (45%)	4 (19%)		
4 hours or more	9 (45%)	6 (28.5%)		
2 hours or more	2 (10%)	7 (33%)		
1 – 2 hours	0	1 (5%)	0.009**	0.61•••
30 mins – 1 hour	0	2 (9.5%)		
10 – 30 mins	0	0		
Less than 10 mins	0	0		
None	0	0		
No answer	0	1 (5%)		

$p \leq 0.05$ Statistical significance*
$p \leq 0.01$ High statistical significance**
$r \geq 0.5$ Large effect size •••
$r \geq 0.3$ Medium effect size ••
$r \geq 0.1$ Small effect size •

4.3.2 Contact questionnaire:

The results for the remainder of the contact questionnaire will now be presented.

Infant whereabouts during the first 24 hours after birth

Mothers rated their perceptions of their infant's whereabouts during the first 24 hours after birth according to the following categories:

1. Infant was in the nursery

2. Infant was in a bassinette in the room with the mother

3. Infant was dressed and held by the mother

4. Infant was dressed and held by others (family members or friends)

5. Infant was in skin-to-skin contact with mother

6. Infant was in skin-to-skin contact with others (family members or friends).

There was a highly statistically significant difference (p= 0.002) between the median scores of the experimental (Md= 1, $Q1$= 1, $Q3$= 2) and control groups' (Md= 3, $Q1$= 2, $Q3$= 3) ratings of the time their infants spent in the nursery. This was supported by a medium effect size (r= -0.45). Sixty percent (n= 12) of the experimental group said that their infants were never in the nursery whereas 24% (n= 5) of the control group reported the same. This indicates that the control group reported that their infants spent a greater frequency of time in the nursery over the first 24 hours after birth (Figure 4.1).

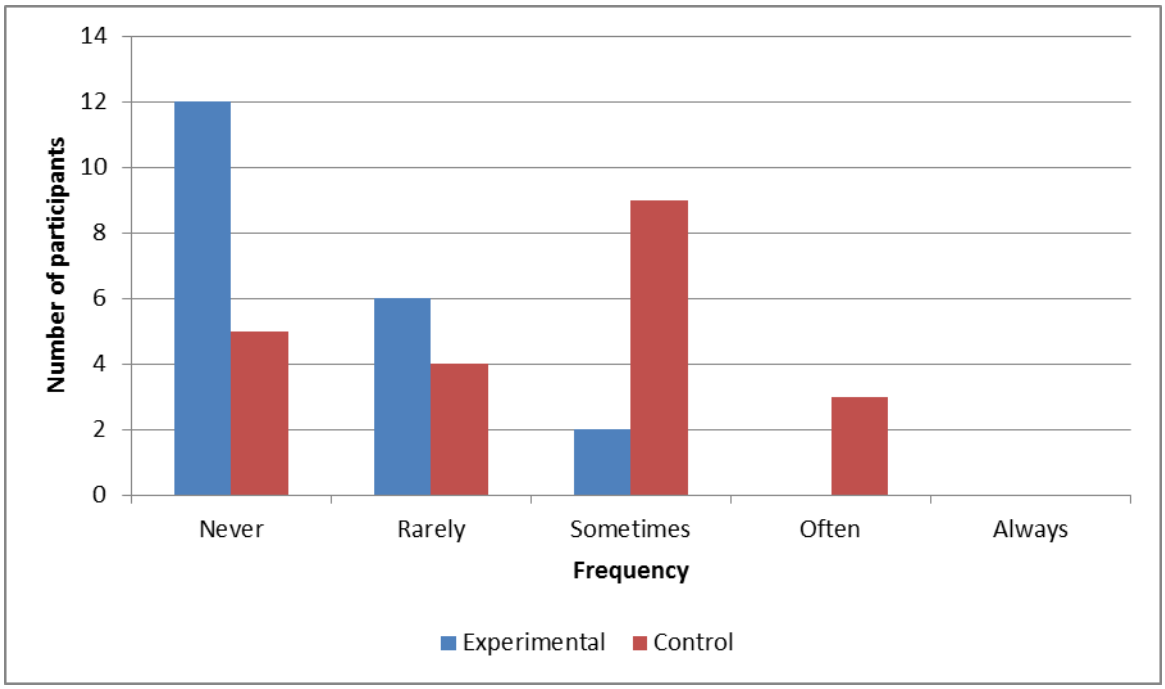


Figure 4.1 Infant whereabouts during the first 24 hours: rating of time spent in the nursery (n=41)

In correspondence with the findings of the previous section, significance was also identified between the two groups' ratings of the frequency of mother-infant skin-to-skin contact. Median score for the experimental group (Md= 4, $Q1$= 3.5, $Q3$= 4) and the control group

(*Md*= 3, *Q1*=3, *Q3*= 4) was statistically significant (*p*= 0.019). Corresponding with a medium effect size (*r*= 0.34). This indicates that mothers in the experimental group reported spending more time in skin-to-skin contact with their infants than mothers in the control group (see Figure 4.2).

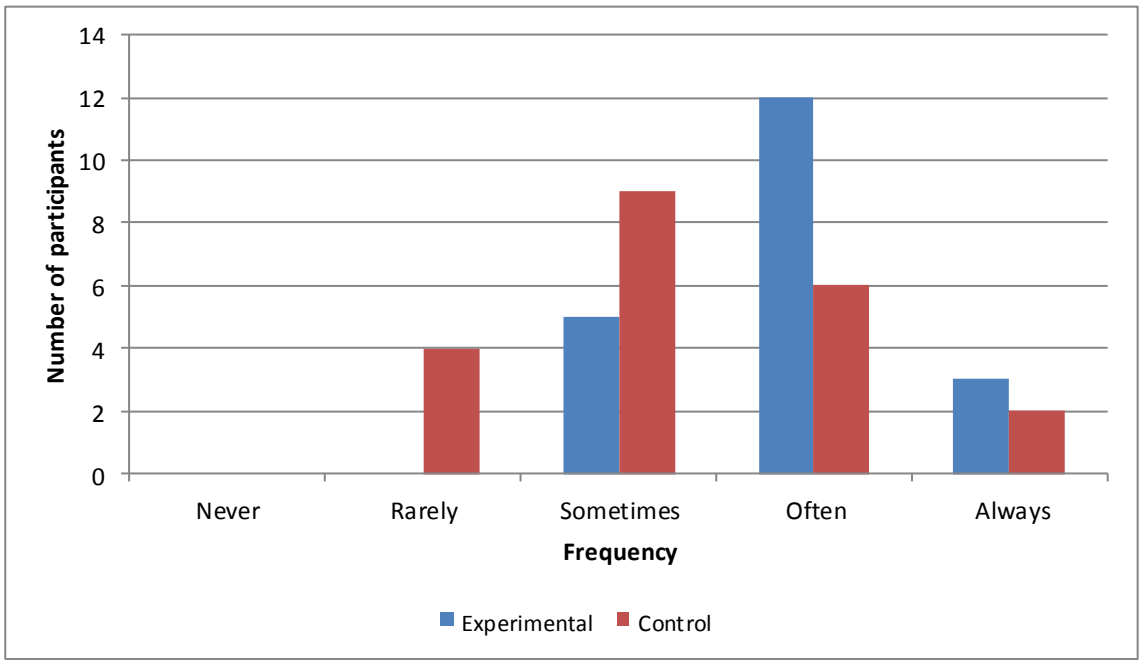


Figure 4.2 Infant whereabouts during the first 24 hours: rating of time spent in skin-to-skin contact with mother (n=41)

No statistically significant or clinical differences were found with the remaining 'infant whereabouts' variables. Mothers' ratings of time the infant spent in a bassinette, dressed and held by mother, dressed and held by other and in skin-to-skin contact with other were comparable between the experimental and control groups.

Who held the infant during the first 24 hours after birth?

Mothers from both groups gave very similar reports of who held their infants (including parents, friends, immediate and extended family) during the first 24 hours after birth. No statistically significant or clinical difference was found in any of the categories. All mothers from both groups reported holding their infants. All except one father from each group respectively was reported to have held their infants. Ninety percent (n= 19) of the control group and 90% (n= 18) of the experimental group were held by immediately family

members. Ten percent (n= 2) of the experimental group and 19% (n= 4) of the control group were held by extended family. Lastly 10% (n= 2) of the experimental group and 14% (n= 3) of the control group were held by friends.

Infant sleep during the first 24 hours after birth

Three variables regarding infants' sleeping whereabouts were referred to. This includes:

1. In the bed with mother and/or father

2. In a bassinette in the mother's room

3. In the nursery.

Highly statistically significant differences were identified for two of these variables: in bed with mother and/or father (p= 0.009) in favour of the experimental group, and the nursery (p= 0.005) in favour of the control group. The experimental group reported spending more time with their infants in their beds (*Md*= 4.5, *Q1*= 4, *Q3*= 5) and having their infants spend less time in the nursery (*Md*= 1, *Q1*= 1, *Q3*= 2) as compared to the control group's rating of time in bed (*Md*= 3, *Q1*= 3, *Q3*= 4) and time in the nursery (*Md*= 2, *Q1*= 1, *Q3*= 3). This correlated with medium effect size findings for both variables (r= 0.30 and r= -0.41 respectively) (Figures 4.3 and 4.4).

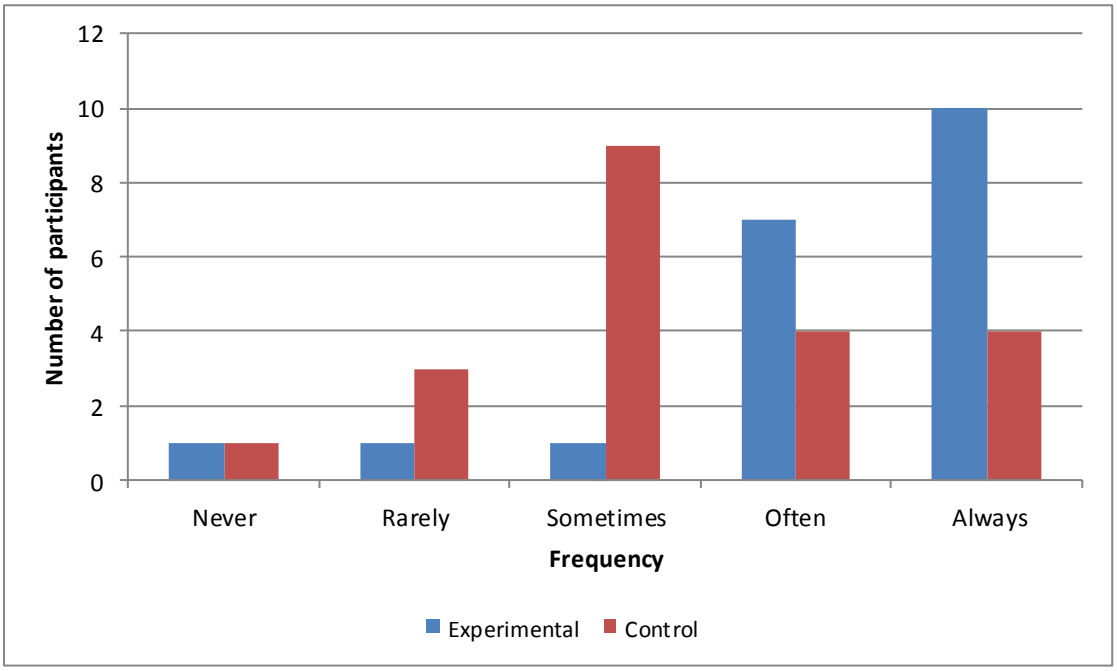


Figure 4.3 Infant sleep during the first 24 hours: rating of time spent in bed with mother and/or father (n=41)

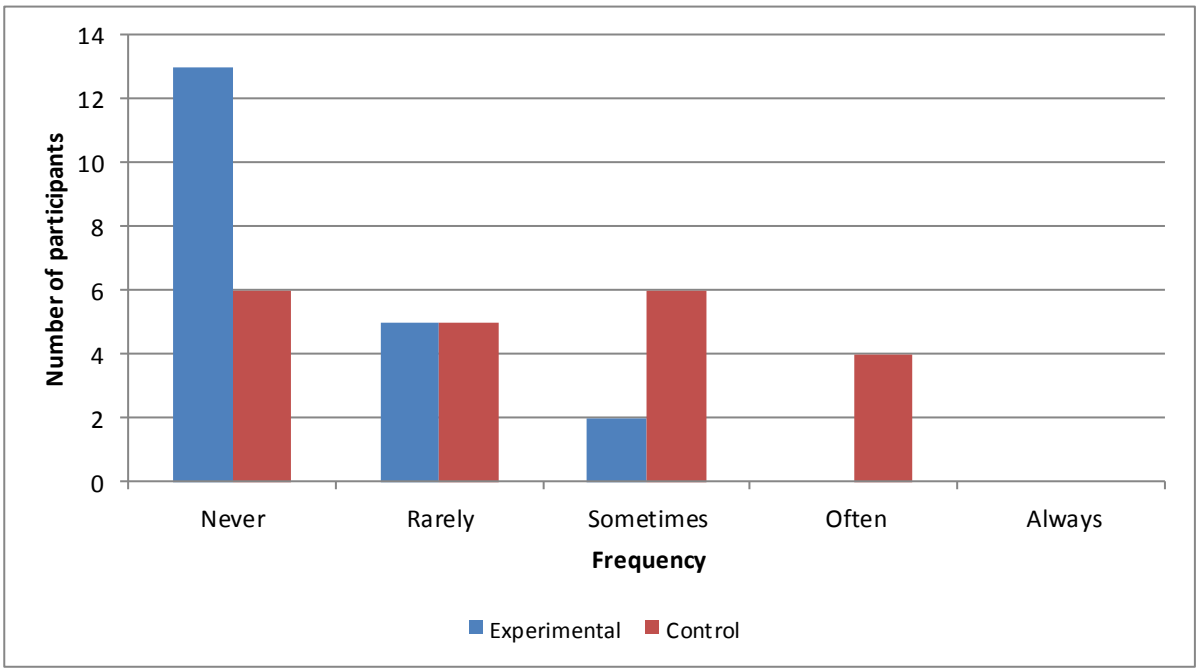


Figure 4.4 Infant sleep during the first 24 hours: rating of time spent in the nursery (n=41)

There was no significant difference in mothers' reports of the time infants spent sleeping in bassinettes in their rooms (p= 0.106).

Hours spent in the nursery

In this section mothers reported on the total time their infants spent in the nursery over the first 24 hours after birth. A highly statistically significant difference was found between the two groups (p= 0.004) which correlated with a medium effect size (r= 0.43). The experimental group had a higher median (Md= 5, $Q1$= 4, $Q3$= 5) than the control group (Md= 2, $Q1$=2, $Q3$= 3). Sixty percent (n= 12) of the experimental group reported that their infants had spent no time in the nursery whereas 24% (n= 5) of the control group reported the same. In contrast, 43% (n= 9) of the control group reported that their infants had spent 4 to 8 hours in the nursery whereas only 10% (n= 2) of the experimental group reported the same (Figure 4.5).

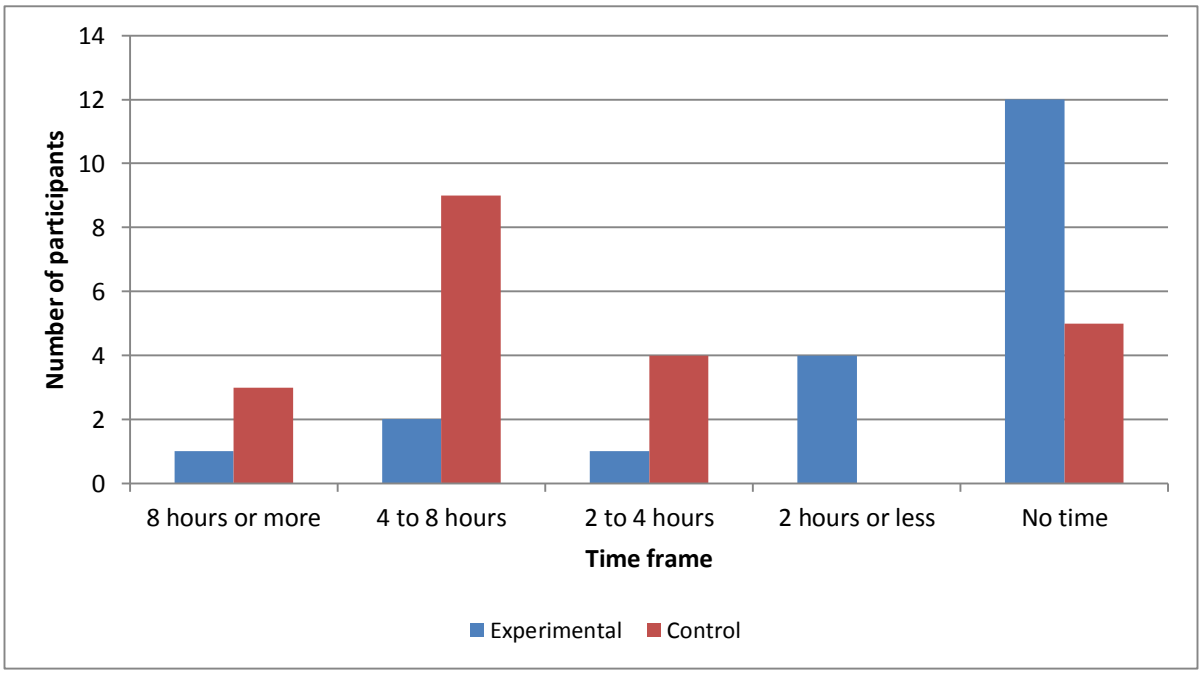


Figure 4.5 Time spent in the nursery (n=41)

Infant feeding

Three questions were asked regarding infant feeding. Firstly the type of feeding that took place during the first 24 hours after birth, secondly, the time frame of the first breastfeed and lastly, mothers' plans for feeding their infants over the following two months.

For type of feeding, a statistically significant difference was found in three out of the five categories. This included: expressed breastmilk (χ^2 (3, *N*= 41) = 4.02, *p*= 0.045), and breastfeed with assistance from hospital staff (χ^2 (3, *N*= 41) = 5.63, *p*= 0.019) both in favour of the control group. As well as breastfeed via self-attachment (χ^2 (3, *N*= 41) = 4.11, *p*= 0.043) in favour of the experimental group. Sixty percent (n= 12) of the experimental group reported breastfeeding with their infants self-attaching whereas 29% (n= 6) of the control group reported the same. In converse, 76% (n= 16) of the control group reported requiring assistance from hospital staff for the first breastfeed whereas only 40% (n= 8) of the experimental group reported the same. The control group also reported significantly higher (28%) (n= 6) use of expressed breastmilk in comparison to the experimental group (5%) (n = 1). Fourteen percent (n= 3) of the control group reported feeding their infants formula and no mothers reported their infants not feeding within the first 24 hours after birth (Figure 4.6).

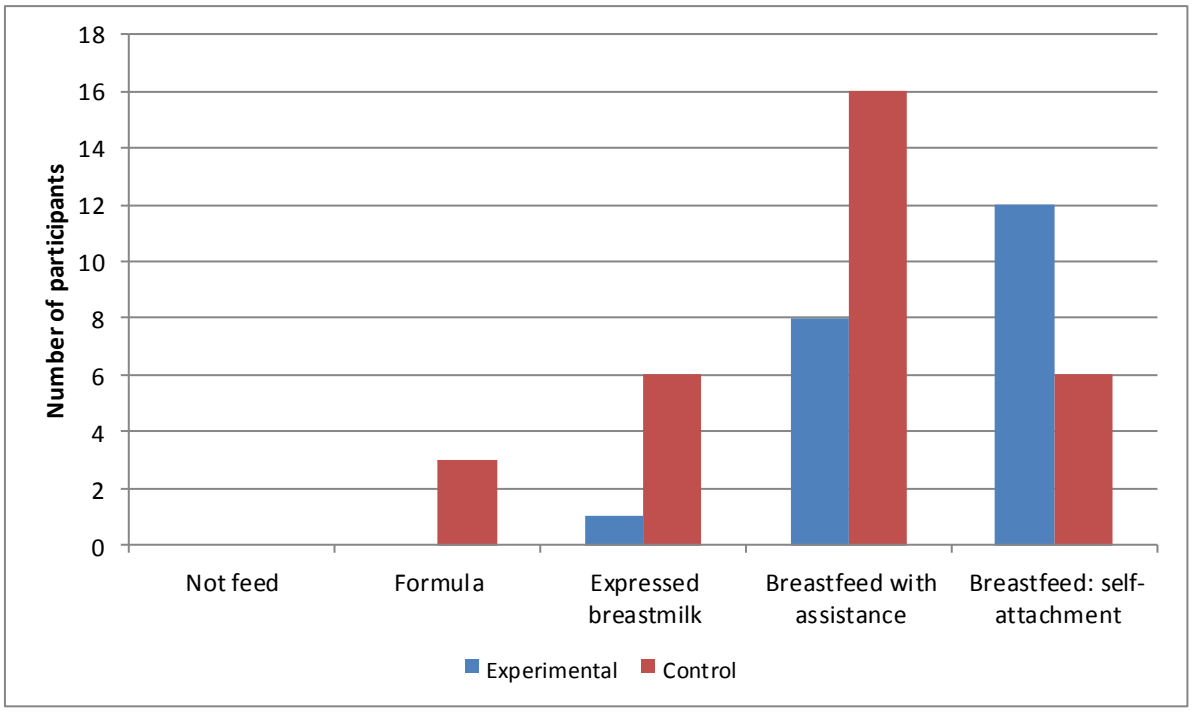


Figure 4.6 Infant feeding (n=41)

The second question focused on the time frame in which the infant first latched onto the breast. The entire experimental group (n= 20) reported that their infants latched within the

first two hours after birth whereas 67% (n= 14) of the control group reported the same. Median scores for the experimental group (*Md*= 5, *Q1*= 5, *Q3*= 5) and the control group (*Md*= 5, *Q1*=4, *Q3*= 5) were highly statistically significant, *p*= 0.006. This correlated with a small effect size (*r* = 0.28) (Figure 4.7).

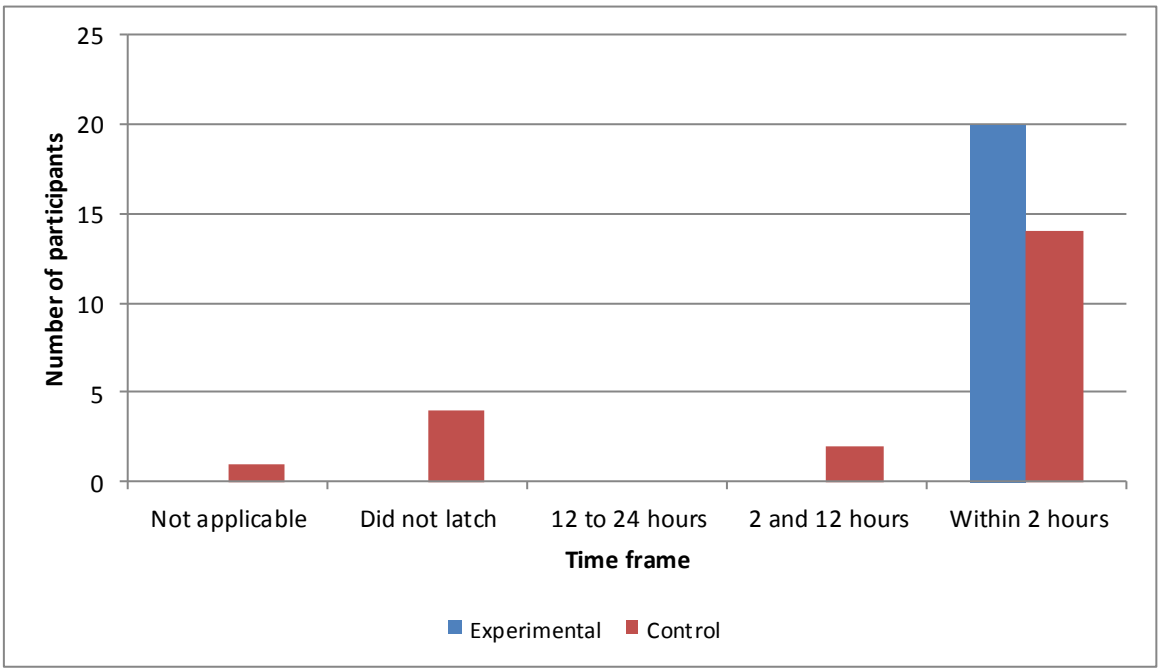


Figure 4.7 Time frame for the first breastfeed (n=41)

Lastly, no statistical or clinical significance was found between the two groups' reports on their intent for feeding their infants over the subsequent two months (*p*= 0.10). Ninety five percent (n=19) of the experimental group reported planning to exclusively breastfeed their infants and 5% (n=1) had not yet decided. Seventy six percent (n=16) of the control group reported planning on exclusively breastfeeding their infants, 19% (n=4) reported planning on doing mixed feeding and 5% (n=1) reported on planning to formula feed their infant.

In summary, the contact questionnaire identified the following statistical significance and/or clinical difference between the experimental and control groups:

- Immediate skin-to-skin contact after birth: high statistical significance in favour of the experimental group.
- Total time spent in skin-to-skin contact after birth: high statistical significance and clinical difference (large effect size) in favour of the experimental group.

- Total time spent in skin-to-skin contact over the first 24 hours after birth: high statistical significance and clinical difference (large effect size) in favour of the experimental group.
- Infant whereabouts during the first 24 hours after birth:

  - Time spent in the nursery: high statistical significance and clinical difference (medium effect size) in favour of the control group.

  - Frequency of skin-to-skin contact: statistical significance and clinical difference (medium effect size) in favour of the experimental group.

- Infant sleeping whereabouts

  - In bed with mother and/or father: high statistical significance and clinical difference (medium effect size) in favour of the experimental group.

  - In the nursery: high statistical significance and clinical difference (medium effect size) in favour of the control group.

- Time the infant spent in the nursery: high statistical significance and clinical difference (medium effect size) in favour of the control group.

- Feeding over the first 24 hours after birth

  - Expressed breastmilk: statistical significance in favour of the control group.

  - Breastfeed with assistance from hospital staff: statistical significance in favour of the control group.

  - Breastfeed via self-attachment: statistical significance in favour of the experimental group.

- Time taken to first breastfeed: high statistical significance and clinical difference (small effect size) in favour of the experimental group.

Neither statistical significance nor clinical difference was found in the following:

- Infant whereabouts during the first 24 hours after birth:

  - In bassinette

  - Dressed and held by mother

  - Dressed and held by other

  - In skin-to-skin contact with other

- Infant sleeping whereabouts

- In bassinette in room

- Feeding over the first 24 hours after birth

  - Formula feeding

  - Not feeding

- Infant feeding intent

4.4 Results of the Maternal-Infant Bonding Scale (MIBS)

Mothers completed the MIBS twice during the study. The first completion was within one week after birth (referred to as MIBS 1) and then again at six to eight weeks after birth (referred to as MIBS 2). Completion of the MIBS 1 and MIBS 2 answered objectives two and three of the study. All 41 mothers completed the MIBS 1 whereas only 37 mothers completed the MIBS 2. The results of the MIBS will be discussed as a comparison between the experimental and control groups at both points of contact (MIBS 1 and MIBS 2).

4.4.1 MIBS 1

The experimental and control group mothers' reporting of bonding with their infants was very similar for the MIBS 1. Neither a statistically significant difference nor an effect size was identified between the experimental and control groups (Table 4.4).

Table 4.4 MIBS 1 (n=41)

Variable	**Experimental Group (n=20)**	**Control Group (n= 21)**	**Change in Median**	**p value**	**Experimental Group (n=20)**	**Control Group (n= 21)**	**Effect Size (d)**
	Median (Lower and Upper quartile)				**Mean (SD)**		
MIBS 1 Total	0 (0-1)	0 (0-1)	0	0.64	0.65 (1.04)	0.67 (0.8)	-0.02

$p \leq 0.05$ Statistical significance*
$p \leq 0.01$ High statistical significance**
$d \geq 0.8$ Large effect size •••
$d \geq 0.5$ Medium effect size ••
$d \geq 0.2$ Small effect size •

4.4.2 MIBS 2

Thirty seven mothers completed the MIBS 2; 19 from the experimental group and 18 from the control group. The mean score of the experimental group was 0.65 (SD= 1.09) and the

mean score from the control group was 1.00 (SD= 1.48). Lower scores on the scale indicate fewer bonding disturbances. The majority (n= 12) of mothers from the experimental group (63%) scored 0 on the MIBS 2, whereas only 8 (44%) from the control group scored the same. These findings were supported by a small effect size (*d*= -0.27). This indicated that mothers from the control group reported more disturbances in the mother-infant bond than those in the experimental group (Table 4.5).

Table 4.5 MIBS 2 (n=37)

Variable	**Experimental Group (n=20)**	**Control Group (n= 21)**	**Change in Median**	**p value**	**Experimental Group (n=20)**	**Control Group (n= 21)**	**Effect Size (d)**
	Median (Lower and Upper quartile)				**Mean (SD)**		
MIBS 2 Total	0 (0-1)	0 (0-2)	0	0.41	0.65 (1.09)	1.00 (1.48)	-0.27 •

$p \leq 0.05$ Statistical significance*
$p \leq 0.01$ High statistical significance**
$d \geq 0.8$ Large effect size •••
$d \geq 0.5$ Medium effect size ••
$d \geq 0.2$ Small effect size •

In Summary there was no statistically significant or clinical difference between the experimental and control groups for the MIBS 1 but the small positive effect size indicates a clinical difference in favour of the experimental group for the MIBS 2.

4.5 Results of maternal mental health

Mothers completed questions relating to their mental health both within one week after birth and again at six to eight weeks after birth. At the first point of contact, mothers were asked to rate their mental health during their pregnancy (referred to as maternal mental health 1). At six to eight weeks after birth, mothers rated the same aspects of their mental health but this time for the period from birth (referred to as maternal mental health 2). The results of maternal mental health 1 and 2 will now be presented.

4.5.1 Maternal mental health 1

The medians for both groups were the same (6) but the mean score was slightly higher for the experimental group (μ= 6.1, SD= 2.59 versus μ= 5.24, SD= 3.33). This indicated that the

experimental group reported having more mental health concerns during their pregnancies than the control group. There was no significant difference between the two groups (p= 0.35) but a small effect size (d= 0.29) was found.

4.5.2 Maternal mental health 2

Similar to the first set of results, mothers in the experimental group also had a higher mean score than the control group (μ= 5.4, SD= 2.14 versus μ= 5.05, SD= 3.02). The median scores for the two groups were once again the same (*Md*= 5). No significant difference (p= 0.97) or effect size was found (d= 0.14). Figure 4.8 depicts the mean scores for the maternal mental health questions for the first and second halves of the study.

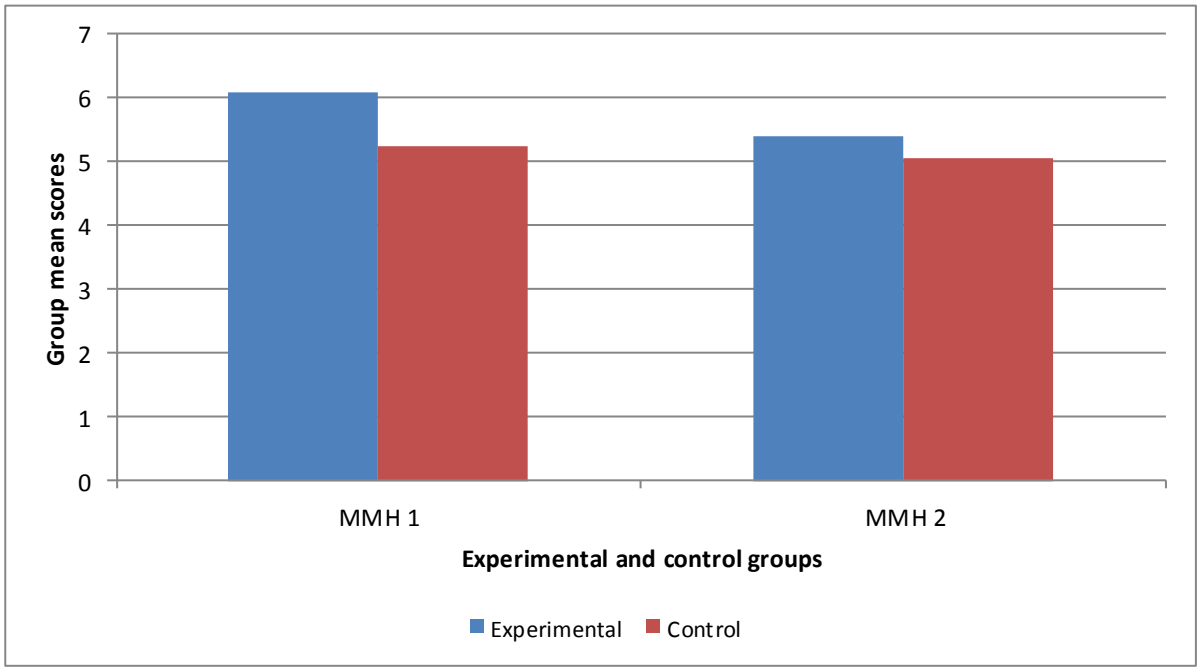


Figure 4.8 Maternal mental health 1 (n=37) and 2 (n=36) between experimental and control groups

In summary, a small effect size indicating clinical difference in favour of the control group was identified in maternal mental health 1. No clinical or statistically significant difference was found between the two groups for maternal mental health 2.

4.6 Results of the tactile questionnaire

Thirty seven participants completed the tactile questionnaire, 19 from the experimental group and 18 from the control group. The tactile questionnaire explored touch during activities of daily living as well as asked a follow-up question regarding infant feeding. The questions related to touch included:

1. Time spent bathing and doing infant massage
2. Means of carrying the infant
3. Means of feeding the infant
4. Contact when the infant is awake
5. Contact when the infant is fussy
6. Cry response time
7. Affectionate touch.

The tactile questionnaire helped to achieve objective four of the study. The results will firstly explore the touch related questions and then look at the feeding related question.

4.6.1 Bathing and massage

Mothers in the experimental group reported spending more time bathing and massaging their infants than mothers in the control group. For bathing, the experimental group's results were *Md*= 4; *Q1*= 2, *Q3*= 4 versus the control group's results of *Md*= 3, *Q1*= 1, *Q3*= 4 (Figure 4.9). For massage, the experimental group's results were *Md*= 2, *Q1*= 1, *Q3*= 4 and the controls groups results were *Md*= 2, *Q1*= 1, *Q3*= 5 (Figure 4.10). There was however no statistically significant difference between the two groups in terms of bathing time (p= 0.091) or massage time (p= 0.082). A small effect size was however identified for both bathing (r= 0.26) and massage (r= 0.26).

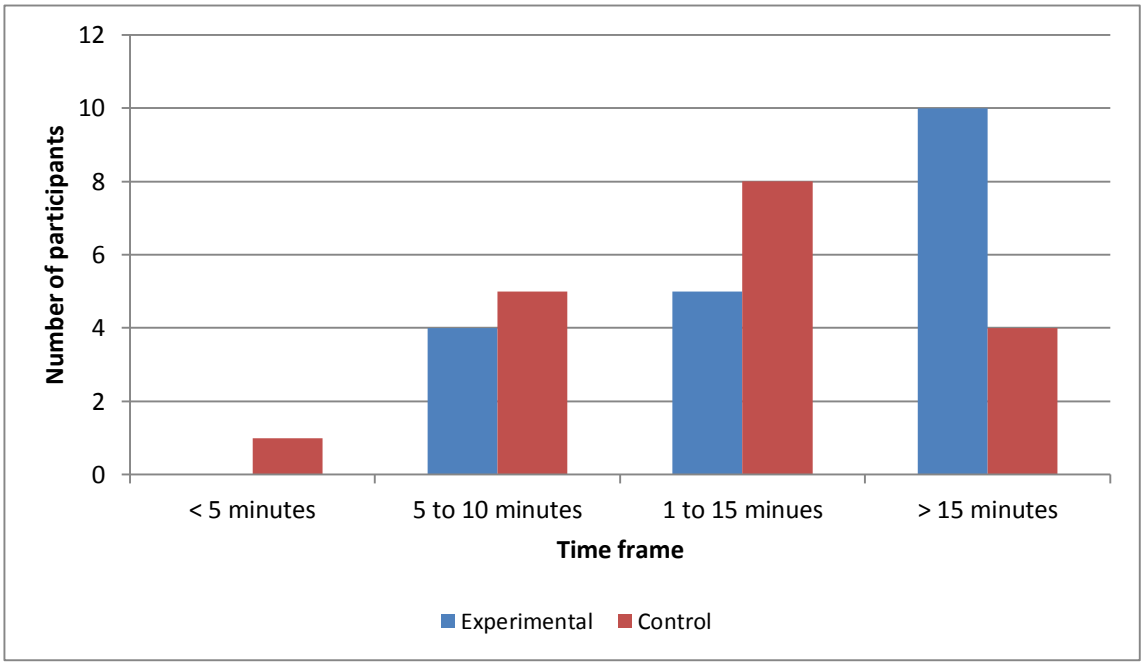


Figure 4.9 Bathing time (n=37)

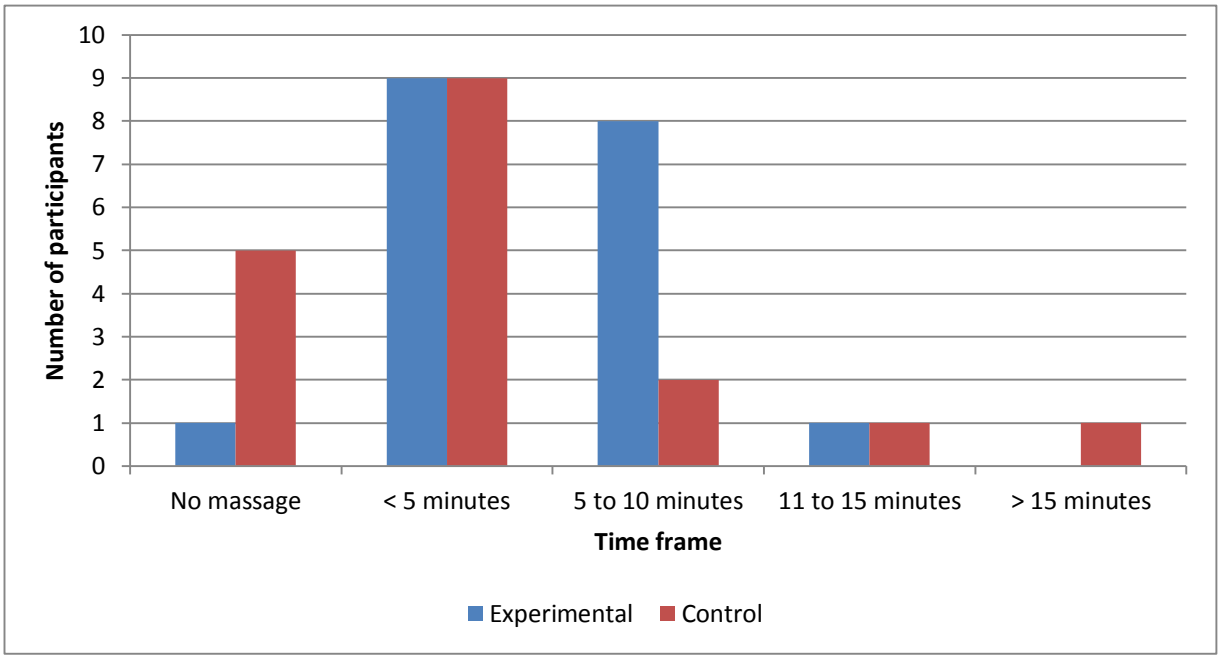


Figure 4.10 Massage time (n=37)

4.6.2 Carrying

Mothers reported the frequency that they spent carrying their infants according to the following variables:

1. In their arms

2. In a pram

3. In a sling or infant carrier

4. In a baby seat.

High scores for variables 1 and 3, indicated greater physical contact between mothers and infants, whereas variables 2 and 4 indicated less physical contact.

The median scores for in arms, in pram and in baby seat were the same for both groups. The experimental group had a higher median score (*Md*= 3, *Q1*= 1 *Q3*= 5) than the control group (*Md*= 2.5, *Q1*= 1, *Q3*= 4) for carrying in sling or carrier. No statistical significance was identified in any of the categories but some clinical difference was. A small effect size in favour of the control group was identified in the carrying in arms category (*r*= -0.16) and the carrying in the baby seat category (*r* = -0.24) (Figures 4.11 and 4.12). This shows that the control group rated a higher frequency in both of these categories. A medium effect size was found for the carrying in a sling or carrier (*r*= 0.30) in favour of the experimental group. This indicates that the experimental group rated a higher frequency of carrying their infants in a sling or carrier in comparison to the control group (Figure 4.13).

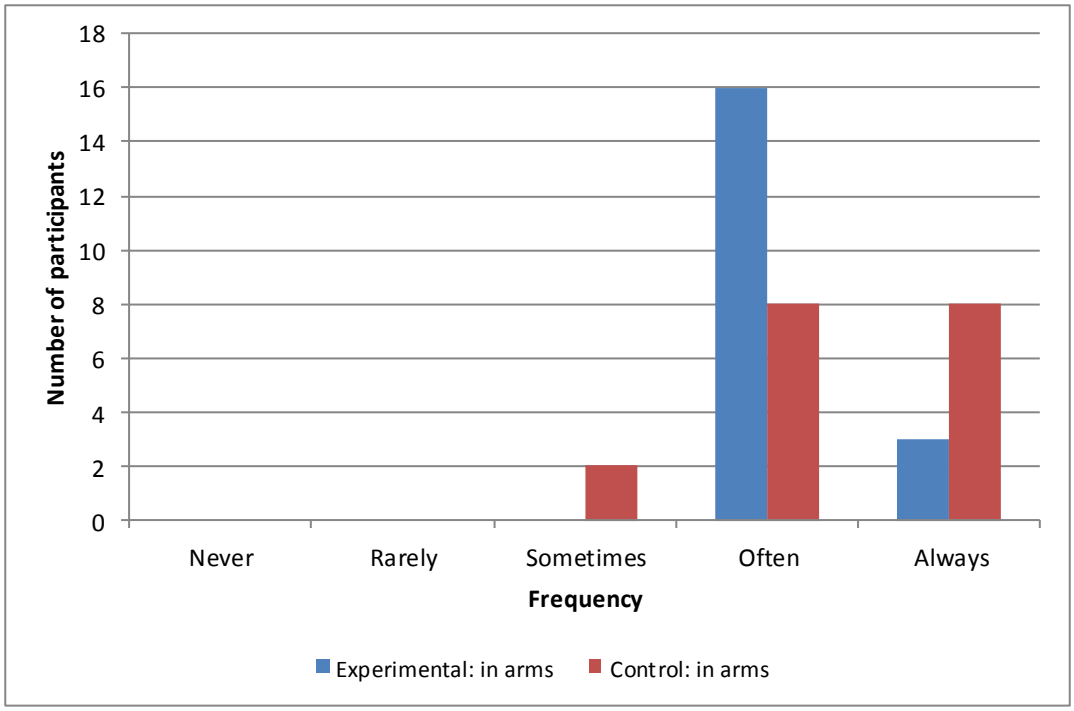


Figure 4.11 Carrying in arms (n=37)

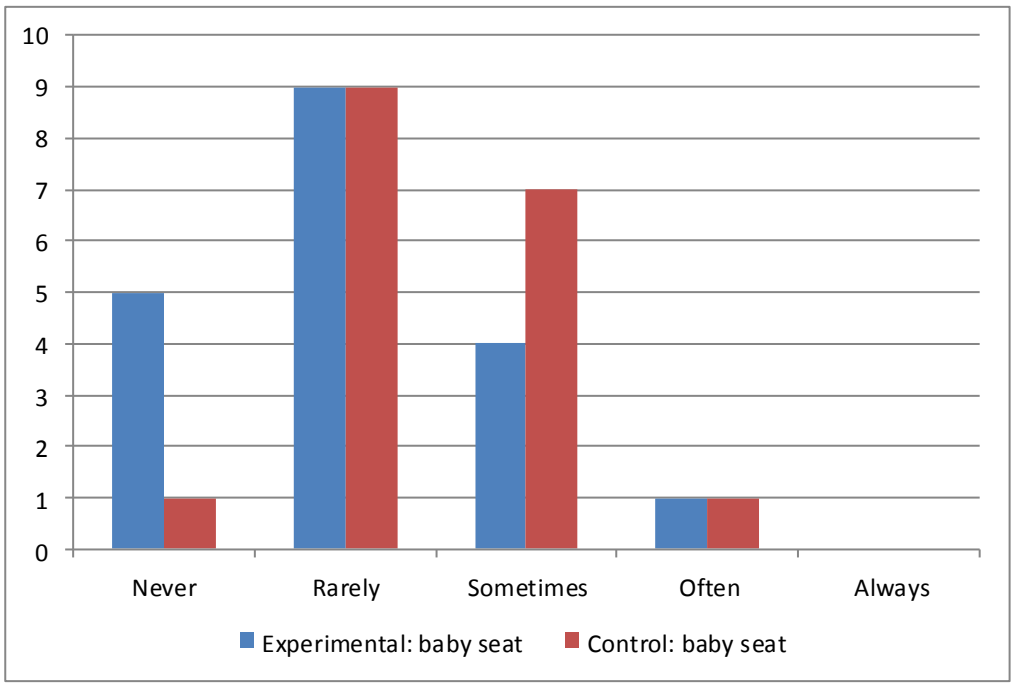


Figure 4.12 Carrying in baby seat (n=37)

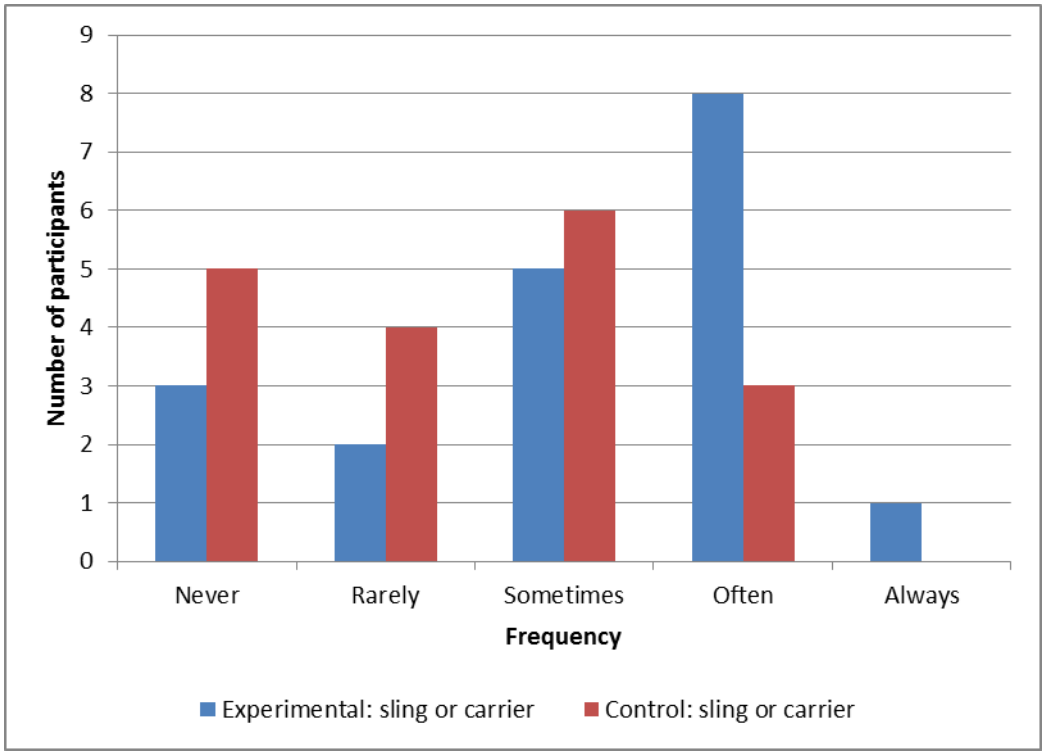


Figure 4.13 Carrying in sling or carrier (n=37)

4.6.3 Feeding

Mothers reported the frequency of the manner in which they fed their infants according to the following variables:

1. Hold in arms while feeding
2. Cover with a cloth while feeding
3. Place infant a crib with the bottle propped up
4. Swaddle while feeding.

No statistical significance was found between the two groups in any of the categories but some clinical difference was identified. This included a small effect size (r= -0.26) in the swaddling category (experimental *Md*= 2 ; control *Md*= 3). This indicates that mothers from the control group rated a higher frequency of swaddling their infants during feeding than mothers in the experimental group (Figure 4.14).

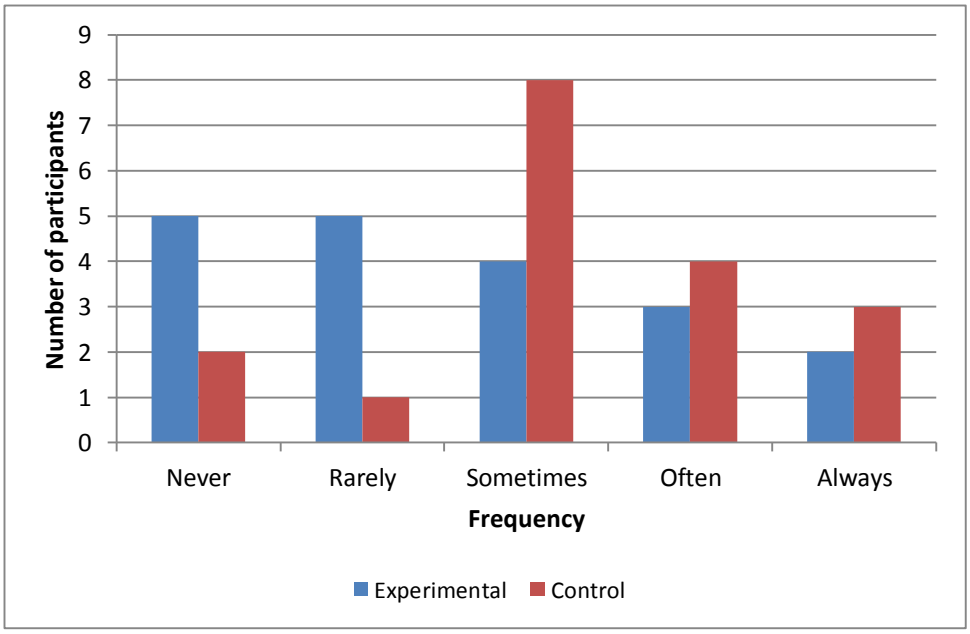


Figure 4.14 Feeding: swaddling (n=37)

4.6.4 Contact when the infant is awake

Mothers reported the frequency of different forms of contact while their infant was awake. This included the following variables:

1. Held in arms
2. Placed on a play mat or in a cot
3. Placed on a bed or couch
4. Carried in a sling or baby carrier
5. Placed in a swing seat
6. Placed in a pram.

No statistical significance was found between the two groups in any of the categories yet some clinical difference was identified. The control group reported a higher frequency of holding their infants in their arms (small effect size of r= -0.15), and placing them in swing seats (small effect size of r= -0.17). Conversely, the experimental group reported a higher frequency of carrying their infants in a sling or baby carrier (small effect size of r= 0.23) (Table 4.6).

Table 4.6 Contact when infant is awake (n=37)

Variable	Median (Lower and Upper Quartile)		Change in Median	p value	Effect Size (r)
	Experimental Group (n=19)	Control Group (n = 18)			
Awake					
Hold in arms	4(3-5)	4(3-5)	0	0.262	-0.15•
Play mat or cot	3(1-4)	3(1-4)	0	0.734	0.04
Bed or couch	3(1-4)	3(1-4)	0	0.987	-0.00
Sling or carrier	3(1-4)	2(1-4)	1	0.157	0.23•
Swing seat	1(1-4)	1(1-3)	0	0.219	-0.17•
Pram	2(1-3)	2(1-3)	0	0.634	0.07

$p \leq 0.05$ Statistical significance*
$p \leq 0.01$ High statistical significance**
$r \geq 0.5$ Large effect size •••
$r \geq 0.3$ Medium effect size ••
$r \geq 0.1$ Small effect size •

4.6.5 Fussy Response

Mothers were asked about their responses when their infants were fussy. They rated the frequency of each of the following options:

1. Swaddling their infant
2. Holding their infant
3. Rocking their infant
4. Putting their infant into a crib
5. Placing their infant in a swinging chair
6. Holding and singing to their infant
7. Sitting their infant in front of the TV
8. Placing their infant into a crib and playing music
9. Caressing their infant whilst in a crib.

No statistical significance was found between the two groups in any of the categories but some clinical difference was identified. The control group rated a higher frequency of placing

their infant in a crib (small effect size of *r*= -0.15) and placing their infant into a swinging chair (small effect size of *r*= -0.23) (Figures 4.15 and 4.16).

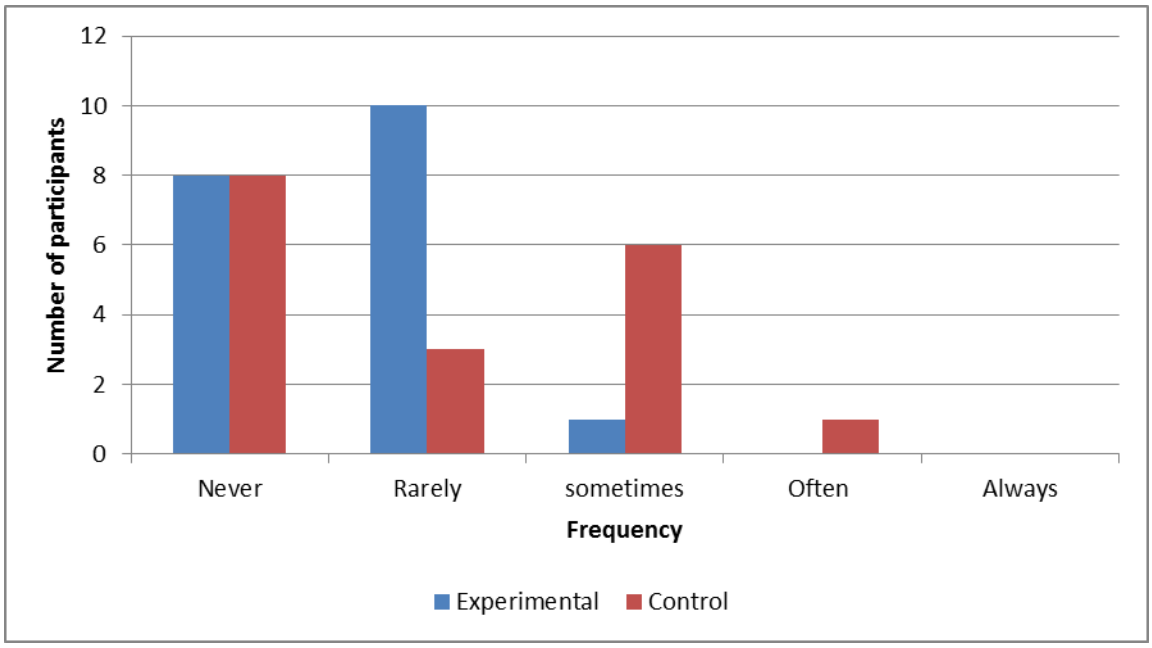


Figure 4.15 Fussy response: place in crib (n=37)

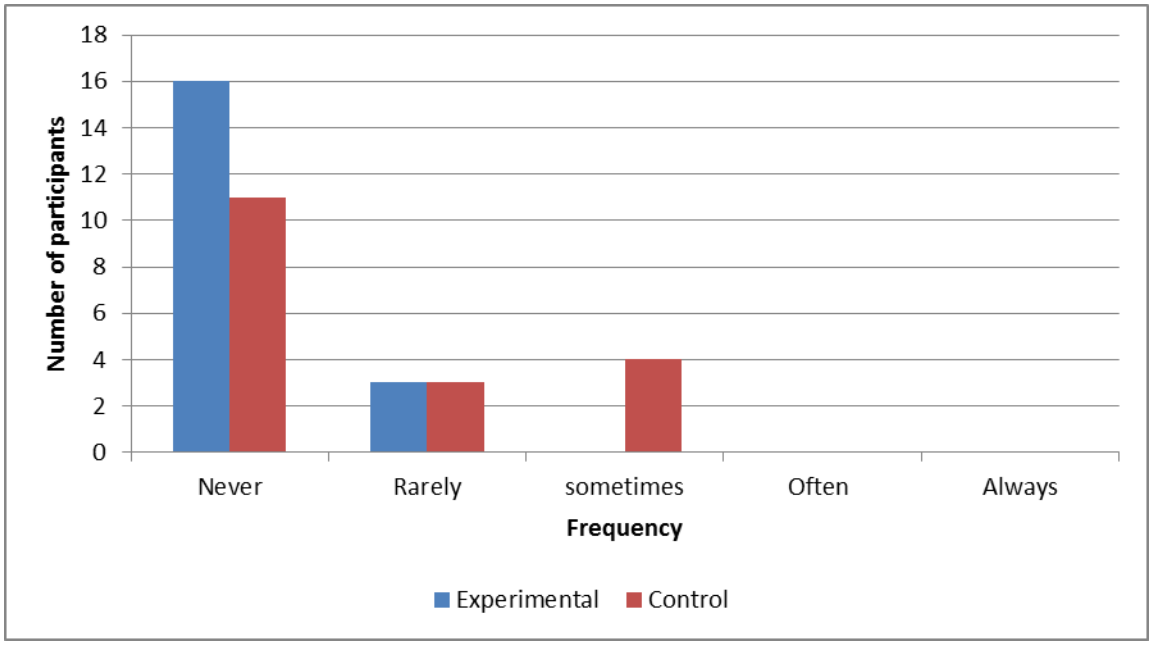


Figure 4.16 Fussy response: place in swinging chair (n=37)

4.6.6 Cry response

Mothers rated four different variables of how long they would usually take to respond to their infant's crying, including:

1. Immediately pick up the infant

2. Let the infant cry for 5 to 10 minutes

3. Let the infant cry for more than 10 minutes

4. Let the infant cry it out.

No statistical significance was found between the two groups in any of the categories but some clinical difference was identified. This included a small effect size (r= -0.20) for the immediate pick up category in favour of the control group (Figure 4.17).

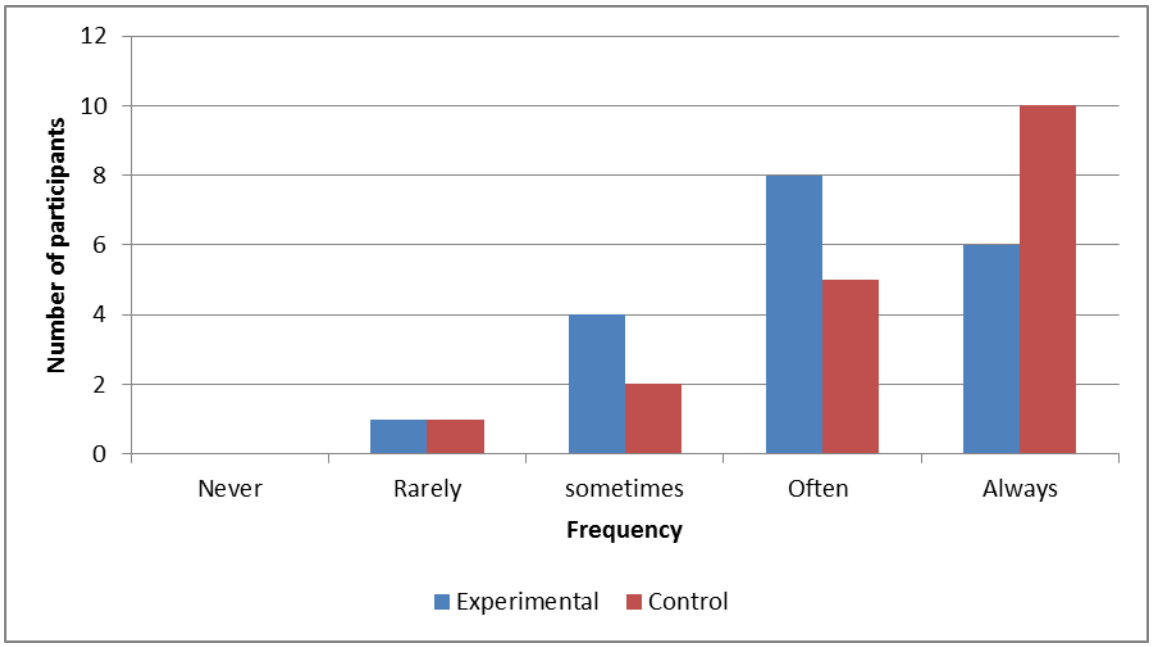


Figure 4.17 Cry response: immediate pick up (n=37)

4.6.7 Affectionate touch

Mothers rated the frequency with which they used affectionate touch with their infants during the following activities of daily living:

1. Feeding

2. Nappy change

3. Bathing

4. Consoling

5. Putting their infant to sleep

6. Changing their infant's clothing

7. During face-to-face interaction.

No statistical significance was found between the two groups in any of the categories but some clinical difference was identified. This included a small effect size for affectionate touch during feeding (*r*= 0.27) in favour of the experimental group (Figure 4.18).

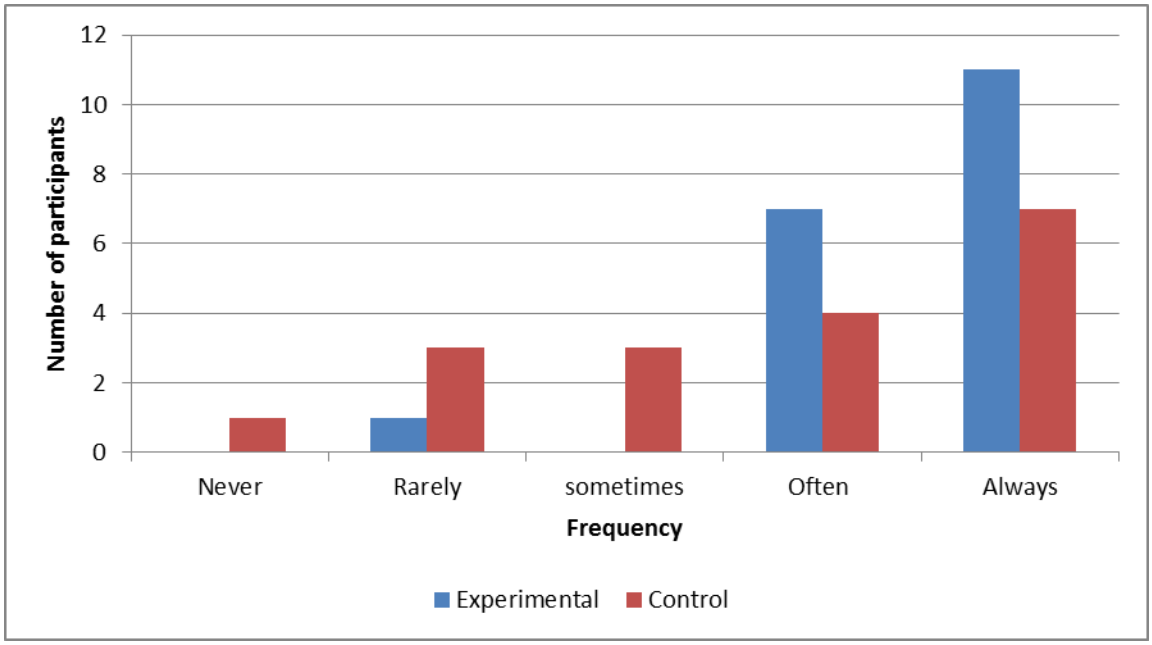


Figure 4.18 Affectionate touch: feeding (n=37)

4.6.8 Infant feeding

Following on from the questions asked about infant feeding in the contact questionnaire, mothers answered a question about their infant's feeding since birth in the tactile questionnaire. Sixteen (84%) of the mothers from the experimental group reported that they had exclusively breastfeed their infants since birth whereas only 11 (61%) of the mothers

from the control group reported the same. There was however, no statistically significant difference between the two groups.

In summary, the tactile questionnaire identified the following statistical significance and/or clinical difference between the experimental and control groups:

- Bathing: clinical difference (small effect size) in favour of experimental group
- Massage: clinical difference (small effect size) in favour of experimental group
- Carrying
  - In arms: clinical difference (small effect size) in favour of control group
  - Sling or carrier: clinical difference (medium effect size) in favour of experimental group
  - Baby seat: clinical difference (small effect size) in favour of control group

- Feeding
  - Swaddle: clinical difference (small effect size) in favour of the control group
- Awake
  - Hold in arms: clinical difference (small effect size) in favour of the control group
  - Held or carried in a sling or carrier: clinical difference (small effect size) in favour of the experimental group
  - Placed in a swing seat: clinical difference (small effect size) in favour of the control group
- Fussy response
  - Put infant into crib: clinical difference (small effect size) in favour of the control group.
  - Put infant into a swinging chair: clinical difference (small effect size) in favour of the control group
- Cry response
  - Immediate pick up: clinical difference (small effect size) in favour of the control group
- Affectionate touch
  - Feeding: clinical difference (small effect size) in favour of the experimental group

No statistical significance and/or clinical difference between the experimental and control groups were identified in the following areas:

- Carrying

- In pram

- Feeding
  - Hold in arms
  - Cover with cloth or blanket
  - Place infant in crib with bottle propped
- Awake
  - Place on a play mat or cot
  - Place on a bed or couch
  - Placed in a pram
- Fussy response
  - Swaddle
  - Hold
  - Rocking
  - Holding infant and singing
  - Place infant in front of TV
  - Play music for infant while they are in a crib
  - Caress infant while they are in a crib
- Cry response
  - Leave to cry for 5-10mins
  - Leave to cry >10mins
  - Allow infant to cry it out
- Affectionate touch
  - Nappy change
  - Bath
  - Consoling
  - Putting to sleep
  - Change clothes
  - Face-to-face interaction
- Feeding

4.7 Results of the tactile interactions

This information was gathered in order to answer fifth objective of the study. Mothers and infants took part in face-to-face interaction at the second point of contact, six to eight weeks after birth. Interactions were videotaped, analysed and then coded. The following categories of touch will be reported on: passive, active, no touch, and affectionate touch.

In total 32 dyads took part in the interaction task, 16 from the experimental group and 16 from the control group. The results of the tactile interactions are tabulated below (Table 4.7). Overall the experimental group spent more time touching their infants during face-to-face interaction than the control group. This can be seen in the higher median and mean scores for the passive, active and affectionate categories of touch. This was also supported by the finding that the control group had a higher mean score in the no touch category than the experimental group. The experimental group spent 81% of the time using some form of touch with their infants, whereas the control group did the same for 71% of the time during the face-to-face interaction. Despite this difference, no statistical significance was identified between the two groups in any of the categories. Small effect sizes were however found for the passive (d= 0.22) and affectionate (d= 0.24) categories of touch and a medium effect size for the active (d= 0.59) category of touch, all in favour of the experimental group.

Table 4.7 Results of tactile interactions (n=32)

Variable	Experimental Group (n=16)	Control Group (n=16)	Change in Median	p value	Experimental Group (n=16)	Control Group (n=16)	Effect Size Cohen's d
	Median (Lower and Upper quartile)				Mean (SD)		
Passive	19.02 (5.95-33.20)	14.35 (03.04-27.92)	04.67	0.58	19.37 (14.60)	16.14 (14.34)	0.22•
Active	41.31 (35.32-48.38)	31.83 (12.67-48.00)	09.48	0.17	40.56 (12.20)	30.91 (19.66)	0.59••
No Touch	10.50 (2.42-17.60)	09.80 (01.83-18.65)	00.70	0.98	11.47 (10.62)	14.01 (15.85)	0.19
Affectionate	15.30 (9.36-21.75)	11.01 (07.95-17.97)	04.29	0.44	17.20 (11.52)	14.48 (11.56)	0.24•

$p \leq 0.05$ Statistical significance*
$p \leq 0.01$ High statistical significance**
$d \geq 0.8$ Large effect size •••
$d \geq 0.5$ Medium effect size ••
$d \geq 0.2$ Small effect size •

4.8 Conclusion

This section summarizes the results of the data analysis according to the study objectives of the study.

Objective 1: To determine the amount of skin-to-skin contact between mothers and infants over the first 24 hours after birth.

The experimental group had statistically significant and clinically higher ratings of the total time spent in skin-to-skin contact in the first 24 hours after birth.

Objective 2: To investigate the influence of early skin-to-skin contact on bonding within the first week after birth.

There was no statistically significant or clinical difference between the experimental and control groups for mother-infant bonding in the first week after birth.

Objective 3: To investigate the influence of early skin-to-skin contact on bonding six to eight weeks after birth.

The experimental group had better ratings of bonding with their infants in comparison to the control group at six to eight weeks after birth. This was supported by a small effect size indicating clinical difference.

Objective 4: To investigate the influence of early skin-to-skin contact on touch in daily routine when the infant is six to eight weeks old.

No statistically significant differences were identified between the two groups in terms of tactile interactions in daily routine. Several clinical differences were however identified. Mothers from the experimental group spent more time bathing and massaging their infants than mothers in the control group. These mothers also spent more time carrying their infant's in slings or soft carriers. Mothers from the control group had higher ratings of holding their infants in their arms, carrying their infants in baby seats, swaddling their infants and placing them into cribs or swinging chairs when they were fussy. Mothers from the control group also had higher ratings of picking up their infants immediately once they started crying. Lastly, mothers from the experimental group recorded higher ratings of affectionate touch during feeding than the control group.

Objective 5: To investigate the influence of early skin-to-skin contact on tactile interactions between mothers and infants, six to eight weeks after birth.

No statistically significant differences were identified between the two groups in terms of tactile interactions. Clinical differences were however identified. Mothers from the experimental group spent more time touching their infants during face-to-face interaction. This included clinical differences in most categories of touch namely: passive, active and affectionate.

CHAPTER 5

DISCUSSION

5.1 Introduction

This chapter answers the research question and objectives of the study by examining the results and comparing them with existing literature on the interrelated topics. The discussion of the findings will firstly examine the demographics of the study population, and then look at the findings of the contact questionnaire, the MIBS, maternal mental health, the tactile questionnaire, mother-infant touch interactions and then conclude with the implications of the findings. This chapter will also highlight any unanticipated outcomes.

5.2 Overview of the findings

The purpose of this study was to determine the influence of early skin-to-skin contact on mother-infant bonding and touch. By comparing the outcomes of two groups of mother-infant dyads (control and experimental groups), who experienced different exposure to skin-to-skin contact, one can deduce whether the variable amount of skin-to-skin contact correlated with maternal-infant bonding and touch outcomes.

The study found several differences on the outcome measures between the experimental and control groups, thus the null-hypothesis of the study can be rejected. The power score of the study helped to safeguard against mistakenly rejecting the null hypothesis (type l error).

5.3 Demographics of the study population

A total of 41 primiparous and multiparous women, together with their infants, that had given birth in the private health care sector in Gauteng, South Africa, took part in the study. Twenty of the dyads formed the experimental group and 21 formed the control group. Although the required sample size was achieved, with the power score set at 80%, caution should be taken with generalising the study findings to the greater population. One reason for this is because all of the participants that took part in the study did so on a volunteer basis. Callahan, Hojat and Gonnella (2007) state that volunteers tend to have a higher social

status, be more intelligent, be less conforming and have an increased need for approval and thus cannot be generalised to a non-volunteer population.

5.3.1 Maternal demographics

The age of the participating mothers ranged from 22 to 41 years of age, the average age being 30 years. The majority of the mothers were primiparous. Mothers from the experimental and control groups were comparable in terms of age and parity. It has been established that these factors can affect touch interactions as well as maternal responsiveness between mother and infants (Ferber, 2004). It was therefore important to establish comparability between the experimental and control groups to ensure that the results of the study can be compared between the two groups.

5.3.2 Infant demographics

The experimental and control group infants were comparable in terms of gender, birth weight and type of delivery. Just over half of the participants had vaginal deliveries. This does not appear to be reflective of the private health care sector in South Africa. It was reported in 2015 that of South African woman who have private medical insurance, 70% give birth by caesarean section (Mehta, 2015). Although the current study's rate of caesarean section was only 46% this is still very high when compared to the international average of 18% and the recommendation from the WHO of 15% (Mehta, 2015). Although there was no statistical significance found between the experimental and control groups with regards to type of delivery, it should be noted that the experimental group had a higher rate of vaginal delivery (65%) than the control group (43%). Rowe-Murray and Fisher (2002) report that woman who give birth via caesarean section often experience a longer elapsed time between giving birth and having their infant put to the breast when compared to mothers who had delivered vaginally. Similarly, Bramson *et al.* (2010) also identified caesarean section deliveries as being a barrier to early skin-to-skin contact and breastfeeding initiation. In contrast to this literature, 35% of the experimental group was made up of dyads that had under gone caesarean section deliveries and thus this form of delivery did not appear to hinder early skin-to-skin contact.

Another consideration is the practices of the different maternity facilities. A statistically significant difference was identified between the experimental and control dyads in terms of

which were born at facilities that were certified as being baby friendly in terms of the BFHI and which were not. Forty percent of the experimental group were born at BFHI facilities whereas only 10% of the control group were born at BFHI institutions. This too is likely to have influenced the skin-to-skin experienced after birth because the hospital practices for the BFHI facilities would routinely include early skin-to-skin contact whereas the practices at the non-BFHI facilities would not necessarily be practicing skin-to-skin contact routinely. No literature could be found with which to compare these rates of skin-to-skin contact after birth in BFHI versus non-BFHI facilities in South Africa. A recent study conducted in Brazil did however find that even in a BFHI accredited facility, the rate of correctly implemented skin-to-skin contact after birth was only 9.3% (Sampaio, Bousquat & Barrros, 2016).

5.4. The contact questionnaire

Although there can be some doubt as to the accuracy of this self-reported information from the contact questionnaire, Githens, Glass, Sloan and Entman (1993) and Rowe-Murray and Fisher (2002) believe that mothers are very reliable witnesses when it comes to describing, with great accuracy, the events they experienced during labour and delivery.

5.4.1 Contact questionnaire: division of participating dyads into the experimental and control groups

The differentiation between the experimental and control group in terms of having immediate skin-to-skin contact for at least two hours or not was made because of what existing literature informs us about the promptness of skin-to-skin contact after birth as well as the optimal time frame of this contact. Immediate skin-to-skin contact forms part of the evidence for the ten steps to successful breastfeeding and it has been highlighted by several authors as a main feature in studies on skin-to-skin contact (World Health Organization, 1998; Kennell & McGrath, 2005; Dalbye *et al.*, 2011; Widström *et al.*, 2011; Phillips, 2013; Svensson *et al.*, 2013). The two hour time frame of skin-to-skin contact after birth has also been emphasized as a sensitive period for newborn infants because of their particular responsiveness to sensory cues from their mother's body (thermal, tactile and olfactory) which assists in establishing effective breastfeeding (Gómez *et al.,* 1998; Moore & Anderson, 2007). The first two hours after birth also appear to be of significant importance to infants' self-regulation, irritability as well as maternal sensitivity and mutuality of the dyad (Bystrova

et al., 2009). The two hour time frame of skin-to-skin contact has also been used in several studies previously (Insel & Young, 2001; Moore & Anderson, 2007; Caruana, 2008).

5.4.2 Contact questionnaire and objective 1

The contact questionnaire answered the first objective of the study. A highly statistically significant difference was identified between the experimental and control groups, indicating that spending the first two hours after birth in skin-to-skin contact positively correlated with spending a longer overall duration in skin-to-skin contact over the first 24 hours after birth (see Tables 4.3b). No literature could be found that specifically looked at this same correlation of skin-to-skin contact in the first two hours and the first 24 hours after birth. A correlation between early and later skin-to-skin contact has however been found. Bigelow *et al.* (2010) studied the relationship between skin-to-skin contact and later maternal sensitivity. They identified a significant correlation between the amount of time that infants spent in skin-to-skin contact in the first 24 hours after birth and the amount of skin-to-skin contact that they did in the first month after birth (Bigelow *et al.*, 2010).

Infant whereabouts during the first 24 hours after birth

Time in the nursery

There were highly statistically significant differences identified between the experimental and control groups in terms of the three different questions asked about infants being in the nursery (see Figures 4.1, 4.4 and 4.5). In all three instances, the control group reported a greater frequency and longer time-span that their infants spent in the nursery. For the question relating to the total hours their infants spent in the nursery over the first 24 hours after birth, the experimental group had a 36% higher rate of reporting that their infants had spent no time in the nursery, in comparison to the control group. Conversely, the control group had a 32% higher rating of their infants spending 4-8 hours in the nursery in comparison to the experimental group (see Figure 4.5).

These findings correlate with previous literature by the International Childbirth Education Association (2015) which states that mothers that experienced early skin-to-skin contact with their newborns make fewer requests for their infants to be cared for in the nursery. One study by Widström *et al.* (1990) investigated the short-term effects of an infant's early

suckling and touch of the mother's nipple on maternal behaviour in Sweden. They found that mothers who had experienced early skin-to-skin contact together with suckling at the breast within the first hour after birth left their infants in the nursery for significantly less time than those who had not experienced skin-to-skin contact (Widstrom *et al.,* 1990). Similar to the study by Widstrom *et al.* (1990) mothers in the experimental group of the present study would have also experienced early sucking and touch of the nipple as they all reported having their infants start to breastfeed within two hours after birth.

An alternative explanation to the difference between the two groups is the variable practises of BFHI and non-BFHI facilities. Specifically at BFHI facilities, rooming-in and keeping mothers and infants together 24 hours a day would be encouraged (United Nations Children's Fund & World Health Organization, 2009). Yet seeing as though 60% of the experimental group came from non-BFHI institutions, this cannot fully account for the difference in the time that the experimental and control infants spent in the nursery.

Infant feeding within 24 hours postpartum

There was a highly statistically significant difference between the two group's ratings of the time frame in which their infants' first breastfed after birth as well as a statistically significant difference between the types of feeding that took place. Significantly more of the infants from the experimental group breastfed via self-attachment and within two hours after birth, in comparison to the control group (see Figures 4.6 and 4.7).

This confirms previous findings that early and extended skin-to-skin contact aids the initiation of breastfeeding (Carfoot *et al.,* 2005; Anderson *et al.,* 2007; Moore & Anderson, 2007; Henderson, 2011; Phillips, 2013). This is likely due to the instinctual behaviours of newborns that are elicited when they are exposed to the olfactory, tactile and thermal cues that skin-to-skin contact provides during the sensitive period after birth (Moore *et al.,* 2012; Bergman & Bergman, 2013). These behaviours include the initiation of breastfeeding by locating and moving towards the breast to self-attach for the first breastfeed (Kennell & McGrath, 2005; Henderson, 2011; Phillips, 2013). The timing of this intervention is important because the first two hours after birth are a sensitive period whereby infants are especially alert (Bergman & Bergman, 2013). If infants are left undisturbed and un-medicated they are

likely to self-attach within 55 minutes after birth (Bergman & Bergman, 2013) although other reports say that self-attachment can take longer, up to two hours (Widström *et al.*, 2011; Phillips, 2013). The findings of this study are in agreement with this literature as all of the infants in the experimental group starting feeding within two hours after birth and the majority did so via self-attachment.

Infants that initiate breastfeeding through this self-attachment process are more likely to breastfeed effectively (Carfoot *et al.,* 2005; Winberg, 2005; Moore & Anderson, 2007; Bramson *et al.,* 2010; Henderson, 2011; Karimi & Khadivzadeh, 2012). The current study may have identified similar findings to this literature as there was a statistically significant difference between the two groups in terms of requiring assistance from hospital staff for breastfeeding and for the use of expressed breastmilk in the first 24 hours after birth. The control group reported needing significantly more assistance from hospital staff for breastfeeding as well as reported significantly greater use of expressed breastmilk in the first 24 hours after birth than the experimental group (see Figure 4.6). It is therefore possible that skin-to-skin contact enhanced early breastfeeding success and effectiveness as seen in the experimental groups' lesser need of assistance from hospital staff and use of expressed breastmilk (Vogel, 2016). Definite conclusions cannot be drawn however as the reasons as to why assistance was required or expressed milk was used, are unknown.

Other possible confounding variables to this early breastfeeding success is the influence of the type of birth, the mother's intent to breastfeed and use of analgesia or anaesthesia during labour (Bramson *et al.*, 2010).

There was no statistical significance between the experimental and control groups with regards to type of delivery, although, the experimental group did have a higher rate of vaginal delivery. There was also no statistical significance between the experimental and control groups' intent to feed their infants over the two months following birth, with the majority of both groups planning to exclusively breastfeed their infants. Bramson *et al.* (2010) found that type of delivery as well as infant-feeding method intent had some influence on breastfeeding outcomes whereas early skin-to-skin contact had a much greater effect. Similarly, in the current study, type of delivery and intent to feed did not appear to have a significant impact on early breastfeeding outcomes whereas early skin-to-skin contact

did. Information regarding the use of analgesia or anaesthesia during labour was not obtained and thus little is known about this possible confounding variable.

Infant feeding at six to eight weeks after birth

The study found no statistically significant difference between the two groups in terms of exclusive breastfeeding rates at six to eight weeks after birth. Eighty four percent of the mothers from the experimental group reported that they had exclusively breastfed their infants since birth whereas 61% of the mothers from the control group reported the same.

This is contradictory to previous literature by Philipp, Merewood, Miller, Chawla, Murphy-Smith, Gomes, Cimo and Cook (2001) and Bramson *et al.* (2010) which suggests that early skin-to-skin contact is positively associated with breastfeeding duration. More specifically, Moore *et al.* (2012) identified that early skin-to-skin contact had a positive influence on breastfeeding duration at one to four months postpartum. A possible reason for this contradiction is the time frame of the follow-up whereby this study was limited to a maximum of a two month follow-up period.

The findings are however supported by Bystrova *et al.* (2009) who found that skin-to-skin contact did not have a statistically significant impact on breastfeeding duration at four months when compared to infants that were held dressed or swaddled after birth.

Another possibility is that the small amount of skin-to-skin contact and/or other contact that some of the control group experienced after birth may have also had a positive impact on breastfeeding duration. Previous research has shown that as little as 15 minutes of skin-to-skin contact immediately after birth doubled the duration of breastfeeding (Phillips, 2013).

In conclusion, it appears that early and extended skin-to-skin contact positively affects the initiation of breastfeeding and possibly also the success of early breastfeeding. It does not however appear to be positively correlated with breastfeeding exclusivity rates at six to eight weeks postpartum.

5.5 Maternal-Infant Bonding Scale

The results of the MIBS 1 and MIBS 2 answered objectives two and three of the study.

In comparison to previous studies using the MIBS, the current study sample (both experimental and control groups) reported fewer bonding disturbances in the first week postpartum. In a study by Taylor *et al.* (2005) that looked at the links between bonding and maternal mood in a population of typical mothers and full-term infants in London, the median bonding score was 1 at three days, a few weeks and 12 weeks postpartum. In a study by Bienfait, Maury, Haquet, Faillie, Franc, Combes, Daudé, Picaud, Rideau and Cambonie (2011) examining a population of mothers with infants in a neonatal unit in France, the median score was also 1 at two to three days postpartum. The experimental and control groups of the current study both had median scores of 0 for completion of the MIBS within one week and again at six to eight weeks postpartum (see Tables 4.4 and 4.5). This indicates fewer bonding disturbances than these previous studies. These results are understandable when compared to the study by Bienfait *et al.* (2011) as having an infant in the neonatal ICU unit is likely to impact on bonding (Feldman *et al.,* 2002). The findings in relation to the study by Taylor *et al.* (2005) are however contradictory. Unfortunately no conclusions can be drawn as there are too many unknown variables (including no information on post birth contact) to be able to compare this previous study with the current study.

The results of objective two are in contrast with existing research. The current study found no significant difference in reports of bonding between the experimental and control groups whereas previous research has found that early skin-to-skin contact resulted in improved mother-infant relations (Widstrom *et al.,* 1990; Winberg, 2005; Bystrova *et al.,* 2009; Moore *et al.,* 2012; Phillips, 2013). More specifically, Bystrova *et al.* (2009) found that skin-to-skin contact for 15 to 60 minutes had a positive influence on mother-infant interaction and maternal affectionate behaviour on day four postpartum. This is supported by the findings of multiple studies conducted in the 1970-1980s that compared the behaviours of mothers that had experienced brief periods of skin-to-skin contact (as little as 15 minutes) with their infants immediately after birth versus mothers that only had contact with their infants every four hours and were otherwise kept separate in the nursery. At the end of the postpartum stay, mothers that had experienced only brief skin-to-skin contact displayed more confidence when handling and caring for the infants when compared to the mother-infant

dyads that had been separated from one another (Anderson *et al.,* 2007; Moore *et al.,* 2012;). In the present study, 62% of the control group experienced some skin-to-skin contact, ranging from 1 to 60 minutes, immediately after birth (see Table 4.3b). It is thus possible that even the brief time spent in skin-to-skin contact could have influenced the mother-infant bonding outcomes of the control group.

For the results of objective three, a small effect size was identified at the six to eight week follow-up on the influence of at least two hours of skin-to-skin contact after birth on bonding in favour of the experimental group. A dose-response of the longer duration of initial skin-to-skin contact between the experimental and control groups may have influenced this longer term outcome. This is supported by the findings of Bystrova *et al.* (2009) who found that early skin-to-skin contact positively affected maternal sensitivity and dyadic mutuality and reciprocity at one year postpartum. Bramson *et al.* (2010) also identified a dose-response effect of skin-to-skin contact. They specifically highlighted the importance of not only contact early on but also as often as possible, and for as long as possible for at least the duration of the postpartum stay. The mothers in the experimental group reported having spent not only longer in immediate skin-to-skin after birth (at least two hours) but also having a longer duration of skin-to-skin contact in the first 24 hours after birth (see Table 4.3b). It is therefore possible that together this longer duration of skin-to-skin contact during the postpartum stay had a dose-response effect on the later report of mother-infant bonding, in which the experimental group reported fewer disturbances than the control group.

To help us understand the underlying mechanisms behind the influence of skin-to-skin contact on bonding, Bigelow and Power (2012) report that on a physiological level skin-to-skin contact acts as an oxytocin releasing agent in mothers. Early suckling and infant touch of the breast also releases oxytocin in mothers (Matthiesen, Ransjő-Arvidson, Nissen & Uvnäs-Moberg, 2001). Oxytocin promotes maternal affiliative behaviours, positive maternal mood as well as positive maternal feelings towards their infants thus enhancing bonding (Insel & Young, 2001; Feldman *et al.,* 2002; Bigelow & Power, 2012).

Another consideration to further understand the lack of greater statistical significance between the two groups with regards to bonding may be due to social desirability response bias. This refers to participants possibly having answered the bonding questions in a manner that they thought to be socially acceptable, to avoid criticism, or to gain social approval (Van de Mortel, 2008). This type of response bias is most likely to occur with socially sensitive questions which the mother-infant bonding questions could be considered to be (Van de Mortel, 2008).

5.6 Maternal mental health

There is a history of research that links poor maternal mental health to negative outcomes in infancy (Coplan *et al.,* 2005; World Health Organization, 2008; Meintjes *et al.,* 2010). More specifically, poor maternal mental health can have a significantly negative impact on the mother-infant relationship as well as an infant's self-regulation (Galler, Harrison, Ramsey, Butler & Forde, 2004; Coplan *et al.,* 2005; McGrath *et al.,* 2008; Meintjes *et al.,* 2010). Information regarding maternal mental health was thus gathered to see if it was a possible confounding variable on mother-infant bonding.

In the current study, the experimental group reported more mental health concerns during their pregnancies than the control group (see Figure 4.8). The mental health concerns relate to higher ratings of stress and or anxiety, sadness and or hopelessness and feeling little interest or pleasure in doing things The two groups accounts of their mental health were very similar at the six to eight week follow-up.

Mothers' reports of their mental health during their pregnancies did not appear to be correlated with early mother-infant bonding as previously suggested by Pearson *et al.* (2012). The experimental group rated more mental health concerns than the control group yet the mother-infant bonding ratings within the first week after birth were similar.

At six to eight weeks the maternal mental health ratings were similar between the two groups yet the experimental group had better mother-infant bonding ratings than the control group. There is thus no evidence to suggest that mental health status consistently correlated with mother-infant bonding, which is contrary to previous findings (Bakermans-

Kranenburg, van Ijzendoorn & Kroonenberg, 2004; Weisman, Zagoory-Sharon & Feldman, 2012; Muzik *et al.,* 2013).

These contrasting findings may be due to the variability in the degree of mental health concerns between the current and previous studies. In the current study, a non-standardized measure was used to detect mental health concerns whereas studies by Meintjes *et al.* (2010), Bienfait *et al.* (2011) and Pearson *et al.* (2012) used a standardised measure (the Edinburgh Postnatal Depression Scale). Reports of mental health concerns, in the current study, therefore did not necessarily represent poor mental health or mental illness as some concerns regarding sadness, anxiety and stress still fall within the typical range (National Institute of Mental Health, 2016; World Health Organization, 2016).

Another possibility is that skin-to-skin contact may have attenuated the effects of the experimental groups' reports of greater mental health concerns during pregnancy on mother-infant bonding within the first week postpartum. This is supported by a study by Bigelow *et al.* (2012) which found that skin-to-skin contact helps to reduce mothers' physiological stress and postpartum depressive symptoms at one week after birth. Skin-to-skin contact has also been found to afford mothers a greater sense of competence, helps to strengthen the maternal-infant bond as well as leads to greater physical contact between mothers and infants (Gabriel, Martin, Escobar, Villalba, Blanco & Pol, 2010).

The study by Bigelow *et al.* (2012) also found that skin-to-skin contact had a significantly positive effect on maternal mental health in the early postpartum period (one week) but a lesser effect at one month after birth and no effect at two and three months after birth. This is in line with the current findings whereby at least two hours of skin-to-skin contact did not appear to have an effect on maternal mental health status at six to eight weeks postpartum as the two groups' results were very similar.

5.7 The tactile questionnaire

This section answers objective four of the study by examining the findings of mother-infant touch in daily routine. The main findings of the tactile questionnaire will firstly be discussed as a whole in terms of which factors led to more physical contact and which factors led to less physical contact. The findings will then look specifically at affectionate touch and

maternal holding and carrying, bathing, massage and swaddling and lastly, maternal response to infant crying. These findings will be compared to existing literature on mother-infant touch and the association with skin-to-skin contact and mother-infant bonding.

In general, the experimental group had higher ratings of activities that increased physical contact than the control group. This included reporting spending more time bathing and massaging their infants (both small effect sizes), as well as more carrying their infants in a sling or carrier as a means of carrying (medium effect size) and when their infants were awake (small effect size) in comparison to the control group. Mothers from the experimental group also rated a higher frequency of affectionate touch during feeding than mothers from the control group (small effect size). Mothers' reports of the use of affectionate touch during other activities of daily living were similar between the two groups.

There were however two exceptions to the notion that the experimental group had higher ratings of activities that increased physical contact. This included the control group having higher ratings of carrying their infants in their arms (small effect size) and a higher frequency of immediate pick up in response to their infant crying (small effect size). On the other hand, the control group had higher ratings of other activities that decreased physical contact. This included higher frequency of carrying their infants in a baby seat (small effect size), swaddling their infants during feeding (small effect size), placing their infants in a swing seat when they are awake or fussy (both small effect size) as well as placing their infants into their cribs when fussy (small effect size). It should be noted that this information is based on mother's reported perceptions of touch and proximity in daily routine and was not verified objectively.

5.7.1 Affectionate touch and maternal holding and carrying

This study identified several differences in the ratings of touch in daily routine between the control and experimental groups. These findings reject the null-hypothesis and support the notion that at least two hours of skin-to-skin contact did have an influence on mother-infant touch in daily routine at six to eight weeks. Previous literature suggests that early and extended skin-to-skin contact can positively influence maternal affectionate touch, proximity maintaining behaviours, maternal holding and enface contact behaviours towards infants (Feldman *et al.,* 2003; Anderson *et al.,* 2007; Chiu & Anderson, 2009). Maternal-infant

affectionate touch is of particular importance in the first few months of life because it predicts infants' neurobehavioural and cognitive development (Feldman & Eidelman, 2003b; Ferber *et al.,* 2008).

Some links can be drawn between the existing literature and the current study findings. Similar to previous research, the experimental group had higher ratings of affectionate touch during feeding and higher ratings of proximal maternal holding and carrying (more carrying in sling and less placing the infant in baby seat, swing seat chair and crib) (Feldman *et al.,* 2003; Anderson *et al.,* 2007; Chiu & Anderson, 2009). On the other hand, the control group had higher ratings of holding their infants in their arms in comparison to the experimental group. This is an unanticipated finding because skin-to-skin contact has been reported to increase the desire of mothers to hold their infants (Anderson *et al.*, 2003).

A possible answer lies in the work of Feldman *et al.* (2003) who found that affectionate touch typically takes place during periods of shared visual attention when infants are not in physically constrained positions such as in a baby seat or in the arms. Although in the current study, holding in arms, was initially considered to be a positive touch behaviour, it appears that this passive form of touch is different to active and especially affectionate touch. Feldman *et al.* (2003) believe that active, affectionate touch is more closely related to social exchange whereas full-body yet passive touch, such as carrying an infant in the arms, is related to periods of reduced active social exchange. This social exchange is a vital component of developing dyadic interaction and secure attachment (Bigelow & Power, 2012). Feldman *et al.* (2003) go on to suggest that social maturation comprises of a shift from full body contact in the first few weeks postpartum to interactions that rely more on tactile, visual and affect synchrony of the dyad that emerges later. Feldman *et al.* (2003) suggest the possibility that dyads that have experienced extended skin-to-skin contact move more readily from full physical contact (such as being on the lap or in the arms) to positions that allow for more enface interaction.

On the other hand, there is ample research to say that maintaining mother-infant proximity over the first few months of life significantly enhances maternal sensitivity, attachment and bonding (Anisfeld *et al.,* 1990; Esposito *et al.,* 2013; Gammie, 2013; Phillips, 2013). Anisfeld *et al.* (1990) specifically compared the influence of distant carrying (in a baby seat) versus

proximal carrying (in a sling or soft carrier). They found that carrying infants in a sling or soft carrier enhanced maternal sensitivity to infant vocalizations as well as improved the rates of secure attachment when compared to infants that were carried in a baby seat (Anisfeld *et al.*, 1990). In the current study, the experimental group had higher ratings of carrying their infants in slings and lower ratings of carrying their infants in baby seats in comparison to the control group (see Figures 4.12 and 4.13). This, according to this previous literature, is more optimal for mothers and infants.

To the researcher's knowledge, there are no studies comparing the influence of early skin-to-skin contact on the different types of proximal holding and carrying (in a sling or soft carrier versus in the arms). There is however, literature highlighting the difference between the two forms of proximal holding and carrying. Wall-Scheffler *et al.* (2007) report that carrying an infant in the arms uses 16% more physical exertion than carrying an infant with a tool such as a sling. Although holding in arms provides physical proximity, it is unlikely that infants would be held for as long a period in close proximity because of the additional physical exertion and the limitations of hand use. The use of a sling, however, allows for free use of mothers' hands to complete other tasks (Sears & Sears, 2003). This freedom of the hands is also likely to allow for more affectionate touch of the infant.

Furthermore, the literature on baby wearing (carrying in a sling or soft carrier) reports several benefits for both mothers and infants. For mothers, baby wearing promotes the release of oxytocin which enhances maternal mood, promotes breastfeeding, decreases the rates of depression and enriches mother-infant bonding (Sears & Sears, 2003). For infants, carrying by this means helps to calm, organise and regulate them (Sears & Sears, 2003). It also reduces infant crying and colic, improves weight gain and enhances cognitive, social and speech development (Sears & Sears, 2003). The experimental group of the current study, reported greater use of slings and soft carriers and also had better ratings of maternal-infant bonding and exclusive breastfeeding rates in comparison to the control group. Maternal mental health ratings were however similar for the control and experimental groups at six to eight weeks postpartum.

Regardless of this literature, definitive conclusions cannot be drawn from the current study findings with regards to the influence of skin-to-skin contact on proximal holding. This is

because the information gathered was too variable and not time-bound thus making it difficult to precisely tease out which group had a greater frequency and duration of proximal holding. There is also insufficient evidence to say which form of proximal touch, holding in arms versus holding in a sling, is more optimal for mothers and infants.

5.7.2 Bathing, massage and swaddling

The current study also identified a positive influence of at least two hours of skin-to-skin contact after birth and time spent bathing and massaging infants as well as a negative influence on infant swaddling (see Figures 4.9, 4.10 and 4.14). To the author's knowledge there is also no existing literature with which to compare these findings. Current literature does however inform us of the benefits of infant massage as a positive maternal touch behaviour (Onozawa *et al.,* 2001; Diego *et al.,* 2014; Field, 2014). As well as the potentially detrimental effects of swaddling on mother-infant interaction (Bystrova *et al.*, 2009). More research is however required to confirm the influence of early skin-to-skin contact on these maternal touch behaviours as well as investigation into their contribution to the mother-infant relationship and infants' social and emotional development.

5.7.3 Maternal response to infant crying

Historically, infant crying is understood to be a proximity seeking behaviour, whereby infants use crying as a means to elicit a response of the caregiver (Bell & Ainsworth, 1972). The way in which mothers respond to this behaviour is considered to be a reflection of their maternal sensitivity (Kim *et al.,* 2011). A mother's sensitive attunement to her infant is a central component of positive mothering and contributes to the infant's later social-emotional and cognitive development (Kim *et al.,* 2011; Feldman, 2012b). More specifically, maternal responsiveness to her infant's cries is related to positive developmental outcomes (Del Vecchio *et al.,* 2009).

Some literature states that controlled crying (such as allowing infants to 'cry it out') is harmful for infants (Sears & Sears, 2003; Narvaez, 2011). On the other hand there is literature that encourage the practice of controlled crying (D'Agostino & Waldrop, 2014). Only one mother from the control group reported sometimes allowing her infant to 'cry it out' and all other mothers (from the experimental and control groups) reported never allowing their infants to 'cry it out'. The following discussion therefore relates to the

difference between the experimental and control groups in terms of the frequency with which they responded immediately to their infants crying and is not intended to imply that either group allowed their infants to endure prolonged crying.

As previously discussed, the experimental group reported better bonding than the control group. Conversely, the mothers from the control group had a greater frequency of immediately picking up their infants in response to their crying than the experimental group (see Figure 4.17). A possible reason for this finding lies in the work of Del Vecchio *et al.* (2009). They differentiate responding quickly and non-differentially to all cries versus responding differentially to non-distressed versus distressed cries (Del Vecchio *et al.,* 2009). The belief is that responding to distressed cries and ignoring, rather than reinforcing, certain non-distressed cries helps to shape infants' behaviour by teaching them to cry when necessary but to use other more positive means to solicit social interaction (Hubbard & van Ijzendoorn, 1991; Del Vecchio *et al.*, 2009). Previous literature informs us that skin-to-skin contact aids maternal sensitivity and that maternal sensitivity aids attunement to infants' needs (Kim *et al.,* 2011; Moore *et al.,* 2012). Perhaps this enhanced sensitivity and attunement helped mothers to better differentiate between their infants' different types of cries and not respond to all cries immediately.

Another factor to consider is the role that oxytocin plays in maternal sensitivity. Riem *et al.* (2011) state that oxytocin enhances maternal responsiveness by modulating the neural circuits involved in the perception of infant crying. Oxytocin increases activation in the areas of the brain involved with empathy but it decreases activation of the areas involved with anxiety and aversion (Gamer *et al*., 2010; Riem *et al.*, 2011). The decrease in activation of the areas involved with anxiety and aversion may prevent mothers from being over-reactive to infant's crying (Riem *et al.*, 2011). It is thus a possibility that mothers from the experimental group had a lesser frequency of responding to their infants' cries in comparison to the control group because their oxytocin levels (released during skin-to-skin contact and breastfeeding) helped to decrease their anxiety and aversion. They therefore tended to be less over-reactive to their infants cries.

Regardless of this literature, more research is required to better understand the influence of skin-to-skin contact on maternal responsiveness to infant crying before any definite conclusions can be drawn.

5.8 Results of the Tactile Interactions

Inquiry into the tactile interactions between mothers and infants answered the fifth objective of the study.

Overall, mothers from the experimental group spent more time touching their infants during face-to-face interaction than mothers from the control group (see Table 4.7). There were small effect sizes for the passive and affectionate categories of touch and a medium effect size for the active category of touch. These findings reject the null-hypothesis because there was a difference in tactile interactions between the experimental and control groups.

The results of the tactile interactions serve as an objective measure of mother-infant touch. Interestingly, this objective measure correlates with the findings of the previous section whereby the experimental group reported greater frequency of touch in most areas in comparison to the control group.

Maternal-infant touch and proximity are considered to be positively associated with secure attachment, affect regulation and infants' social-emotional, communication and physical developmental (Koester *et al.,* 2000; Hertenstein & Campos, 2001). The amount of touch that a mother provides to her infant is often defined as an index of her maternal availability (Weiss *et al.,* 2000). Touch and proximity are however broad concepts thus one needs to examine more closely both the quantity and quality of touch in order to understand its contribution to the mother-infant relationship (Koester *et al.*, 2000).

In the current study, the experimental group spent 81% of the time using some form of touch with their infants, whereas the control group did the same for 71% of the time during the face-to-face interaction task. These findings (for both the experimental and control groups) are in line with previous literature regarding the percentage of time mothers spend touching their infants. Stack and Muir (1990) found that mothers typically touch their infants over 65% of the time during normal episodes of parent-infant interaction. Later, Jean and Stack (2012) explained that touch takes places between 55 and 99% of the time during

typical parent-infant face-to-face interaction. Muir (2002) does however state that due to a lack of large scale research, there are no specific norms for maternal-infant tactile interactions thus this comparison should be interpreted with caution.

The difference in the quantity of touch between the experimental and control groups are also similar to the study by Feldman *et al.* (2002) who found that mothers that had experienced skin-to-skin contact with their infants tended to touch them more than non-skin-skin mothers (Feldman *et al.*, 2002).

The findings of the current study are also in line with previous literature that states that mothers who touch their infants more also tend to use all forms of touch more frequently than mothers that provide less touch to their infants (Ferber *et al*., 2008). This is true for the current study whereby the experimental group had a higher percentage of total touch as well as higher frequency of touch in all categories (passive, active and affectionate).

In addition to the quantity of touch, the type of touch provided has also been highlighted as being of importance (Weiss *et al.*, 2000). Weiss *et al.* (2000) specifically delineate touch with regards to the degree to which it is tender and affectionate versus the degree to which it is rejecting or abusive. The experimental group used more affectionate touch during enface interaction than the control group (see Table 4.7). Neither the experimental nor the control groups were observed using any form of negative or rejecting touch during the interaction episodes. These findings are similar to early research which states that early skin-to-skin contact increased later maternal affectionate touch behaviours (De Chateau & Wiberg, 1977; Hales *et al.,* 1977; Curry, 1979; Anisfeld & Lipper, 1983). In a more recent study, a significant positive effect of skin-to-skin contact on affectionate touch was also identified (Feldman *et al.*, 2003).

A possible underlying reason for this association can again be attributed to the effects of oxytocin. Bigelow and Power (2012) report that oxytocin, released during skin-to-skin contact and breastfeeding, contributes to maternal affiliative behaviours such as touch, gaze and positive vocal and facial expression. This cycle then continues as more oxytocin is produced through maternal-infant touch and sustained physical contact (Bigelow & Power, 2012).

Although the findings of the current study are in agreement with previous literature, there were only small effect sizes whereas previous studies identified greater significance (Anderson *et al.*, 2007). This may be due to the dose-response of skin-to-skin contact and the comparison with other forms of contact versus mother-infant separation (Anderson *et al.,* 2007; Moore & Anderson, 2007; Bramson *et al.,* 2010; Moore *et al.,* 2012). As previously discussed, 62% of the control experienced some skin-to-skin contact with their infants after birth. It is possible that the effects of skin-to-skin contact on later positive touch behaviours would have been more exaggerated if the experimental group were compared to a control group that had not experienced any skin-to-skin contact, or even more significant, if they had been separated from their infants after birth. Previous studies have found that the effects of skin-to-skin contact were less significant when compared to a control group who swaddled their infants after birth versus a control group that were separated from their infants after birth (Anderson *et al.*, 2007). This is supported by Feldman *et al.* (2003) who found that early separation specifically decreased later maternal-infant touch and proximity.

In contrast to the assumption that greater quantities of touch are better, some studies have noted that too much touch can in fact have a negative impact on attachment. Excessively stimulating or intrusive caregiving approaches not in line with the infant's needs are associated with insecure attachment whereas a more moderate amount of stimulation is related to a greater security of attachment (Lewis & Feiring, 1989; Weiss *et al.*, 2000).

On the other hand, Feldman *et al.* (2003) have said that a decrease in positive maternal touch is related to maternal depression and intrusiveness. This is supported by the finding that reduced parental affectionate touch is directly related to family intrusiveness and that family cohesiveness could be predicted by the amount of affectionate touch (Feldman *et al.*, 2003).

In conclusion, an association has been identified between two hours or more skin-to-skin contact after birth and an increase in later maternal touch (total quantity of touch and quantity of affectionate touch). There are however no specific norms or ideals with which the current findings can be compared, and thus one cannot specify what the optimal amount of touch is. The implications of these findings together with the limitations of the study will now be discussed.

5.9 General implications of the findings

This study identified positive correlations between two hours or more of skin-to-skin contact after birth, with a population of South African, low risk mother-infant dyads, and the following:

- Increased contact over the first 24 hours postpartum
- Quicker initiation of the first breastfeed
- More effective breastfeeding in the first 24 hours after birth
- Better mother-infant bonding ratings at six to eight weeks postpartum
- Increased mother-infant touch during daily routine (including affectionate touch)
- Increased mother-infant touch during face-to-face interaction.

These findings support the use of early skin-to-skin contact for mothers and newborn infants. It is therefore recommended that all maternity institutions actively implement the practice of early skin-to-skin contact. This notion is supported internationally by the BFHI as well as nationally by the Tshwane declaration and the Infant and Young Child Feeding Policy (United Nations Children's Fund & World Health Organization, 2009; National Department of Health, 2011, 2013).

Furthermore, these findings also support the use of skin-to-skin contact with high risk mothers or infants. As reiterated by Cooper *et al.* (2009) this is especially relevant in the South African context, where those living in socially adverse conditions may be more prone to maternal mental ill-health, suboptimal mother-infant relationships and poor infant social-emotional development. Additionally, populations of premature infants and infants born with disabilities would also benefit from skin-to-skin contact whilst being cared for in neonatal intensive care units (Vergara *et al.*, 2006; Holsti, 2012).

5.10 Implications of the findings for occupational therapy

These findings are specifically important for the practice of occupational therapy because it furthers our understanding of how to better support the vital, mother-infant relationship. This primary relationship forms the foundation for the development of infants' social-

emotional skills (Case-Smith, 2013). Thus by supporting the mother-infant relationship we are in turn supporting infants' social-emotional development.

Occupational therapists can implement the knowledge gained from this study by four different means, namely: as a clinician, as a consultant, as an educator and/or trainer as well as in the role of an advocate (Visser *et al.*, 2016). Firstly occupational therapists can implement the findings of this study into their work as clinicians. At this stage, occupational therapists do not form part of the multi-disciplinary team that are present during labour or in the early postpartum period. It is therefore unlikely that occupational therapists would be clinicians that have direct contact with typical mother-infant dyads during this time. Occupational therapists do however play a role in working with high risk mothers and infants in neonatal intensive care units (Vergara *et al.*, 2006; Holsti, 2012). This knowledge can therefore be used, in conjunction with previous research, to support the use of skin-to-skin contact (forming a part of kangaroo mother care) with high risk and/or premature infants. This is of particular relevance to the South African context because of the high rate of premature birth which is associated with significantly increased rates of morbidity (Lubbe, 2016).

Secondly, as a consultant, occupational therapists can provide mothers with professional advice on mother-infant contact in preparation for the postpartum period (Visser *et al.*, 2016). Once again, occupational therapists are not traditionally involved in the care of typical mother-infant dyads before or after birth. This is however with the exception of coming into contact with expectant mothers who already have a child experiencing difficulties with their development or have been diagnosed with a disability. In the researcher's personal experience, working in the early intervention field, mothers of young children already receiving therapy often expressed concern about how to prevent difficulties with their next child (with whom they were currently pregnant). Although certain disabilities or conditions cannot be prevented, this was an indication of underlying maternal stress and anxiety which could negatively impact on bonding and the infant's later developmental outcomes (World Health Organization, 2008). Recommending skin-to-skin contact in the early postpartum period could thus be recommended for two different reasons. Firstly, skin-to-skin contact can help reduce maternal stress and anxiety. Secondly, it can support the

mother-infant relationship in spite of the presence or absence of a developmental difficulty or disability. This is essential for the infant's optimal social-emotional development and future relationships.

The third role of the occupational therapist is as an educator and/or trainer. Similar to the role of consultant, occupational therapists can provide sound, evidence based information regarding the value of early skin-to-skin contact. This may include imparting knowledge about the newborn infant's capabilities in the early postpartum period including the ability to locate and move towards the breast if left undisturbed and unmedicated in skin-to-skin contact (Phillips, 2013). Mothers can also be trained on developing skills to read their infant's cues and state of arousal as well as educated on the provision of appropriate sensory input (Faure & Richardson, 2007; Visser *et al.*, 2016). Lastly mothers can be educated on the detrimental effects of separation on the infant and the mother-infant relationship (Bergman, 2013a; Phillips, 2013).

The fourth role of occupational therapists is as advocates. The role of an advocate refers to publically supporting a cause (Visser *et al.*, 2016). Skin-to-skin contact has been well established as a means to support the infant's transition from the intrauterine to the extrauterine environment (Bystrova *et al.*, 2003). Skin-to-skin contact is also a precursor to breastfeeding which, as established, is a very important means of reducing infant mortality and morbidity. This has specifically been highlighted as a concern in South Africa (National Department of Health, 2011; Phillips, 2013). Skin-to-skin contact can also support infant's social-emotional development because of the positive impact on the mother-infant relationship (Bergman, 2013b; Phillips, 2013). Together with the benefits for infants, skin-to-skin contact can also be beneficial for mothers and help to improve maternal mental health (Bigelow & Power, 2012; Bigelow *et al.*, 2012).

This is once again relevant to the South African context because of socio-economic hardship and increased risk of mental distress which both contribute to the high rates of postpartum depression in the country (Cooper *et al.*, 2014). It is therefore imperative that occupational therapists advocate for early skin-to-skin contact together with exclusive breastfeeding on behalf of all mothers and infants. Advocacy may take place in the form of being involved in awareness days such as World Prematurity Day and World Breastfeeding Week (Visser *et al.*,

2016). A community based approach can also be used to transform perceptions and normalise the practise of early skin-to-skin contact (Visser *et al.*, 2016).

5.11 Skin-to-skin contact as an instrumental activity of daily living and a co-occupation

Although examining skin-to-skin contact as an activity of daily living and a co-occupation was not originally an objective of the study, it is an area relevant to discuss especially when linking skin-to-skin contact and the practice of occupational therapy.

This study identified that skin-to-skin contact supports the newborn infant's developmental needs by supporting the initiation of breastfeeding, enhancing bonding as well as promoting maternal proximity and touch. Skin-to-skin contact could therefore be referred to as a "*child rearing*" subcategory of an "*instrumental*" activity of daily living which is defined as "*Providing care and supervision to support the developmental needs of the child*" (The American Occupational Therapy Association, 2014a: S19).

Skin-to-skin contact can also be described as a co-occupation. Co-occupations refer to active and reciprocal occupations that involve two or more individuals with shared intention, emotion and meaning (Pickens & Pizur-Barnekow, 2009; Pitonyak, 2014). Traditionally, caregiving occupations are viewed as having an active partner (the caregiver) and a passive partner (the child or infant). Zemke and Clarke (1996) however challenge this view and suggest rather that there are two actors in each caregiving occupation and therefore these tasks should be viewed as co-occupations. With this same consideration, skin-to-skin contact should also be defined as a co-occupation. Skin-to-skin contact involves reciprocal interaction, joint intention and meaning between mothers and infants. The mother's role in this co-occupation is to serve as a means of sustenance for their infants and assists their infants with an easier transition from intrauterine to extrauterine life. The infant's role is to initiate breastfeeding as well as increase a release of oxytocin in both partners which has a knock on positive effect on their relationship.

5.12 Conclusion

This section answered the research question and objectives of the study as well as compared the findings to existing literature. The study found that early skin-to-skin contact was

positively correlated with early breastfeeding, mother-infant bonding and mother-infant touch thus rejecting the null hypothesis of the study. Unanticipated findings were discussed and opposing views were given as possible reasons for these findings. This included a potential dose-response of skin-to-skin contact and possible reasons for the control groups' higher proximity ratings in two areas. The chapter then discussed the implications of these findings to the practice of occupational therapy especially within the South African context.

CHAPTER 6

CONCLUSION

6.1 Introduction

It has been suggested that skin-to-skin contact can directly and indirectly affect the mother-infant relationship which in turn supports the infant's development of social-emotional skills. The vast majority of the existing literature informing us about the effects of early skin-to-skin contact has taken place in developed countries and there is a lack of research on this topic in developing countries (Puig & Sguassero, 2007).

This study therefore set out to examine the influence of early skin-to-skin contact for at least two hours after birth on mother-infant bonding, touch in daily routine and tactile interactions with a population of typical mothers and infants in South Africa. This was done in order to establish whether existing literature regarding skin-to-skin contact was also relevant for a population of South African mothers and infants. It also informs the practice of occupational therapy about interventions that can directly and indirectly have a positive influence on the mother-infant relationship and infants' social-emotional development.

This final chapter will recap the main findings of the study in terms of the research question and objectives as well as subsidiary findings. After which, the limitations of the study as well as suggestions for further research will be discussed.

6.2 Main Findings

This study found that early skin-to-skin contact had a positive influence on mother-infant bonding, touch in daily routine and tactile interactions between mothers and infants. The results were however variable in significance and clinical effect.

The main findings related to the research question will now be discussed, after which subsidiary findings will be examined.

Firstly a correlation was identified between the experimental group, which experienced two hours or more of skin-to-skin contact after birth, and a longer total duration of skin-to-skin contact within the first 24 hours after birth.

Secondly, there was no correlation between two hours or more of early skin-to-skin contact and bonding outcomes within one week after birth. There was however a clinical difference at the six to eight week follow-up in favour of the experimental group. The results from bonding within the first week after birth were unanticipated and the results from six to eight week follow-up were expected as previous literature informs us that skin-to-skin contact has a positive influence on mother-infant bonding (Widstrom *et al.,* 1990; Winberg, 2005; Bystrova *et al.,* 2009; Moore *et al.,* 2012; Phillips, 2013). Sixty two percent of the control group in the current study experienced some skin-to-skin contact (ranging from 1 to 60 minutes) after birth which may have also positively influenced bonding outcomes in the short term and thus resulted in the insignificant difference between the bonding outcomes of the two groups within the first week after birth.

Thirdly, a clinical difference was identified in both subjective and objective measures of mother-infant touch. The experimental group reported higher ratings of affectionate touch in daily routine than the control group. This was substantiated by the objective tactile interaction assessment which also found that mothers from the experimental group made use of more affectionate touch.

In addition to affectionate touch outcomes, it was also found that the experimental group spent more time touching their infants during the interaction task as well as had higher rates of all types of touch including passive and active touch.

The results from the other outcomes on subjective touch in daily routine were variable. In general, mothers from the experimental group had higher ratings of factors related to an increase in touch and proximity. This included a clinical difference in time spent bathing and massaging their infants as well as the frequency with which they carried their infants in slings. The control group, on the other hand, generally had higher ratings of factors related to a decrease in proximity and touch. This included clinical differences in the frequency with which they swaddled their infants, carried them in car seats, and placed them into their cribs

or swing seats. An unexpected finding was the clinical difference, in favour of the control group, for the frequency with which they held their infants in their arms. The other results suggest that early skin-to-skin contact correlated with higher frequency of touch and proximity, yet the control group had a higher rating of holding their infants in their arms.

Furthermore, the study also identified subsidiary findings regarding the amount of time infants spent in the nursery in the first 24 hours after birth and early breastfeeding outcomes.

Firstly, similar to literature by the International Childbirth Education Association (2015) and a study by Widstrom *et al.* (1990), it was found that infants from the experimental group spent significantly less time in the nursery over the first 24 hours after birth in comparison with the control group infants.

Secondly with regards to infant feeding, mothers from the experimental group started breastfeeding sooner after birth and with less assistance. The breastfeeding rates at the six to eight week follow-up were however similar between the two groups.

Lastly, following the findings of the study, the researcher made an argument for defining skin-to-skin contact as an "*instrumental*" activity of daily living and a co-occupation involving mothers and infants within the field of occupational therapy (The American Occupational Therapy Association, 2014a: S19).

6.3 Limitations of the study

This study had several limitations which will now be highlighted. The first limitation is methodological quality. This study made use of a correlation design whereas a randomized control trial (including randomization of maternity facilities and participants) would have been considered to be more methodologically sound. Secondly the experimental group and control group were somewhat homogeneous because some members of the control group had also experienced some skin-to-skin contact. To more precisely study the intervention measure, an experimental group that received the intervention should be paired and compared with a control group that did not receive the intervention. It is also unknown if the participants were aware of the BFHI status of the facility where they gave birth and whether

this influenced their choice of birthing facility. Despite this, the findings of the current study were still relevant because even though the majority of mothers from the control group had experienced some skin-to-skin contact, there was still a difference in the majority of the outcome measures. This indicates a possible dose-response of skin-to-skin contact.

Thirdly, it would have been more methodologically sound if only standardized measures were used for data collection and if subjective information from participating mothers was validated objectively. Lastly, the author was aware of which mothers fell into which group creating a potential for researcher bias. It would have been preferable to make use of an additional blind researcher to complete to tactile interaction coding to avoid this bias.

6.4 Suggestions for further research

Further investigation into the influence of skin-to-skin contact is recommended. Future research should be conducted using experimental techniques so that the correlations identified in this study can be further tested to determine cause and effect. Future studies should also use standardized outcome measures consistent with those in this study and previous studies on skin-to-skin contact. This should be done so that the findings from various studies completed in different contexts or with different populations can be compared, analysed and summarised making the evidence to support or refute the use of early skin-to-skin contact more clear. Research should also use larger sample sizes from diverse socio-economic backgrounds so that the results could be generalised to the South African population. The use of sound methodology, such as a randomised control trial, is also recommended. These studies should clearly indicate the timing of the initiation and duration of skin-to-skin contact, in the first hours, days and weeks after birth. The exact type and time frame of the intervention could then be compared to the outcome measures.

It would have been beneficial to gather additional information for this study. Firstly, one should examine mother-infant interaction as a whole and not only focus on touch interactions. This would be especially relevant when examining touch in daily routine and mother-infant proximity. It would also be helpful to gather more information regarding analgesics and anesthesia during labour and information about mothers' antenatal intentions regarding infant contact and feeding as these were highlighted as possible

confounding variables. Information regarding mothers' awareness of the BFHI status of their birthing facility as well as their reasoning for choosing a particular birthing facility should also be explored.

Lastly, this study has highlighted the possibility of further research on skin-to-skin contact through the lens of occupational therapy as an "*instrumental*" activity of daily living and a mother-infant co-occupation (The American Occupational Therapy Association, 2014a: S19).

In closing, this study found that early skin-to-skin contact has a positive influence on various outcome measures of the mother-infant relationship. This provides an important contribution to occupational therapy literature and supports the use of skin-to-skin contact as a means of intervention and as a health-promoting co-occupation. Further research is however required to confirm and support these findings.

Appendices

Appendix A1

Contact Questionnaire **No.: _____**

1. Mother's Details:

First Name: _____ **Age**: _____

Contact Number: _____

How long will you be on maternity leave?

Less than two months □ More than two months □

---

2. Infant Details:

Date of Birth: _____ **Gender**: Male □ Female □

Birth Weight: _____kg

Type of delivery:

Vaginal □ Planned Caesarean Section □ Emergency Caesarean Section □

Did you experience any difficulties during your pregnancy?

Yes □ No □ If yes, please specify: _____

Did your baby require emergency medical intervention after birth?

Yes □ No □ If yes, please specify: _____

Is this your first baby?

Yes □ No □ If No, how many other children do you have? _____

This page containing identifying information will be removed and stored in a secure location, separate from the remainder of this questionnaire.

3. After Birth: **No.: _____**

Was your baby placed in skin-to-skin contact on your trunk or chest immediately after birth?
Yes □ No □

If yes, how long do you think your baby remained with you in skin-to-skin contact before being taken away?

Tick only the one option that applies	✓
Less than 10 minutes after birth	
10 to 30 minutes after birth	
30 minutes to 1 hour after birth	
1 to 1½ hours after birth	
2 or more hours after birth	

How long do you think you and your baby spent in skin-to-skin contact over the first 24 hours after birth?

Tick only the one option that applies	✓
8 hours or more	
4 hours or more	
2 hours or more	
1 – 2 hours	
30 minutes – 1 hour	
10 – 30 minutes	
Less than 10 minutes	
Not applicable, my baby and I were never in skin-to-skin contact	

Where was your baby during the first 24 hours after birth?
Please respond to every item by drawing a circle around the most appropriate answer: never; rarely; sometimes; often or always.

My baby was in the nursery	Never	rarely	sometimes	often	always
My baby was in a bassinette in the same room as me	Never	rarely	sometimes	often	always
My baby was dressed and held by me	Never	rarely	sometimes	often	always
My baby was dressed and held by a family member/friend	Never	rarely	sometimes	often	always
My baby was in skin-to-skin contact with me	Never	rarely	sometimes	often	always
My baby was in skin-to-skin contact with a family member/friend	Never	rarely	sometimes	often	always

Who held your baby during the first 24 hours after birth (excluding hospital staff)? **No.:_____**

Tick all of the options that apply	✓
Me (mother)	
Father	
Immediate family (for e.g. grandparents, siblings)	
Extended family (for e.g. aunts, uncles, cousins)	
Friends	

Where did your baby sleep during the first 24 hours after birth?

Please respond to every item by drawing a circle around the most appropriate answer: never; rarely; sometimes; often or always.

In the bed with me and/or the baby's father	**Never**	**rarely**	**sometimes**	**often**	**always**
In a bassinette in my room	**Never**	**rarely**	**sometimes**	**often**	**always**
In the nursery	**Never**	**rarely**	**sometimes**	**often**	**always**

Please describe approximately how much time your baby spent in the nursery during the first 24 hours after birth?

Tick only the one option that applies	✓
8 hours or more	
4 to 8 hours	
2 to 4 hours	
2 hours or less	
Not applicable, my baby did not spend any time in the nursery	

Please describe your baby's feeding over the first 24 hours after birth?

Tick all the options that apply	✓
My baby did not feed within the first 24 hours after birth	
My baby drank formula milk	
My baby drank expressed breast milk	
My baby breastfed (with assistance for e.g. from the hospital staff)	
My baby self-attached to the breast and started to breastfeed independently	

No.: _____

Approximately, how soon after birth did your baby first latch on to your breast to breastfeed?

Tick only the one option that applies	✓
Not applicable, I plan to bottle feed my baby	
My baby did not latch onto my breast within the first 24 hours after birth	
My baby latched onto my breast between 12 and 24 hours after birth	
My baby latched onto my breast between 2 and 12 hours after birth	
My baby latched onto my breast within the first 2 hours after birth	

How do you plan to feed your baby over the next 2 months?

Tick only the one option that applies	✓
Formula feeding	
Exclusive Breastfeeding	
Mixed feeding (formula and breast milk)	
I have not yet decided	

Circle the most appropriate answer for each of the following statements about your pregnancy:

During my pregnancy, I felt stressed or anxious

Never **rarely** **sometimes** **often** **always**

During my pregnancy, I experienced feelings of sadness and hopelessness

Never **rarely** **sometimes** **often** **always**

During my pregnancy, I felt little interest or pleasure in doing things

Never **rarely** **sometimes** **often** **always**

Thank you very much for taking the time to complete this questionnaire.

For completion of the second half of this study please indicate a preferred meeting place:

□ The Baby Therapy Centre (Lynnwood, Pretoria) **OR**

□ Your personal residence **OR**

□ At your infant's six week clinic check-up (Please indicate where this will take place) _____

_____

Appendix A2

Comments by expert one are highlighted in blue, expert two in green and expert three in yellow.

Looks very good. The questions seem framed to capture the SSC dose well.

Contact Questionnaire

1. Mother's Details:

First Name: _____ **Age**: _____

Ethnicity:

Asian □ Black □
Coloured □ Indian □
White □ Other □ (Please specific) spelling error _____

Why are you including ethnicity? Is this a factor you are going to be analysing?

Are you currently employed?

Yes □ No □ If yes, what is your occupation?

_____

Again, why is this relevant? None of your objectives are looking at a person's employment

How long will you be on maternity leave?

Less than two months □ More than two months □

_____

How many children do you have? This is my first child □ 2 □ 3 □ 4 □ 5 □ more than 5 □ Simplify this question

2. Infant Details:

Date of Birth: _____ **Gender**: Male □ Female □ **Birth Weight**: _____ kg

Add in due date to make sure the infant was not born premature.

This page is too cluttered and therefor difficult to fill out.

Type of delivery:

Vaginal □ Planned Caesarean Section □ Emergency Caesarean Section □

Did you experience any difficulties during your pregnancy?

Yes □ No □ If yes, please specify:

_____

_____

Did your baby require emergency medical intervention after birth?

Yes □ No □ If yes, please specify:

_____

Make sure the questionnaire is coded and that all the identifying information is one the first page so that it can be removed and stored separately.

3. After Birth:

Was your baby placed on your trunk or chest immediately after birth? Yes □ No □

How long did your baby remain with you in skin-to-skin contact before being taken away?
Consider rephrasing and rather asking 'how long do you think…' because you are asking about the mother's perception

Tick only the one option that applies	✓
Less than 10 minutes after birth	
10 to 30 minutes after birth	
30 minutes to 1 hour after birth	
1 to 1½ hours after birth	
2 or more hours after birth	

How long did you and your baby spend in skin-to-skin contact over the first 24 hours after birth? As above, consider rephrasing the question.

Tick only the one option that applies	✓
8 hours or more	
4 hours or more	
2 hours or more	
1 – 2 hours	
30 minutes – 1 hour	
10 – 30 minutes	
Less than 10 minutes	
Not applicable, my baby and I were never in skin-to-skin contact	

Consider fewer options for the above question.

Who held your baby during the first 24 hours after birth (excluding hospital staff)**?**

Tick all of the options that apply	✓
Me (mother)	
Father	
Immediate family (for e.g. grandparents, siblings)	
Extended family (for e.g. aunts, uncles, cousins)	
Friends	

Where was your baby during the first 24 hours after birth?

Please respond to every item by drawing a circle around the most appropriate answer: never; rarely; sometimes; often or always.

My baby was in the nursery	**Never**	**rarely**	**sometimes**	**often**	**always**
My baby was in a bassinette in the same room as me	**Never**	**rarely**	**sometimes**	**often**	**always**
My baby was dressed and held by me	**Never**	**rarely**	**sometimes**	**often**	**always**
My baby was dressed and held by a family member/friend	**Never**	**rarely**	**sometimes**	**often**	**always**
My baby was in skin-to-skin contact with me	**Never**	**rarely**	**sometimes**	**often**	**always**
My baby was in skin-to-skin contact with a family member/friend	**Never**	**rarely**	**sometimes**	**often**	**always**

Where did your baby sleep during the first 24 hours after birth?

Please respond to every item by drawing a circle around the most appropriate answer: never; rarely; sometimes; often or always.

In the bed with me and/or the baby's father	**Never**	**rarely**	**sometimes**	**often**	**always**
In a bassinette in my room	**Never**	**rarely**	**sometimes**	**often**	**always**
In the nursery	**Never**	**rarely**	**sometimes**	**often**	**always**

Please describe the time your baby spent in the nursery during the first 24 hours after birth? Add in 'approximately' to the question

Tick only the one option that applies	✓
8 hours or more	
4 to 8 hours	

2 to 4 hours	
2 hours or less	
Not applicable, my baby did not spend any time in the nursery	

How do you plan to feed your baby over the next 2 months?

Tick only the one option that applies	✓
Formula feeding	
Exclusive Breastfeeding	
Mixed feeding (formula and breast milk)	
I have not yet decided	

The baby's feeding in the first 24 hours does influence … perhaps if you are able to interview or catch more on this information, even from the record review?

How soon after birth did your baby first latch on to your breast to breastfeed? Add in 'approximately' to the question

Tick only the one options that applies	✓
Not applicable, I plan to bottle feed my baby	
My baby did not latch on to my breast within the first 24 hours after birth	
My baby latched on to my breast between 12 and 24 hours after birth	
My baby latched on to my breast between 2 and 12 hours after birth	
My baby latched on to my breast within the first 2 hours after birth	

Presuming it is breastfeeding outcome that you are looking at, one such factor could be the parity of the mother, and her previous breastfeeding history; tobacco in herself or her environment, etc. Well … not too much etcetera … but not too little either!!

Thank you very much for taking the time to complete this questionnaire.

Clarify the time frame before the second point of contact.

For completion of the second half of this study please indicate a preferred meeting place:

□ The Baby Therapy Centre (Lynnwood, Pretoria) **OR**

□ At your infant's six week clinic check-up. Please indicate where this will take place

_____

_____

In doing this sort of thing, you may be able to control for other factors that are known to influence outcome. Consider other possible confounding variables.

Appendix B1

Tactile Questionnaire **No.: _____**

Directions: While filling out this questionnaire we ask that participants think back to personal parenting techniques of their child from birth to present. There are no right or wrong answers to this questionnaire. Please answer the questions as accurately and honestly as possible.

Mother's Name: _____ **Contact Number: _____**

Has your baby suffered from any infections or illnesses since birth?

Yes □ No □ If yes, please specify: _____

_____

This page containing identifying information will be removed and stored in a secure location, separate from the remainder of this questionnaire.

Please describe your baby's feeding since birth? No.: _____

Tick all of the applicable options		✓
Formula feeding		
Exclusive Breastfeeding		
Expressed breast milk with a bottle or cup		
Mixed feeding (formula and breast milk)		
Other liquids (for e.g. water, tea, goat's milk)	Please specify _____	
Solid foods (for e.g. cereal, pureed fruit or vegetable)	Please specify _____	

With whom do you think your infant spends most of the time? Circle the appropriate option:

Mother Father Grandparents Child-minder Day care Other (please specify)_____

Bathing your baby (from start to finish) lasts approximately:

< 5 minutes

5 to 10 minutes

11 to 15 minutes

> 15 minutes

Baby massage (from start to finish) lasts approximately:

I do not massage my baby

< 5 minutes

5 to 10 minutes

11 to 15 minutes

> 15 minutes

When carrying your baby, how often do you? No.: _____

1. Carry your baby in your arms?	Never	Rarely	Sometimes	Often	Always
2. Push your baby in a pram?	Never	Rarely	Sometimes	Often	Always
3. Carry your baby in a sling or soft baby carrier?	Never	Rarely	Sometimes	Often	Always
4. Carry your baby in a baby seat?	Never	Rarely	Sometimes	Often	Always

While feeding your baby, how often do you?

1. Hold your baby in your arms while feeding?	Never	Rarely	Sometimes	Often	Always
2. Cover your baby with a cloth or blanket while feeding?	Never	Rarely	Sometimes	Often	Always
3. Place your baby in his/her crib with the bottle propped on a towel/pillow?	Never	Rarely	Sometimes	Often	Always
4. Swaddle your baby?	Never	Rarely	Sometimes	Often	Always

When your baby is awake, how often is he/she?

1. Held or carried in your arms?	Never	Rarely	Sometimes	Often	Always
2. Placed on a play mat or in his/her cot?	Never	Rarely	Sometimes	Often	Always
3. Placed on a bed or couch?	Never	Rarely	Sometimes	Often	Always
4. Held or carried in a sling or baby carrier?	Never	Rarely	Sometimes	Often	Always
5. Placed in a swing seat?	Never	Rarely	Sometimes	Often	Always
6. Placed in a pram?	Never	Rarely	Sometimes	Often	Always

If your baby had been fed and their diaper changed but is still fussy how often do you respond by... No.: _____

1. Swaddling your baby?	Never	Rarely	Sometimes	Often	Always
2. Holding your baby?	Never	Rarely	Sometimes	Often	Always
3. Rocking your baby?	Never	Rarely	Sometimes	Often	Always
4. Putting your baby in their crib?	Never	Rarely	Sometimes	Often	Always
5. Putting your baby in a swinging chair or walking/jumping chair?	Never	Rarely	Sometimes	Often	Always
6. Holding and singing to your baby?	Never	Rarely	Sometimes	Often	Always
7. Sitting your baby in a baby swing, chair, etc. in front of the television?	Never	Rarely	Sometimes	Often	Always
8. Play music for your baby while he/she was in their crib?	Never	Rarely	Sometimes	Often	Always
9. Caress your baby while he/she was in their crib?	Never	Rarely	Sometimes	Often	Always

When you hear your baby cry, how often do you...

1. Go to pick them up immediately?	Never	Rarely	Sometimes	Often	Always
2. Let your baby cry for 5 – 10 minutes before picking them up?	Never	Rarely	Sometimes	Often	Always
3. Let your baby cry for >10 minutes before picking them up?	Never	Rarely	Sometimes	Often	Always
4. Let your baby "cry it out"?	Never	Rarely	Sometimes	Often	Always

How often do you use affectionate touch* during daily activities such as... **No.:_____**

*Affectionate touch is defined as a type of touch that does not have a functional purpose but rather is used to display affection. Examples of affectionate touch include stroking, hugging, kissing and light poking.

1. Feeding	Never	Rarely	Sometimes	Often	Always
2. Changing nappy	Never	Rarely	Sometimes	Often	Always
3. Bathing	Never	Rarely	Sometimes	Often	Always
4. Consoling	Never	Rarely	Sometimes	Often	Always
5. Putting to sleep	Never	Rarely	Sometimes	Often	Always
6. Changing clothes	Never	Rarely	Sometimes	Often	Always
7. Face to face interaction	Never	Rarely	Sometimes	Often	Always

Thank you very much for completing this questionnaire.

Julee Waldrop <Julee.Waldrop@ucf.edu> 4/9/14

to lisa.dagostino., me

Karen,

Here is a copy of the MITS. You can get the preliminary psychometric data from the paper you mentioned previously. I am attaching both for you. Good luck and let us know how it goes if you don't mind.

Sincerely,

Julee B. Waldrop, DNP, FNP, PNP
Associate Professor
College of Nursing
University of Central Florida
12201 Research Parkway, Suite 300
Orlando, FL 32826
454 University Towers
407-823-2198

14. Bathing your baby (from start to finish) lasts:

<5 minutes
5 to 10 minutes
11 to 15 minutes
>15 minutes

Directions: While filling out this questionnaire we ask that participants think back to personal parenting techniques of their child from birth to 1 year of age. Questions are based on a frequency scale: Never, Rarely, Sometimes, Often, and Always. There are no right or wrong answers to this questionnaire. People have all kinds of opinions about physical contact and a wide variety of experiences with touch throughout their lives. Please circle only one answer per question and answer as accurately and honestly as possible.

While feeding your baby, how often do you…

1. Hold your baby in your arms while feeding? **Never Rarely Sometimes Often Always**
2. Cover your baby with a cloth or blanket while feeding? **Never Rarely Sometimes Often Always**
3. Place your baby in his/her crib with the bottle propped on a towel/pillow? **Never Rarely Sometimes Often Always**

If your baby had been fed and their diaper changed but is still fussy how often do you respond by…

5. Swaddling your baby? **Never Rarely Sometimes Often Always**
6. Holding your baby? **Never Rarely Sometimes Often Always**
7. Rocking your baby? **Never Rarely Sometimes Often Always**
8. Putting your baby in their crib? **Never Rarely Sometimes Often Always**
9. Putting your baby in a swinging chair or walking/jumping chair? **Never Rarely Sometimes Often Always**
10. Holding and singing to your baby? **Never Rarely Sometimes Often Always**
11. Sitting your baby in a baby swing, chair, etc. in front of the television? **Never Rarely Sometimes Often Always**

12. Play music for your baby while he/she was in their crib? **Never Rarely Sometimes Often Always**
13. Caress your baby while he/she was in their crib? **Never Rarely Sometimes Often Always**

When you hear your baby cry, how often do you...

14. Go to pick them up immediately? **Never Rarely Sometimes Often Always**
15. Let your baby cry for 5 – 10 minutes before picking them up? **Never Rarely Sometimes Often Always**
16. Let your baby cry for >10 minutes before picking them up? **Never Rarely Sometimes Often Always**
17. Let your baby "cry it out"? **Never Rarely Sometimes Often Always**

Appendix C1

PLEASE NOTE SCORES HAVE BEEN INSERTED IN THIS COPY TO CLARIFY THE SCORING PROCEDURE.

Name: Hospital Number:

These questions are about your feelings for your child in **the first few weeks**. Some adjectives are listed below which describe some of the feelings mothers have towards their baby in the FIRST WEEKS after they were born. Please make a tick against each word in the box which, best describes how you felt in the FIRST FEW WEEKS.

	VERY MUCH	A LOT	A LITTLE	NOT AT ALL
Loving	**0**	**1**	**2**	**3**
Resentful	**3**	**2**	**1**	**0**
Neutral or felt nothing	**3**	**2**	**1**	**0**
Joyful	**0**	**1**	**2**	**3**
Dislike	**3**	**2**	**1**	**0**
Protective	**0**	**1**	**2**	**3**
Disappointed	**3**	**2**	**1**	**0**
Aggressive	**3**	**2**	**1**	**0**

Taylor, Alyx <alyx.taylor@kcl.ac.uk> 10/6/14

to me

Dear Karen,
I am delighted that the instrument is useful to you, you have my permission and no document is required, my colleagues and I do not charge for it. If you have any other questions do not hesitate to email me.

I wish you great success in the study and hope the results help towards the care of the mothers and children.

Kindest regards,
Alyx

Dr Alyx Taylor
Senior Lecturer
Director : Graduate & Professional Entry to Medicine
Faculty of Life Science & Medicine
King's College London
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Henriette Raphael Building room 1.21
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Tel: 0207 848 6263
alyx.taylor@kcl.ac.uk

From: Karen Potgieter <jelly2jumping@gmail.com>
Sent: 05 October 2014 13:32
To: Taylor, Alyx
Subject: Request for permission to use the MIBS

TYPE OF CONTACT

Codes

In the TYPE column of the coding sheet, you will record the type of touches you observe. Use the following codes:

1 - passive
2 - active
3 - active/passive combination

1 - Passive

A touch is passive if: 1) the parent does not move his/her point of contact with the infant for 1 second or longer, and; 2) the parent does not move any part of the infant's body for 1 second or longer. Resting a hand or arm on an infant is the most common situation which is coded as passive. However, the following examples also qualify as passive touches: 1) For at least 1 second, a mother holds up her infant's leg, but does not move the leg and does not move her hand along the leg. 2) For at least 1 second, a father holds his hands in one place on his infant's face while playing "peek-a-boo."

2 - Active

A touch is active if: 1) the parent is moving his/her point of contact with the infant, or; 2) the touch is less than 1 second (a tap). The following behaviors are a few examples of active touches: tapping, kissing, adjusting clothing, stroking, and tickling.

3 - Active/Passive Combination

This code is used when the parent is simultaneously touching the infant passively and actively. Parents will frequently rest their nondominant hands on the infants while actively touching the infants with their dominant hands. Another example of this type of touch is a parent holding up an infant's leg while kissing the infant's foot.

LOCATION ON BODY

Codes

In the LOCATION column of the coding sheet you will record the parts of the infant's body being touched by the parent. Use the following codes:

T - torso
H/F - head, face or neck
F/L - feet or legs
A/H - arms or hands

You will list all locations being touched at one time. For example, if the parent were to simultaneously shake one foot and one arm, you would record A/H, F/L. It is possible for all four locations to be touched simultaneously.

Change in Location

If there is a change in the location of a touch within a code area, you should not code the change as a new behavior. For example, if the parent were to rub the infant's arm and then move down the arm and rub the infant's hand, this would all be coded as a single behavior.

If, however, there is a change in location to a different code area, or a touch to another code area is added, you must code this as a new behavior. For example, if the parent were to tap the infant's torso and then move down and tap his leg, this would be coded as two separate behaviors. Likewise, if the parent were to move the infant's leg, then move the infant's hand, while continuing to move the infant's leg, two behaviors would be coded. The movement of the leg alone would be coded F/L. The movement of the leg and the hand together would be coded F/L, A/H.

Exception - Occasionally you may observe a parent changing locations so quickly that it would be very difficult to separate the behavior into individual touches. In these cases, you should code the event as one behavior, as though the various locations were being touched simultaneously.

Locations Stimulated But Not In Direct Contact

You should record only those parts of the infant's body which are being directly touched by either the parent's body, an object the parent is using as an extension of his/her body, or the infant's own body (as when a parent uses the infant's hand to pat the infant's leg). You may notice other locations on the infant's body being stimulated by touches. For example, if the parent

4. *Parent Touch*: This category considers episodes of parental touch of the infant and the nature of such touch

   a. Affectionate touch - indicating loving touch that has the sole purpose of expressing affection and has no functional purpose, such as hugging, kissing, stroking, or light pokes. Affectionate touch is typically gentle.

   b. Touch of Extremities – parent touches the infant's hands and feet, parent may move the child's limbs or touch the infant's limbs with another object.

   c. Functional touch - indicating touch that has a functional purpose, such as wiping the infant's mouth, organizing the infant's clothes etc.

   d. Proprioceptive touch – this touch implies that the parent's changes changes the infant's position in space, for instance, pulling the infant to a sitting position, or throwing the infant in space. Typically touch of high intensity and more characteristic of father-child play.

   e. Stimulatory touch – touch that stimulates or energizes the child and typically intents to increase arousal

   f. No touch.

Appendix D3

Koester, Lynne S <lynne.koester@mso.umt.edu> 5/28/14

to me

Dear Karen,

My apologies for the delayed response, as I do appreciate your interest in our work and in the use of the coding system. In the meantime, my students and I have also developed a coding system for use during free play (mothers and infants at 12-18 months), in which we have examined the *functions* of touch rather than just the occurrence of different types of tactile contact. (I would be happy to send you the relevant information for this if you're interested.) From your description however, it sounds as if you would need something that's more useful with younger babies. I plan to be at the university tomorrow and will look for information about the earlier coding system in my lab there – hopefully I have an electronic version that I can send to you. I am happy for you to use any of these in your study, and hope that you will find them to be helpful; in case you need to make adaptations for your particular sample or age group, please feel free to do so.

Best wishes, and I will be back in touch again soon,

Lynne Koester

Lynne Sanford Koester, Ph.D.
Professor Emerita
Department of Psychology
University of Montana
Missoula, MT 59812 USA

Koester, Lynne S <lynne.koester@mso.umt.edu> 5/29/14

to me

Dear Karen,

I have attached a PDF version of the Face-to-Face Touch Coding system for you, but if you prefer I can also convert it to a WORD document. You will notice that this was designed for use with the old VHS-style videocassettes, and therefore some of the details will no longer be relevant (assuming you'll be working from digital images instead). In fact, a lot of the detail here might seem quite self-evident, but the instructions were developed for purposes of training undergraduate student research assistants – many of whom had never coded behavioral interactions before.

I hope this will be helpful to you, and I would very much appreciate being kept apprised of the findings of your interesting project!

Best wishes,
Lynne Koester

Lynne Sanford Koester, Ph.D.
Professor Emerita
Department of Psychology, and Intercultural Youth & Family Development
University of Montana
Missoula, MT 59812

Appendix D4

Re: Information on tactile coding Inbox x

Ruth Feldman <feldman.ruth@gmail.com> 6/2/14

to me

Dear Karen,

I'm glad you find our work of interest. Attached please find the manual for the free play (for this study it was conducted in the home ecology and measures of proximity were highly relevant).

However, you would need to acknowledge that the coding scheme was developed at our lab.

Good luck
Ruth Feldman

R14/49 Ms Karen Louise Potgieter

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M140867

NAME: (Principal Investigator)	Ms Karen Louise Potgieter
DEPARTMENT:	Occupational Therapy [redacted]
PROJECT TITLE:	The Influence of Skin-to-Skin Contact on Bonding and Touch
DATE CONSIDERED:	29/08/2014
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Fasloen Adams
APPROVED BY:	Professor PE Cleaton-Jones Chairperson, HREC (Medical)
DATE OF APPROVAL:	05/12/2014

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**.

Principal Investigator Signature Date 01.10.2014

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix F1

To: The University of Witwatersrand Human Research Ethics Committee

Re: Research Study Approval
Protocol Reference Number: M140867

To whom it may concern

The management committee at [redacted] private maternity hospital, has read and approved the research study entitled, *the influence of early skin-to-skin contact on maternal-infant bonding and touch* by Karen Louise Potgieter and gives consent for the study to be conducted at this maternity facility.

Ingram R/N

4/11/14

Sr [redacted]

Date

Unit Manager

Appendix F2

RESEARCH OPERATIONS COMMITTEE FINAL APPROVAL OF RESEARCH

Approval number: UNIV-2014-0052

Ms Karen Potgieter

E mail: jelly2jumping@gmail.com

Dear Ms Potgieter

RE: THE INFLUENCE OF EARLY SKIN-TO-SKIN CONTACT ON MATERNAL-INFANT BONDING AND TOUCH

The above-mentioned research was reviewed by the Research Operations Committee's delegated members and it is with pleasure that we inform you that your application to conduct this research at private Hospitals, has been approved, subject to the following:

i) Research may now commence with this FINAL APPROVAL from the Committee.

ii) All information regarding the Company will be treated as legally privileged and confidential.

iii) The Company's name will not be mentioned without written consent from the Committee.

iv) All legal requirements regarding patient / participant's rights and confidentiality will be complied with.

v) The research will be conducted in compliance with the GUIDELINES FOR GOOD PRACTICE IN THE CONDUCT OF CLINICAL TRIALS IN HUMAN PARTICIPANTS IN SOUTH AFRICA (2006)

vi) The Company must be furnished with a STATUS REPORT on the progress of the study at least annually on 30th September irrespective of the date of approval from the Committee as well as a FINAL REPORT with reference to intention to publish and probable journals for publication, on completion of the study.

vii) A copy of the research report will be provided to the Committee once it is finally approved by the relevant primary party or tertiary institution, or once complete or if discontinued for any reason whatsoever prior to the expected completion date.

viii) The Company has the right to implement any recommendations from the research.

ix) The Company reserves the right to withdraw the approval for research at any time during the process, should the research prove to be detrimental

to the subjects/ Company or should the researcher not comply with the conditions of approval.

x) APPROVAL IS VALID FOR A PERIOD OF 36 MONTHS FROM DATE OF THIS LETTER OR COMPLETION OR DISCONTINUATION OF THE TRIAL, WHICHEVER IS THE FIRST.

We wish you success in your research.

Yours faithfully

13/11/2014

[redacted]

Full member: Research Operations Committee & Medical Practitioner evaluating research applications as per Management and Governance Policy

[redacted]

Chairperson: Research Operations Committee
Network Healthcare Holdings Limited [redacted]
Date: 18/11/2014

This letter has been anonymised to ensure confidentiality in the research report. The original letter is available with author of research

Anonymous

[redacted] [redacted]

27th October 2014

LETTER CONFIRMING KNOWLEDGE OF NON-TRIAL RESEARCH TO BE CONDUCTED IN THIS [redacted] FACILITY

Dear *Karen Louise Potgieter*

Re: ***The influence of early skin-to-skin contact on maternal-infant bonding and touch.***

We hereby confirm knowledge of the above named research application to be made to the [redacted] Research Operations Committee and in principle agree to the research application for [redacted] Hospital, subject to the following:

1. That the data collection may not commence prior to receipt of FINAL APPROVAL from the [redacted] Research Operations Committee.
2. A copy of the research report will be provided to the [redacted] Research Operations Committee once it is finally approved by the tertiary institution, or once complete.
3. [redacted] has the right to implement any recommendations from the research.
4. That the Hospital/Site/Division Management reserves the right to withdraw the approval for research at any time during the process, should the research prove to be detrimental to the subjects / [redacted] should the researcher not comply with the conditions of approval.

We wish you success in your research.

Yours faithfully

[redacted]

Hospital Manager

[redacted]

[redacted] [redacted]

2 October 2014

LETTER CONFIRMING KNOWLEDGE OF CLINICAL MEDICATION RELATED TRIAL OR CLINICAL NON-MEDICATION RELATED TRIAL RESEARCH TO BE CONDUCTED IN THIS [redacted] FACILITY

Dear Karen,

RE: ***The influence of early skin-to-skin contact on maternal-infant bonding and touch***

We hereby confirm knowledge of the above named research application to be made to the [redacted] Research Committee and in principle agree to the research application for [redacted] Hospital, subject to the following:

i) That the research may not commence prior to receipt of FINAL APPROVAL from the Academic Board of [redacted] (Research Committee).

ii) That the researcher will notify the Academic Board of [redacted] (Research Committee) of the proposed date of commencement of the project, in writing.

iii) That insurance stating the necessary indemnity cover (where applicable) will be provided by the researcher and maintained for the duration of the research, protecting both the staff and the hospital facility from potential liability

iv) That, in accordance with MCC approval, that medicine will be administered by or under direction of the authorised Trialist

v) That [redacted] will be furnished with a STATUS REPORT on the progress of the study at least annually on 30th September irrespective of the date of approval from Academic Board of [redacted] Research Committee) as well as a FINAL REPORT with reference to intention to publish and probable journals for publication, on completion of the study.

[redacted]

vi) That the Hospital Management reserves the right to withdraw the approval for research at any time during the process, should the research prove to be detrimental to the subjects / [redacted] or should the researcher not comply with the conditions of approval.

We wish you success in your research.

Yours faithfully,



[redacted]
GENERAL MANAGER

[redacted] [redacted]

LETTER CONFIRMING KNOWLEDGE OF NON-TRIAL RESEARCH TO BE CONDUCTED IN THIS [redacted] FACILITY

Dear *Karen Louise Potgieter*

Re: *The influence of early skin-to-skin contact on maternal-infant bonding and touch.*

We hereby confirm knowledge of the above named research application to be made to the [redacted] Research Operations Committee and in principle agree to the research application for [redacted] Hospital subject to the following:

1. That the data collection may not commence prior to receipt of FINAL APPROVAL from the [redacted] Research Operations Committee.
2. A copy of the research report will be provided to the [redacted] Research Operations Committee once it is finally approved by the tertiary institution, or once complete.
3. [redacted] has the right to implement any recommendations from the research.
4. That the Hospital/Site/Division Management reserves the right to withdraw the approval for research at any time during the process, should the research prove to be detrimental to the subjects / [redacted] or should the researcher not comply with the conditions of approval.

We wish you success in your research.

Yours faithfully

[redacted] 15/12/2021

Signed by Hospital **Date**

[redacted]

(Specify designation)

[redacted]

Appendix F6

25 October 2014

To: The University of Witwatersrand Human Research Ethics Committee

Re: Research Study Approval

Protocol Reference Number: M140867

To whom it may concern

The research study entitled, *the influence of early skin-to-skin contact on maternal-infant bonding and touch* by Karen Louise Potgieter has been read and approved by the Baby Therapy Centre. I hereby give consent for the study to be conducted at this facility.

Mrs. Karin Muller

The Baby Therapy Centre Manager

Participant Information Leaflet

I, Karen Potgieter, am an Occupational Therapy post graduate student at the University of the Witwatersrand conducting research for the fulfilment of my postgraduate degree. I would like to invite you to participate in a research study on the interaction between mothers and their infants. In this study I would like to investigate mother-infant interaction as well as mothers' feelings towards their infants.

Before agreeing to participate, it is important that you read and understand the following explanation of the purpose of the study, the study procedures, benefits, risks as well as the alternative procedures that are available to you, and your right to withdraw from the study at any time. This participant information leaflet has been provided to help you to decide if you would like to participate.

Taking part in this study would involve completing two questionnaires as well as being filmed for five minutes during a face to face interaction task. The first questionnaire consists of frequency scales and choosing appropriate answers that match your post birth experience and feelings towards your baby. The questionnaire will take approximately 5 to 15 minutes to complete.

The researcher will then contact you and arrange to meet six to eight weeks after the birth of your baby. The meeting will take place at a location and time convenient to you. Here you will be asked to complete another questionnaire related to the daily activities you do with your baby and your interaction with your baby. This questionnaire consists of rating scales and choosing of applicable options and takes approximately 5 to 15 minutes to complete. You will also be requested to do a five minute interaction task with your infant that will be filmed. After this is complete you will have an opportunity to ask the researcher (Occupational Therapist) to answer any questions that you may have regarding the study or your child's development.

Every effort will be made to keep personal information confidential (including the 5 minute film clip and completed questionnaires). Absolute confidentiality however cannot be guaranteed. Personal information may be disclosed if required by law. Organizations that may inspect and/or copy your research records for quality assurance and data analysis may include groups such as the University of Witwatersrand Human Research Ethics Committee. Questionnaires will be coded and any identifying information will be kept in a separate, secure location. Video tapes will also be kept in a separate and secure location and will only be viewed by the researcher and the researcher's supervisors at the University of the

Witwatersrand. The video tapes will be destroyed after six years, as per Health Professions Council guidelines.

This study is taking place with approximately 40 mothers and their infants who have given birth in private health care institutions in South Africa. There are no risks associated with taking part in this study. You will however be contributing to the knowledge of how post birth practices influence mother-infant interaction. Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you, the participant, are otherwise entitled. You may discontinue your participation in the study at any time.

If, at any time during your participation in the study, the researcher identifies a potential concern regarding you or your infant's physical and/or psychological health, a referral will be made to an appropriate health professional.

If you have any questions, please do not hesitate to ask me. You should not agree to take part unless you are satisfied about all the procedures involved. If you decide to take part in this study, you will be asked to sign an informed consent form to confirm that you understand the study. You will be also be given a copy to keep.

For further information, the researcher, Karen Potgieter, can be contacted on 072 419 4700 or jelly2jumping@gmail.com. Professor P. Cleaton-Jones from The University of Witwatersrand Human Research Ethics Committee can also be contacted on 011 717 1234 for any ethical queries or concerns.

Thank you for your time and consideration.

Regards

Karen Potgieter
Occupational Therapist

Informed Consent Form

- I hereby confirm that I have been informed by the research student, Karen Potgieter (Occupational Therapist) about the nature, conduct, benefits and risks of study: (M140867)
- I have received verbal and written information regarding the purpose and procedure of the study.
- I am aware that the results of the study, including personal details regarding my and my infant's sex, age, date of birth and initials will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher and researcher supervisors.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.

I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

PARTICIPANT:

Printed Name	**Signature**	**Date and Time**

I, Karen Potgieter, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

RESEARCHER:

Printed Name	**Signature**	**Date and Time**

No: 001 (Two copies required; one for the participant and the other for the researcher)

Appendix H1

RE: Research Request Inbox x

[redacted] 11/24/14

to me

Good day Karen

You are very welcome to attend our next Antenatal class on 13 December.
Our class starts at 8:00 – 16:30.
How long will you research take?

Kind regards.

[redacted]

From: Kristel [mailto:kristel@birth2baby.co.za]
Sent: 18 Nov 2014 03:18 PM
To: 'storksnest'
Subject: FW: Research Request

[redacted]

us on facebook
012[redacted]

think green
BEFORE PRINTING THIS E-MAIL
please consider the environment

Appendix H2

[redacted] 2/2/15

to me

Hi Karen,
You are more that welcome to attend as many classes as necessary for you we will keep you up to date I am glad that we started.
Thanks

Nursing with competence, confidence and compassion

[redacted]
[redacted]Coordinator
[redacted]hospital
0124[redacted]
Fax [redacted]
[redacted]

Participant Information Leaflet

I, Karen Potgieter am an Occupational Therapy post graduate student at the University of the Witwatersrand conducting research for the fulfilment of my postgraduate degree. I would like to invite you to participate in a research study on the interaction between mothers and their infants. In this study I would like to investigate mother-infant interaction as well as mothers' feelings towards their infants.

Before agreeing to participate, it is important that you read and understand the following explanation of the purpose of the study, the study procedures, benefits, risks as well as the alternative procedures that are available to you, and your right to withdraw from the study at any time. This participant information leaflet is to help you to decide if you would like to participate.

Taking part in this study would involve being visited by the researcher during your post-natal stay in hospital. During this visit you will be asked to complete two questionnaires. The first questionnaire consists of frequency scales and choosing appropriate answers that match your post birth experience and feelings towards your baby. The questionnaire will take approximately 5 to 15 minutes to complete. The researcher will ask you to complete this questionnaire before your discharge from hospital.

The researcher will then contact you and arrange to meet six to eight weeks after the birth of your baby. The meeting will take place at a location and time convenient to you (such as at your baby's six week clinic checkup). Here you will be asked to complete another questionnaire related to the daily activities you do with your baby and your interaction with your baby. This questionnaire consists of rating scales and choosing of applicable options and takes approximately 5 to 15 minutes to complete. You will also be requested to do a five minute interaction task with your infant that will be filmed. After this is complete you will have an opportunity to ask the researcher (Occupational Therapist) to answer any questions that you may have regarding the study or your child's development.

Every effort will be made to keep personal information confidential (including the 5 minute film clip and completed questionnaires). Absolute confidentiality however cannot be guaranteed. Personal information may be disclosed if required by law. Organizations that may inspect and/or copy your research records for quality assurance and data analysis may include groups such as the University of

Witwatersrand Human Research Ethics Committee. Questionnaires will be coded and any identifying information will be kept in a separate, secure location. Video tapes will also be kept in a separate and secure location and will only be viewed by the researcher and the researcher's supervisors at the University of the Witwatersrand. The video tapes will be destroyed after six years, as per Health Professions Council guidelines.

This study is taking place with approximately 40 mothers and their infants who have given birth in private health care institutions in South Africa. There are no risks associated with taking part in this study. You will however be contributing to the knowledge of how post birth practices influence mother infant interaction. Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you, the participant, are otherwise entitled. You may discontinue your participation in the study at any time.

If, at any time during your participation in the study, the researcher identifies a potential concern regarding you or your infant's physical and/or psychological health, a referral will be made to an appropriate health professional.

If you have any questions, please do not hesitate to ask me. You should not agree to take part unless you are satisfied about all the procedures involved. If you decide to take part in this study, you will be asked to sign an informed consent form to confirm that you understand the study. You will be also be given a copy to keep.

For further information, the research student, Karen Potgieter, can be contacted on 072 419 4700 or jelly2jumping@gmail.com. Professor P. Cleaton-Jones from The University of Witwatersrand Human Research Ethics Committee can also be contacted on 011 717 1234 for any ethical queries or concerns.

Thank you for your time and consideration.

Regards

Karen Potgieter
Occupational Therapist

Informed Consent Form

- I hereby confirm that I have been informed by the research student, Karen Potgieter (Occupational Therapist) about the nature, conduct, benefits and risks of study: The influence of skin-to-skin contact on bonding and touch (protocol reference number: M140867).
- I have received verbal and written information regarding the purpose and procedure of the study and give consent for the researcher to visit me during my post-natal stay in hospital.
- I am aware that the results of the study, including personal details regarding my and my infant's sex, age, date of birth and initials will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher and researcher supervisors.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.

I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

PARTICIPANT:

Printed Name	**Signature**	**Date and Time**

I, Karen Potgieter, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

RESEARCHER:

Printed Name	**Signature**	**Date and Time**

No: 001 (Two copies required; one for the participant and the other for the researcher)

Appendix J1

Distress Protocol

If a problem is identified in one of the participating mother-infant dyads, during the course of the study, a referral to an appropriate health professional will be made.

This includes the following:

Maternal and Infant Mental Health

Psychologists specialising in parenting, antenatal experience and attachment:

Michelle Beneke,
Clinical Psychologist - Clydesdale, Pretoria.
Tel.: 012 343 0265

Andri Burger
Counselling Psychologist in Ruimsig, Johannesburg & Garsfontein, Pretoria
011 662 1196 or 082 853 3431

Dr Sonia Joubert
Registered Psychologist in Linden, Johannesburg
082 822 4179

Lomé Koekemoer
Registered Psychologist in Randburg & Hartbeespoort
082 453 8132

Jeanine Lamusse
Clinical Psychologist- Fairland, Johannesburg
072 789 5172

Nardus Saayman
Clinical Psychologist
Parkview, Johannesburg
083 410 5408

Mark Southwood
Clinical Psychologist- Groenkloof, Pretoria
076 061 4078

Sheetal Vallabh
Clinical Psychologist- Oaklands, Johannesburg
083 544 3833

Suzette Weideman
Clinical Psychologist- Krugersdorp
082 775 9986
Jonathon Bosworth
Counselling Psychologist- Greenside, Johannesburg
083 703 5121

Play Therapists:

Josanne Adam
Fourways, Johannesburg
074 114 7524

Tarryn Brady
Bryanston, Johannesburg
011 514 0738

Sheethal Behari
Sandton, Johannesburg
082 409 4334

Natacha Latouf
Garsfontein, Pretoria
083 447 4507

Carien Muller
Faerie Glen, Pretoria
082 454 7516

Infant Developmental Concerns

Occupational Therapists, Speech and Language Therapists and Physiotherapists specialising in Early Intervention:

The Baby Therapy Centre
Lynnwood, Pretoria
012 348 2060

The Faerie Glen Practice
Faerie Glen, Pretoria
083 292 5544

The Children's Therapy Centre
Bryanston, Johannesburg
011 803 1321

Bright Start Right Start
Saxonworld, Johannesburg
011 447 2202

Infant Health Concerns

Paediatricians:

Dr Bamford, Lesley Jean
+27 12 395 9017
Room 869 North Tower Civitas Building, 242 Struben Street, Pretoria

Dr Buchner, Ane
+27 12 354 1000
Tshwane District Hospital, Dr Savage & Soutpanberg Road

Prof De Witt, Theunsina Wilhelmina
+27 12 354 5276
Level D3 New Pretoria Academic Hospital, Malherbe Street

Dr Mackinnon, Diane Joan
+27 11 463 8922
Section A Donald Gordon Medical Centre, 21 Eton Road, Parktown

Dr Ahmed, Muhammad-Ashraf Suleman Vally
+27 11 875 1840
Suite C40 Life Fourways Hospital, Cnr Cedar Road & Cedar Avenue West, Four Ways

Dr Hay, Nicoletta
+27 11 784 2729
Suite E1 Block C Rochester Place, 173 Rivonia Road, Morningside

Dr Pillay, Vasanthie
+27 11 234 3288
Suite 10 West Wing Level 1 Sunninghill Hospital, Cnr Nanyuki & Witkoppen Road, Sunninghill

Appendix K1

Video Recording Informed Consent Form

I, Karen Potgieter am an Occupational Therapy post graduate student at the University of the Witwatersrand conducting research for the fulfilment of my postgraduate degree. In this study I would like to investigate mother-infant interaction as well as mothers' feelings towards their infants.

This form is a video recording consent form. It will give you information about the video recording task that forms part of this study, so that you can make an informed decision about your and your baby's participation in this task. The face to face interaction task has three sequential phases namely: the interactive phase, still face phase and reunion phase. You and your baby will be positioned face to face around 30-50 cm apart. During the interactive phase, you will be asked to interact with your baby for three minutes as you normally would. You will then be given a verbal cue to start the second still face phase, whereby you will need to become still with a neutral expression. You can continue to look at your baby but should not talk or touch your baby for one minute. You will then be given another verbal cue, when a minute has passed, to start the reunion phase whereby you can interact normally again with your infant for the fifth and final minute. This five minute face to face interaction task will be video recorded. The researcher will use this video clip to examine mother-infant interactions.

Every effort will be made to keep personal information confidential. Absolute confidentiality however cannot be guaranteed. Personal information may be disclosed if required by law. The video clip will be viewed by the researcher and by the researcher's supervisors at the University of Witwatersrand. The video clip will be coded and any personal information pertaining to you and your baby will be stored in a secure location (locked file cabinet). The video tapes will be destroyed after six years, as per Health Professions Council guidelines).

All electronic files containing identifiable information will be password protected and any computer hosting such files will also have password protection to prevent access by unauthorized users. Only members of the research staff will have access to the passwords. After conclusion of the study, the researcher may publish the findings. Information will be presented in a summary formation and neither you nor your baby will be identified in any publications or presentations.

This study is taking place with approximately 40 mothers and their infants who have given birth in private health care institutions in South Africa. There are no risks associated with taking part in this study. You will however be contributing to the knowledge of how post birth practices influence mother infant interaction. Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you, the participant, are otherwise entitled. You may discontinue your participation in the study and in the video recorded task at any time.

If you have any questions, please do not hesitate to ask me. You should not agree to take part unless you are satisfied about all the procedures involved. If you decide to take part in this video recorded task, you will be asked to sign an informed consent form to confirm that you understand the study and video recorded task. You will be given a copy of this information and the consent form to keep.

For further information, the researcher, Karen Potgieter, can be contacted on 072 419 4700 or jelly2jumping@gmail.com. Professor P. Cleaton-Jones from The University of Witwatersrand Human Research Ethics Committee can also be contacted on 011 717 1234 for any ethical queries or concerns.

When signing this consent form, I am agreeing to voluntarily enter myself and my infant into this video recording task. I have had a chance to read this consent form, and it was explained to me in a language which I use and understand. I have had the opportunity to ask questions and have received satisfactory answers. I understand that I can withdraw at any time. A copy of this signed video recording consent form has been given to me. Please choose your preference for use of this video clip from the three options below:

_____I agree that segments of the recordings made of my participation in this research may be used for conference presentations, as well as education and training of future researchers/practitioners.

_____I agree to have my recordings archived for future research in the field of (*insert area/field of research for which the recordings will be used).*

_____I do not agree to allow segments of recordings of my participation in this research to be used for conference presentations or education and training purposes.

- I hereby confirm that I have been informed by the researcher, Karen Potgieter (Occupational Therapist) about the nature, conduct, benefits and risks of study: (M140867)
- I have received verbal and written information regarding the purpose and procedure of the study.
- I am aware that the results of the study, including personal details regarding my and my infant's sex, age, date of birth and initials will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher and researcher supervisors.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.

I have had sufficient opportunity to ask questions and (of my own free will) declare myself and my infant prepared to participate in the study.

PARTICIPANT:

Printed Name	**Signature**	**Date and Time**

I, Karen Potgieter, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study task and has been given a copy of the consent form.

RESEARCHER:

Printed Name	**Signature**	**Date and Time**

No: 001 (Two copies required; one for the participant and another for the researcher)

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THE INFLUENCE OF SKIN-TO-SKIN CONTACT ON BONDING AND TOUCH

Karen Potgieter

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Appendix L2

Dissertation 29th Jan

ORIGINALITY REPORT

%12	%10	%4	%3
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.kangaroocareusa.org Internet Source	%2
2	onlinelibrary.wiley.com Internet Source	%1
3	www.ncbi.nlm.nih.gov Internet Source	<%1
4	Submitted to Grand Canyon University Student Paper	<%1
5	www.researchgate.net Internet Source	<%1
6	www.nice.org.uk Internet Source	<%1
7	www.kan.or.kr Internet Source	<%1
8	Submitted to University of Greenwich Student Paper	<%1
9	www.skintoskincontact.com Internet Source	<%1
10	www.ucl.ac.uk Internet Source	<%1

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