

Cognitive, Emotional and Environmental Mediators of Early Parenting in High Risk Families.

Christopher R. Barnes BSc (Hons.)

A thesis submitted in partial fulfilment of the requirements of the University of Wolverhampton for the degree of Doctor of Philosophy.

June 2008

This work or any part thereof has not previously been presented in any form to the University or to any other body whether for the purposes of assessment, publication or for any other purpose unless directly indicated. Save for any express acknowledgements, references and/or bibliographies cited in the work, I confirm that the intellectual content of the work is the result of my own efforts and of no other individual.

The right of Christopher Barnes to be identified as author of this work is asserted in accordance with ss.77 and 78 of the Copyright, Designs and Patents Act 1988. At this date, copyright is owned by the author.

Signature:

Date:

Abstract

The UK currently has the highest number of premature births (babies born before 37 weeks gestation age and below 2.5kg) in Europe affecting around 70,000 babies and their caregivers each year. Consequently many interventions have been created to support the development of the preterm newborn and minimise the complications of prematurity. Many of the interventions developed have been predominantly tactile and have almost exclusively focused upon their effect upon the baby and not, for example considered the effect that this type of intervention might have upon the parents; specifically the mother, when they are the ones who perform the therapy. In fact there is a severe lack of systematic studies investigating the latter. Hence, the aim of this thesis was to search for research-based evidence on the benefits of environmental support to both babies (e.g. increased weight gain or awake periods) and their mothers (e.g. higher perceptions of themselves as a mother) during hospital confinement and within the context of Neonatal Health Psychology (NNHP). For this reason, the main hypothesis investigated whether mothers' cognitions and emotions; specifically Maternal Self-Efficacy, Self-Esteem and Attachment, would be affected by environmental mediators in the form of structured or non-structured tactile sensory nurturing interventions.

The empirical work reported in this thesis is divided into 3 distinct phases. Firstly, as there was no appropriate measure of maternal Self-Efficacy for mothers of hospitalised preterm neonates the main aim of Phase-1 was to develop and validate an appropriate measure. Using a prospective survey method and a mixed design (between/within and correlational) a total of 160 mother-preterm dyads (pooled from 2 cohorts; cohort 1, N=100; cohort 2, N=60) were recruited. The results demonstrated

that the Perceived Maternal Parenting Self-Efficacy (PMPS-E) tool had good initial psychometric properties (including internal/external reliability and construct validity) for its use with mothers of relatively healthy hospitalised preterm neonates. Secondly, in order to investigate mothers' perceived maternal parenting self-efficacy beliefs further Phase-2 examined whether the type of feeding a mother chose to give to her baby mediated her self-efficacy beliefs. The results suggested that breastfeeding a preterm neonate during hospital confinement may adversely affect mothers' perceptions of their efficacy in all aspects of parenting. Finally, using an experimental method Phase-3 tested the main hypothesis of this thesis and used a randomised cluster control trial (RCCT) design to allocate 60 mothers and their preterms equally to one of three cluster groups; consisting of either structured (e.g. TAC-TIC therapy or Using a Toy) or non-structured (Placebo/Control) tactile sensory nurturing interventions. The main findings illustrate that tactile sensory nurturing interventions do mediate maternal cognitions and emotions, preterm weight gain and behavioural state. In particular, mothers who performed TAC-TIC demonstrated significantly higher self-reported perceptions in their self-efficacy, self-esteem and attachment, which was attributed to the fact that these babies spent increased amounts of time in an alert and responsive behavioural state, and gained more weight throughout the study period. Thus, the work presented throughout this thesis has implications for Neonatal Health Psychologists and other Health Care professionals' practice within neonatal units, the use of Neonatal Health Psychology as a framework to study the preterm neonate and their family, and also the way in which both mothers and their hospitalised preterm neonates are supported during hospital confinement.

General Contents

<i>Abstract</i>	II
<i>General Contents</i>	IV
<i>Table of Contents: Tables</i>	VII
<i>Table of Contents: Figures</i>	VIII
<i>Table of Contents: Pictures</i>	X
<i>Table of Contents: Appendices</i>	X
<i>Acknowledgements</i>	XI

Page No.

CHAPTER 1. – The hospitalised Preterm neonate

1.0 Overview	1
1.1 General Background	1
1.2 The Impact of Premature Labour and Delivery	3
1.3 The Environmental Influence of the Neonatal Unit (NNU)	5
1.4 Parenting A Preterm Neonate	7
1.5 Characteristics of Preterm Neonates	11
1.6 The Mother-preterm Interaction Relationship	15
1.7 Chapter Summary	17

CHAPTER 2. – Early Tactile Stimulation

2.0 Overview	18
2.1 The Importance of Early Supplemental Touch for the Hospitalised Preterm Neonate	19
2.2 Types of Therapies for Preterms in the Neonatal Unit (NNU)	22
2.3 TAC-TIC Therapy (Touching and Caressing-Tender in Caring)	33
2.4 Chapter Summary	47
2.5 Discussion of the Vickers et al. (2007) Cochrane Review	51

CHAPTER 3. – Cognitive and Emotional mediators of early parenting

3.0 Overview	54
3.1 Cognitive Mediators of Early Parenting	55
3.2 Emotional Mediators of Early Parenting	65
3.3 Chapter Summary	69

CHAPTER 4. – Theoretical background and outline of research

4.1 Theoretical Background	70
4.2 Outline of Studies	79
4.3 Originality of this research: Contributions and Implications	82

CHAPTER 5. –Perceived Maternal Parenting Self-Efficacy (PMP S-E) of Mothers of Hospitalised Preterm Neonates (Phase-1 and -2).

5.0 Chapter Overview	84
5.1 Phase-1 Overview	85
5.2 Introduction	86
5.3 Method	95
5.4 Results	100
5.5 Discussion	112
5.6 Phase-1 Summary	118
5.7 Phase-2 Overview	119
5.8 Introduction	120
5.9 Method	124
5.10 Results	126
5.11 Discussion	130
5.12 Phase-2 Summary	133

CHAPTER 6. – Cognitive, Emotional and Environmental Mediators of Early Parenting

6.0 Overview	134
6.1 Introduction	134
6.2 Method	138
6.3 Results	148
6.4 Discussion	183
6.5 Chapter Summary	200

CHAPTER 7. – General Discussion & Conclusion	
7.0 Theoretical Background	201
7.1 Empirical Work	207
7.2 Limitations	228
7.3 Directions for Further Research	239
7.4 Final Conclusions	235
REFERENCES	237
APPENDIX I. – BEHAVIOURAL ETHOGRAM	
APPENDIX II – TAC-TIC (PARENTS VERSION) PROTOCOL	
APPENDIX III – GRAPHIC EXAMPLES OF BABY BEHAVIOURAL STATE	
APPENDIX IV – THE PERCEIVED MATERNAL PARENTING SELF-EFFICACY QUESTIONNAIRE	
APPENDIX V – CONTRIBUTIONS TO CONFERENCE PROCEEDINGS AND PUBLISHED WORK	

Table of Contents: Tables

Table No.	Table Name	Page No.
Table 2.1	A table showing all included studies in the Vickers et al. (2007) Cochrane Review and associated information.	27-28
Table 2.2	Summary information of TAC-TIC versions	35
Table 2.3	A Summary of Published Investigations into TAC-TIC Therapy and its Main Outcomes	49-50
Table 5.1.	Measures of Maternal and Parenting Efficacy	94
Table 5.2.	Mean, standard deviation (S.D.), range and modal values for maternal/child characteristics	98
Table 5.3.	Factor analysis loadings and patterns of scoring on the Perceived Maternal Parenting Self-Efficacy (PMP S-E) tool for all subscales and items.	104-5
Table 5.4	Proportion (frequency) and percentage of agreement for all items on the PMP S-E questionnaire.	107
Table 5.5	Mean and standard deviation values by group (N=50) for maternal and infant variables at birth.	125
Table 6.1.	Overview of the study period design	138
Table 6.2	Mean (s.d.) values for maternal Preterm characteristics by cluster (Developmental Support or Placebo/Control) group.	141
Table 6.3	Mean (s.d.) values for Maternal/Preterm characteristics by Hospital	149
Table 6.4	Mean (s.d.) maternal self-efficacy (SE), self –esteem (SES) and Attachment (ATTACH) scores pre- and post-intervention by group	150
Table 6.5	Mean (s.d.) maternal self-efficacy, self –esteem and Attachment subscale scores pre- and post- supporting programme/intervention by group	154
Table 6.6	A table to show the mean time babies spent in each behavioural state (sec's) per 9 minute daily session by developmental Support / Placebo Control Groups	174
Table 6.7	A table to show the overall mean (s.d.) time babies spent in each behavioural state (seconds) for all sessions by developmental Support / Placebo Control Group and Phase	175
Table 6.8	Mean (s.d.) time babies spent in low or medium activity by group and study period	179
Table 6.9	Mean (s.d.) weight at study beginning (time 1 weight) and end (time 2 weight) and mean weight gain between time-1 and -2 (WG)	182

Table of Contents: Figures

Figure No.	Figure Name	Page No.
Figure 4.1	A diagram showing the pathways in the emergence and scope of Neonatal Health Psychology (NNHP)	72
Figure 4.2	A figure showing an outline of the study phases, the participants recruited and brief sample characteristics.	81
Figure 5.1	Distribution of Maternal Parenting Self-Efficacy Scores	101
Figure 5.2	Correlation of mothers' prior experience with childbirth and their self-efficacy scores.	109
Figure 5.3	Correlation of self-reported visiting procedure and their self-efficacy scores.	110
Figure 5.4	Path diagram for PMP S-E with path coefficients	111
Figure 5.5	Perceived Maternal Parenting Self-Efficacy (PMP S-E) total score in relation to group membership.	127
Figure 5.6	Perceived Maternal Parenting Self-Efficacy (PMPSE) subscale score in relation to group membership.	128
Figure 5.7	Perceived Maternal Parenting Self-Efficacy (PMPSE) subscale score in relation to group membership.	129
Figure 6.1	Interaction plot between day of test and intervention group for maternal self-efficacy.	156
Figure 6.2	Interaction plot between day of test and intervention group for maternal self-esteem.	156
Figure 6.3	Interaction plot between day of test and intervention group for maternal attachment.	157
Figure 6.4	Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 1 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	160
Figure 6.5	Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 2 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	161
Figure 6.6	Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 3 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	162
Figure 6.7	Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 4 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	163
Figure 6.8	Maternal Postnatal Attachment subscale 1 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	164

Figure 6.9	Maternal Postnatal Attachment subscale 2 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	165
Figure 6.10	Maternal Postnatal Attachment subscale 3 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	166
Figure 6.11	Maternal Self-Esteem subscale 1 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	167
Figure 6.12	Maternal Self-Esteem subscale 2 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	168
Figure 6.13	Maternal Self-Esteem subscale 3 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	169
Figure 6.14	Maternal Self-Esteem subscale 4 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	170
Figure 6.15	Maternal Self-Esteem subscale 5 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) intervention	171
Figure 6.16	Interaction plot between study period and intervention group for preterm low activity state.	179
Figure 6.17	Interaction plot between study period and intervention group for preterm medium activity state.	180
Figure 7.1	Figure 7.1. A simplified scheme of the developmental systems view.	205

Table of Contents: Pictures

Picture No.	Picture Name	Page No.
Picture 1.1	A baby lying in their incubator surrounded by technical equipment	7
Picture 6.1	Toys (finger puppets) mothers could choose from in cluster group 2.	147

Table of Contents: Appendices

	Appendix Name
APPENDIX I	Behavioural Ethogram
APPENDIX II	TAC-TIC (Parents Version) Protocol
APPENDIX III	Graphic Examples of Baby state
APPENDIX IV	The perceived maternal parenting Self-Efficacy Questionnaire
APPENDIX V	Contributions to Conference Proceedings and Published Work

Acknowledgements

I would firstly like to thank the University of Wolverhampton for financial support of this thesis and also the Psychology technicians, particularly Ian Jukes and Alex O'Rourke, who were a constant source of help whenever I had a problem with the observational software and equipment.

Secondly, thank you to my 2nd supervisors Dr Maggie Redshaw and Dr Christina Del Priore for helpful advice. Thank you also to Dr Bob Welch (Shrewsbury Hospital), Dr Janet Anderson (New Cross Hospital Wolverhampton) and the many neonatal staff members who have supported my work and always made me feel welcome.

Thirdly, the following people I would like to give especial thanks to for their constant support which has been very important to me and has kept me going whenever I needed reassurance.

Therefore, to Elvidina I thank you for your guidance as my director of studies, for nurturing my thoughts, and helping me to develop and grow throughout my PhD.

To my Mum and Dad I would like to say thank you for being simply the most wonderful parents, for giving up your car everyday so that my journey to the hospitals was that much easier over the past years, and for fostering in me a desire to help other people.

To my wife, Vanessa, words cannot truly express the level of support you have given to me; your love and encouragement has helped me persevere through all obstacles. The work in this thesis is a result of the great effort you have put into our life together and the sacrifices you have made so that I could follow my dreams. I couldn't have done it without you!

My final thanks is to the many parents and their babies who have agreed to be part of my research even when they have had to contend with the most stressful of situations. Thank you all for allowing me to be part of your lives, for your willingness to participate, and for sharing with me your experiences.

CHAPTER 1. – The Hospitalised Preterm Neonate

1.0 - OVERVIEW

In this chapter it is reported that preterm birth affects a significant proportion of the population and is considered a major public health issue. The various sections ahead clearly outline the stages and factors which may critically impinge upon the physiological development of the baby and psychological processes of both mother and baby. Evidence is provided which confirms that not only is the parenting of a hospitalised preterm neonate a complex issue but also one which is dependant upon the context and environmental situation, preterm characteristics and factors surrounding the dyadic interaction between the mother and her baby. Through the process outlined above a picture will emerge of the journey faced by parents (specifically the mother) from early delivery to their time practicing early parenting on the Neonatal Unit (NNU). Therefore, this chapter has 2 aims; (1) to illustrate the many challenges and difficulties faced by mothers from the time of premature delivery to the parenting experience within the neonatal unit, and (2) to introduce what and in which ways the characteristics (e.g. behaviours) of the preterm neonate are manifested.

1.1 - GENERAL BACKGROUND

What is a preterm?

There are around one in ten babies in the UK who are born too soon (i.e. before 37 weeks gestation age) that is 70,000 premature births each year (WellBeing, 2006) costing the NHS an estimated 4 billion pounds (Action Medical Research, 2006).

Babies who are born before 37 weeks gestation age are categorised as either moderately (35-37 weeks), very (29-34 weeks), or extremely (24-28) premature. Similarly, babies are also classified by their birthweight; low (< 2.5kg), very (< 1.5kg) and extremely low birthweight (< 1kg). Those babies that are born before 37 weeks gestation age and who weigh less than 2.5kg in weight are classed as preterm (Gandy and Robertson, 1987). The most recent data indicates that the UK has the highest rate of prematurity in Europe (Wellbeing, 2006) and that the West Midlands has the highest percentage of live births under 2.5kg in the UK (8.4%, 2004). The reasons why mothers give birth prematurely are not fully understood and it is impossible to predict which women will deliver prematurely (Carson, 2004). However, some studies have indicated that premature labour may result following intrauterine infection, cervical thinning or length reduction (Iams, 2003), premature rupture of the membranes surrounding the foetus (Kenyon et al., 2003) or multiple birth. Other factors associated with preterm birth include adverse social circumstances (e.g. poorer home environment and low socioeconomic class), maternal age (young mums below 15 years or older mums over 35 years) and cigarette smoking (Jewell et al., 2001; BLISS, 2007). Many of the conditions that are a result of premature delivery are largely based upon just how prematurely a baby is born but include; temperature regulation difficulties, increased risks of blindness and respiratory problems, mental disabilities and cerebral palsy. Thus, the parenting of preterm newborns is clearly a major public health problem making it a very stressful event for all involved with evidence existing from the parents themselves (Leung, 2004; Manns, 2004) and scientific literature (Padden and Glenn, 1997).

Whilst the reasons behind premature delivery are still not fully understood the sequelae for these babies includes increased risk of blindness, mental disabilities and child abuse. In fact, Spencer et al. (2006) suggest that the younger babies are born and the lower their birthweight is, the more likely they are to suffer child abuse (sexual, physical, emotional abuse and neglect). In their retrospective study they used records of almost 120,000 babies in the West Sussex area between the years 1983 and 2001. Babies born at less than 34 weeks gestation age were more than twice as likely to be placed on the child protection register than babies born at term. Therefore, the short and long-term deleterious effects on health and development of the infant can be long lasting and may affect mothers' cognitions and emotions with further negative consequences to all involved including society as a whole. The following chapter is divided into 6 main sections in line with the chapter aims and discusses (1) the impact of premature labour and delivery, (2) the environmental influence of the neonatal unit, (3) parenting of a preterm neonate, (4) the characteristics of preterm neonates, (5) the mother-preterm interaction relationship, and (6) The Theoretical framework adopted within this thesis.

1.2 THE IMPACT OF PREMATURE LABOUR AND DELIVERY

Suffice to say immediately following birth many of these babies are admitted into a neonatal unit where the medical complications of being born prematurely are dealt with. Mothers of prematurely born infants must adjust to early labour and delivery (Zichella, 1992; Miles et al., 1998) which is likely to cut short the emotional and practical preparation for birth that they had anticipated (Rosenblatt, 1997). Recent

research has suggested that mother's dissatisfaction with childbirth begins with aspects of perceived personal control during labour (Maclean et al., 2000).

Moreover, early delivery is the first in a sequence of events which must be adjusted to and overcome by the mother. Indeed, Fisher and colleagues (1997) suggest from their research that there are significant adverse psychological effects which are associated with the mode or type of delivery experienced. In fact, the women in their study who had had spontaneous vaginal deliveries were most likely to experience a significant improvement in their mood and self-esteem during the time leading up to the birth and the brief period afterwards. In contrast, mothers who had delivered their baby by caesarean section were significantly more likely to experience the opposite. In addition, Fisher et al. suggest that mothers often perceived that intervention (i.e. c-section) during the labour and delivery were because of personal inadequacies and failure as opposed to factors outside their control. In contrast, a fulfilling experience of childbirth without intervention was linked with active participation during delivery and resulted in an increase in sense of control and competence (Fisher et al., 1997).

Other studies which have examined the psychosocial outcomes of caesarean section delivery have demonstrated that this may have negative psychosocial consequences. In fact, DiMatteo and colleagues (1996) suggest that caesarean section, a potentially psychologically disturbing experience, may interfere with the psychological tasks of making a successful transition to parenthood. However, in their study Maclean et al. (2000) note that it was mothers who received instrumental deliveries that described their birth experience as significantly more distressing, than those women who underwent emergency caesarean section and spontaneous deliveries. Nevertheless,

similarly to Fisher et al. (1997) both Maclean et al (2000) and DiMatteo et al (1996) did not report on the differences between the types of caesarean section (e.g. emergency or elective) or instrumental delivery (e.g. forceps) which may play an important and different roles affecting mothers' perceptions in their ability to parent a baby born preterm.

1.3 THE ENVIRONMENTAL INFLUENCE OF THE NEONATAL UNIT

When a baby is born preterm they are confronted by a major environmental change from the relatively warm and dark womb in exchange to an incubator where there are increased amounts of light, noise and handling (Forrest, 1993). One of the major challenges for neonatal staff is the physical well being of the baby through artificial means and these may include surgery, drugs or mechanical ventilation for the preterm. It is not known just how much the environment of the neonatal unit (e.g. in terms of light etc) and necessary medical interventions (e.g. surgery) impinge and directly affect development of the preterm because it is impossible to disentangle specific features of care from effects of the medical conditions that require them (Goldberg and DiVitto, 2002). Cornell and Gottfried (1976) suggested that the stimuli of the neonatal care unit were harmful to preterm babies, and that to optimise development, attempts should be made to reduce stimulation. Other authors postulated that the preterm infant was under-stimulated, through the loss of the mother's heartbeat sounds or the absence of appropriate extra uterine stimuli (Field, 1980), and that extra stimulation was necessary to maximise progress and development. Furthermore, because the neonatal unit deals with such a broad spectrum of babies, ranging from a

25 week old preterm in intensive care, who is in an incubator, requires mechanical ventilation, has major medical conditions and may be in the unit for many months, compared to a 36 week old preterm who may have relatively few complications, is in a cot and may be in the unit for a few days or weeks, there becomes a fine balance between the Neonatal Unit (NNU) as an approachable place but that also deals with life threatening medical crises.

Many researchers describe the neonatal unit as an intimidating environment where mothers see babies (not always their own) receiving aversive medical procedures and intrusive monitoring which are said by some to cause an emotional withdrawal of the parent from their baby (Levy-Shiff et al., 1989). The types of environmental stressors for parents include the technical equipment that surrounds the baby; the tubes, wires, respirators, intravenous feeds, procedures carried out on their baby (e.g. heel prick), the death and suffering of other babies including the many sounds from monitoring equipment (Miles et al., 1991) as illustrated in picture 1.1 below (permission to use given via informed consent). In addition, parents often share rooms where they must also cope with the reactions and emotions of other parents which may have an affect upon their emotional state and understanding of their own baby's condition (Redshaw and Harris, 1995). However, anecdotal evidence from the author of this thesis suggests that many mothers also find other parents of great strength and resource to share experiences with and gain as confidants.

Picture 1.1 – A baby lying in their incubator surrounded by technical equipment



1.4 PARENTING A PRETERM NEONATE

(i) General

For many mothers the birth of a preterm baby will be unexpected and will constitute an abrupt disruption of the biological agreement of the internal environment of the mother and the foetus (Zichella, 1992). The birth of a premature baby has been described as a stressful event for parents and there is an abundance of literature available that ranges from parents' own accounts (Leung, 2004; Manns, 2004), from clinical observations (Knepper and Johns, 1989), and from scientific research (Pederson et al., 1987; Padden and Glen, 1997). The stress often experienced by parents may be exacerbated by such factors as the transfer of the baby to a referral

hospital (which can be 10s of miles from their home), separation from family members or friends that provide support, monetary worries, and childcare concerns for other siblings (Eckerman and Oehler, 1992). Ultimately, these worries may have the affect of altering interactions with their newborn preterm and the future relationship between mother and baby..

(ii) A Time of Crisis

Moreover, the period immediately following birth and delivery is typically referred to as a time of crisis (Graham, 1995; Redshaw and Harris, 1995). In particular the seminal work of Kaplan and Mason (1960) who used case notes from 86 families suggested that mothers must progress through and accomplish four major psychological tasks in order to successfully master the crisis situation, namely; Anticipatory grief - preparation for the possible loss of the baby, Acknowledge her feelings of failure, Believing that the baby will survive, Understand the needs of the premature baby.

Thus, the first psychological task (anticipatory grief) is said to involve preparation for the possible loss of the baby. This task is marked by a withdrawal by mothers from the parent-infant relationship. The mother hopes that the baby will survive although simultaneously prepares for its death (Lau, 1998). In fact, most mothers have grave concerns for the survival of their preterm baby. Research by Miles and Holditch-Davis (1997) suggests that no matter how healthy the baby is viewed by the health professionals caring for their newborn, the parents often view their baby as mortally ill, are pessimistic and generally only focus upon the negative information.

Secondly, and at the same time as the first psychological task, mothers are said to acknowledge their feelings of failure due to not delivering a 'normal' fullterm baby. During this task mothers are said to experience feelings of grief for a 'normal baby' (Eckerman and Oehler, 1992), disappointment (Levy-Shiff, 1989), guilt and blame about the possible reasons for the early birth (Rosenblatt, 1997) such as working, drinking or smoking heavily during pregnancy, anger that professional staff were unable to diagnose and prevent the early delivery and feelings of helplessness in relation to the skilled staff and the more experienced parents in the neonatal unit (Rosenblatt and Redshaw, 1984). Furthermore, Miles and Frauman (1993) have identified that mothers and nurses both have a deep concern for the well-being of the newborn and overlapping roles in which mothers find themselves unequal partners. Thus, mothers must also learn to negotiate the role as caregiver with nursing staff (Miles and Holditch-Davis, 1997) as-well as adjusting to parenthood before they are psychologically and practically ready (Levy-Shiff et al., 1989). Overall, a conglomerate of these factors may have the net result of affecting parental behaviour towards their new baby.

Thirdly, once the mother feels that the baby may survive she will be able to continue the process of relating to the baby. This period is said to be triggered by an event which the mother feels she can begin to believe that her baby will survive (e.g. a gain in weight or change in appearance).

Lastly, mothers must understand the individual needs of their premature baby, including; their special needs and growth patterns but they must also make sure that they do not deprive either themselves or their baby of meaningful and enjoyable

interactions. However, Kaplan and Mason (1960) suggested that if mothers could not cope with all of the psychological tasks associated with premature birth, then they would not have a sound basis for a future parent-child relationship as they had not dealt with the stress of premature birth.

(iii) The Loss of the Normal Parenting Role Early Separation & Visitation

Many mothers of preterms may have to wait hours or days before they can properly see, hold and touch their baby which is dependant upon the age at which the baby was born and how ill that the baby and mother are (Redshaw et al., 1996). There is no doubt that the initial separation of mother and preterm has an affect upon and contributes to a disturbance in the parent-child relationship. Much of the very early work (Klaus and Kennel) in this area suggested that the first minutes and hours were critical for later development. However, Jackson and Gorman (1988), argue that this type of early contact has no lasting effect on the mother-infant relationship. They also report that mothers may feel less confident in their ability to care for their babies initially but that this feeling normally disappears within a few weeks to months following discharge from hospital.

However, parents who have had a preterm baby have a limited opportunity to provide the normal parental caregiving they had expected. In fact, some research suggests that mothers may first of all react to this separation by distancing themselves from their baby and in doing so they drastically reduce their visiting pattern (Forrest, 1993). Miles and Holditch-Davis (1997) suggest that parents of lower socioeconomic class, unmarried parents, those who lived greater distances from the hospital, those with

greater financial costs per visit, and those who did not own a car visited less frequently (Brown et al., 1991; Giacoia et al., 1985).

Minde (1992) suggests that the quality of interaction a mother showed during her visits was related to the frequency of her visits and that mothers who demonstrated little activity with their children visited infrequently. Thus, whilst the initial separation may not have a direct affect upon the baby, indirectly initial separation may affect visitation patterns which in the long term have been argued by some to affect later childcare practices (Rosenblatt, 1997). However, during their time in the neonatal unit parents are reported to find the appearance and behaviour of their baby as well as fears about their health and survival as the most stressful part of the experience (Miles, 1989; Pederson, 1987)

1.5 CHARACTERISTICS OF PRETERM NEONATES:

(i) Illness Severity, Treatments and Physical Characteristics

It was established in the first section of this chapter that preterm birth creates an emotional crisis for the parents and that the 'normal' parental role may be compromised. Perhaps one of the chief reasons for the continuation of a mother's crisis is the severity of her baby's illness, the treatments that her baby is receiving and the way the baby looks and behaves. Moreover, the premature infant differs from a term newborns in their size, weight, appearance, pattern of crying, as well as self-regulated behaviours (Levy-Shiff et al., 1989). In addition, many parents are confronted with a baby that is tiny, who has wrinkled skin and is surrounded by

medical equipment and tubes (Miles and Holditch-Davis, 1997). It is also quite common for preterm neonates to experience apnoea and periods of respiratory distress causing either rapid or significant detrimental changes in their breathing pattern. Also, many preterms experience colour change such as jaundice (giving them a yellowish tinge) or cyanosis (turning them typically blue at their extremities, lips and nails). Moreover, there have been several studies which have linked neonatal illness and preterm birth to disruption of the parent-child relationship (Lau, 1998), failure of the child to thrive (James and Mott, 1988) and in severe cases child abuse (Jackson and Gorman (1988). Babies who have been born earlier are generally much worse and less organised in behaviour patterns-such as sleep/wake cycles, demonstrate a poorer auditory responsiveness, rooting and sucking (Miles et al., 1991).

(ii) Preterms Behaviour, State and Arousal

Babies' behavioural state is important because it is primarily used to evaluate their short-term developmental outcomes (Brandon et al., 2005). It is said that because the preterm has a limited behavioural repertoire one of the most reliable early neurobehavioural evaluations is state (Gertner et al., 2002). Measuring the state of preterms has been indicated as reliable measures which aid in identifying individual differences in patterns of development for the baby (Holditch-Davis, 1990). Essentially, sleep wake states identify central nervous system maturation and organisation (Scher et al., 2003) and may predict later problems (Freudigman and Thoman, 1993). Preterms that spend increased amounts of time in quiet sleep amongst other factors have been associated with lower developmental scores (Freudigman and Thoman, 1993) with those in awake states associated without delay

(Whitney and Thoman, 1993) and are also much more likely to be responsive to interactions with their mother (Constantinou, 2002).

In general, the typical demeanour of a preterm neonate is one of low alertness and fewer periods of wakefulness (Harrison, 1992). Preterms are also much less active and responsive to social stimulation during the neonatal period (Crnic et al., 1983) and when they do respond to stimulation they often emit less clear behavioural cues (Eckerman et al., 1994). Some researchers describe premature newborns responsiveness as 'all-or-nothing'. These types of reactions often mean that preterms are difficult to bring to an alert state and when they are alert they can easily be over-aroused or over-stimulated especially when there are too many environmental inputs (Eckerman et al., 1994). Fearon et al. (2002) suggest that the preterm neonate is either hyper or hypo responsive to touch and that more finely tuned, sensitive environmental structuring and support is necessary.

Newborn behavioural state is noted as one of several indicators of central nervous system maturation and is reflected in the pattern of sleep and wakefulness of the preterm (Chang et al., 2002). It is typical for a foetus to spend almost 90% of its time asleep in the womb. Preterm neonates do not reach this level of sleep and are reported to spend around a reduced total of 70% in such sleep states. Moreover, several studies have shown that the awake state is often accompanied by increased demand for oxygen and cardiac output (Ludington, 1990; Filtchev et al., 1994) which indicates an increase in energy expenditure, something which may not always be beneficial to the preterm who needs his/her energy for physiological and neurological development. One of the main concerns within contemporary and past neonatal units

has been the quantities of unnecessary environmental stimuli, in the form of bright light, loud noise, cold room temperature, and intrusive procedures (Als, 1997) many of which may disturb sleeping patterns. Recent research indicates that although many modern neonatal units do moderate the levels of light and noise etc they are still above acceptable and recommended amounts (Gerhardt and Abrams, 2000).

Attempts have been made to encourage better sleeping patterns in preterms through the use of prone positioning and nests (typically a horse shoe shaped tool which the preterm lies within the confines of and which is indicative of the womb) which has been suggested to promote better sleep and less crying (Als, 1986). Moreover, compared with the supine position, studies which have investigated the effects of the prone position report an increase in quiet sleep (Martin et al., 1979) and a decrease in awake time for physically stable preterm infants (Masterson, 1987). In addition, studies by Miles and Holditch-Davis (1997) suggest that preterms showed different behavioural responses according to the stimulation received from parents or nurses. Newborns showed more sleep-wake transition, large body movements, and jitters when with nurses, and more active sleep and more smiles when with parents.

However, preterms may also respond to their parents in a complex behavioural way that is not easily interpreted and which can lead to avoidant behaviour. They may less quickly adapt their responses to the specific stimulation they receive. Several reports have demonstrated that particularly during the neonatal period and throughout the first year of life, preterms are more passive and show problems in their regulation of arousal (Wijnroks, 1999). Quite often poor arousal in preterms is linked with minimal attentiveness, more gaze aversion, and greater fussiness than fullterm infants during

interactions with their mothers (Field, 1977; Malatesta et al., 1986). In addition, there is a conflict between the level of arousal of preterms and the amount of stimulation that mothers provide. Moreover, Wijnroks (1999) suggests that whilst preterm newborns are less alert, active and responsive on the one hand, their mothers appear to be more active in initiating and maintaining interaction on the other.

1.6 THE MOTHER-PRETERM INTERACTION RELATIONSHIP

Mothers and their preterm neonate's interactions begin in a context which is not only different, but which also occurs in a variety of differing circumstances where newborn characteristics can play a large role as indicated in the previous section. During the first few months, mothers of preterm infants often provide their babies with increased levels of stimulation and work harder to engage their infants (Macey et al., 1987). The babies react to intrusive procedures and attempts at social interaction with unpredictable or unresponsive behaviour (Miles et al., 1991). The early interactions between a mother and her preterm neonate have been hypothesised as great importance to the child's later development but few studies have investigated these early interactions particularly in the neonatal unit (Oehler et al., 1993). The mother's ability to read their babies behaviour is thought to be integral to later child development but what makes this process difficult is the disorganised, and unpredictable behaviour of the babies due to immaturity of the central nervous system. If mothers fail to interpret their baby's behaviour then this can lead to asynchrony in the parent-infant dyad, which is said to affect infants psychological development, hinder the infants ability to interact socially and cause psychological difficulties and delays in the long term (Krebs, 1998). However, there is little

mention of how cognitive and emotional factors of the mother may affect the immediate parenting of hospitalised preterms within the neonatal period.

Previous research has indicated that preterms often have an increased level of activity when parents use passive behaviours (e.g. Holding) whereas inactivity was linked to multiple forms of stimulation at the same time (e.g. talking and stimulating or tactile and vestibular stimulation) (Wijnroks, 1999). The reason why some mothers increase their stimulation to their baby is the focus of much debate (Wijnroks and Kalverboer, 1997). Some researchers believe that high activity levels and stimulation on the part of the mother represent an adaptation which is appropriate to the special needs and inactivity on the part of the preterm (Stevenson et al., 1992). Other researchers (Field et al., 1981) believe that a mothers' persistence in attempts to stimulate their baby represents inappropriate and insensitive maternal behaviour as the older preterms will often display gaze aversion. Therefore, this implies that any stimulation needs to be within a narrow intensity band and that is also sensitive to whether the baby wants to be stimulated at that time. Furthermore, the early research by Cohen and Beckwith (1977), Jacobs and Moss (1976), and Lewis and Kreitzberg (1979) all noted that in the home environment there was significantly more social interaction from first time mothers as opposed to mothers with other children. However, the influence of birth order effects upon levels of interaction has been reported with mother-neonate dyads in hospital but remains to be an under researched area (Fish and Stifter, 1993).

1.7 CHAPTER SUMMARY

This chapter has been particularly important in identifying the multiple and complex factors which may ultimately affect the process of early development and early parenting. In fact, much of the research presented here demonstrates that the event of preterm birth including both delivery and the adjustment to it throughout the course of the neonatal period is extremely stressful. In addition, it was reported that mothers experience a range of emotions and cognitions that are the result of a loss in the normal parenting role, that factors related to the neonatal unit and characteristics of the baby influence maternal visitation which may affect later childcare practices, that the babies themselves experience diverse forms of stimulation which are not always tailored to their specific requirements and within the intensity levels they can withstand, and that the unique characteristics of these babies makes parenting and parent-preterm interactions a much more complex issue but which may affect later child development.

CHAPTER 2. – EARLY TACTILE STIMULATION

2.0 - OVERVIEW

In the previous chapter it was established that mothers of preterms experience significant and distressing situations which they must adapt to in order to create a future sound basis for maternal –child interactions. Equally, it was illustrated that mothers may often withdraw from their baby (demonstrated by decreased visits), perhaps due to the often unresponsive and complex way in which preterm neonates behave towards their environment. In addition, the previous chapter highlighted that hospitalised preterms themselves have to overcome a lag in their development process (physiologically, behaviourally, immunologically and cognitively). The following chapter proposes that the sense of touch may play a pivotal role in preterm development (as identified through previous research) but goes on to indicate that few if any benefits have been established scientifically for the parents themselves, particularly the mother. Therefore, this chapter has 3 key aims; (1) to illustrate the importance of early supplemental touch for the preterm neonate, (2) to describe and differentiate between different types of tactile interventions indicating the preferred and potentially more appropriate form of stimulation, and (3) to outline the previous findings of studies utilising tactile interventions.

2.1 - THE IMPORTANCE OF EARLY SUPPLEMENTAL TOUCH FOR THE HOSPITALISED PRETERM NEONATE

Research concerning the sense of touch has established, for some time now that tactile sensitivity begins as early as the 7th week of gestation when babies first react to the stroke of a hair on the cheek (Chamberlain, 1994). Overall, the sensitivity of the skin extends to include almost all body parts by about 17 weeks and all body parts by 32 weeks gestation age. Moreover, research conducted in the area of prenatal psychology suggests that unborn babies from as early as 16 – 22 weeks are actively exploring the uterine environment; grasping the umbilical cord and other body parts, sucking on their toes and thumbs, and many other different types of behaviours (Piontelli, 1987). Therefore, it is not surprising that many researchers believe that tactile stimulation is of great benefit to preterm infants because it matches the epigenetic sequence of development i.e. tactile; propriovestibular; visual; auditory (Hunt, 1979; Gottlieb, 1983). In fact, recent research is showing that functional reorganisation of the somatosensory area occurs as a result of light touch (Diamond et al., 1993).

However, when babies are born preterm their existence shortly following birth is limited to the environment of the neonatal unit and possibly an incubator. Life for preterms and the amount and type of human contact that they receive is primarily for medical and nursing procedures, many of which may be distressing and invasive (Horton, 1998). Recent reports have suggested that the former mentioned procedures account for approximately 2 hours of daily contact (Eyler et al. 1994; Appleton, 1997). In the late 1970s work conducted by Speidel (1978) and Long et al. (1980)

documented falls in arterial oxygen (an indicator of infant distress) of sick neonates as a result of routine medical care and procedures (e.g. changing the baby) which led to the introduction of a policy of minimal handling in an effort to lower potential suffering that may be caused to the newborn. However, in the 1980s this approach was retested and these studies suggested that preterm babies were in fact now deprived of adequate sensory stimulation (Yellot, 2001). Subsequently, many interventions were designed and tested as a way of improving the health of the preterm neonate. A recent review of interventions in place in 82 neonatal units in the United States of America (Field, 2006) suggests that Static touch or skin-to-skin contact is used the most (containment [86%] and kangaroo care [98%]) with active touch used less than half of the time (massage [38%]). The author of this thesis is aware of no such review of interventions in place in neonatal units across the United Kingdom.

Nevertheless, most researchers agree that touch is crucial for the general well-being and growth of the neonate (Harrison and Woods, 1991). The benefits of early parental touch are well documented in the literature (McIluff, 1998) and include increased weight gain, growth, alertness (decreased motor activity, behavioural distress and apnoea) reduced hospitalisation, and more favourable social and neurological development (Oehler 1996; Harrison et al., 1991; Harrison et al., 1996).

Factors such as weight gain and length of hospitalisation are two of the most frequently studied outcomes of this kind of research. Preterm weight gain is often studied because it is vital to prematurely born babies perhaps most of all because they need the energy from food mainly for physiological and neurological development

(Ludington, 1990; Filchev et al., 1994). Length of hospitalisation is of importance to researchers and the Government primarily because of the cost that the National Health Service (NHS) incurs as a result. As reported earlier in this thesis there are around 70,000 preterm births each year who on average stay for a length of 18-27 days in the neonatal unit (Bhutta et al., 2004). The average cost per cot in the Neonatal Unit is between £340 - £1140 per night (Ashington Audit Group, 2004; Bandolier, 1994; The UKNSS Group 2002) which is an estimated NHS Neonatal services bill of around 4 billion (Action Medical Research, 2006). However, studies that seek to reduce length of hospitalisation through intervention programmes choose the duration of stay not only because of its cost saving potential. Length of hospitalisation is also used as a measure of the general improvement in the health of the baby (Bhutta et al., 2004) i.e. babies that are relatively free from medical problems and showing progressive weight gain are discharged home. Nevertheless, many studies to date have found associations between length of stay and various forms of stimulation; be it tactile (Gaebler, 1996; Als et al., 2004), vestibular (Gatts, 1994), auditory or visual (Mann, 1996) or a combination of all four (White-Traut, 2002).

However, there has been much debate about what type of touch is the most appropriate for hospitalised preterm neonates. This has resulted in the development of several different approaches to intervention research (Multimodal / Unimodal stimulation) and also the way in which the interventions are delivered (e.g. Static / Active touch or Deep/Light touch). The former points are dealt with in greater detail below.

2.2 - TYPES OF THERAPIES FOR PRETERMS IN THE NEONATAL UNIT (NNU)

(i) - Multimodal Vs Unimodal sensory interventions

There are currently several different types of tactile stimulation programmes that have been developed for use with preterm neonates and may be broadly categorised into those sensory interventions that are either multimodal (comprising a combination of Tactile, auditory, visual, vestibular stimulation) or unimodal (focusing on one sense only). Since the late 1970s both multimodal and unimodal stimulation intervention studies have reported benefits to the physiological (e.g. weight gain), immunological (e.g. SIgA) and behavioural processes of the preterm newborn. However, whilst multimodal studies have incorporated the sense of touch into their interventions 2 fundamental problems have emerged as a result of there multisensory stimulation approach.

Firstly, the stimulation of too many of the senses of the preterm can lead to sensory bombardment a feature that is avoided in unimodal interventions (Adamson-Macedo et al., 1994). Goldberg and DiVitto (2002) add that the difficulty for caregivers of preterms is that social interactions should be sensitive enough to elicit a response but take steps to stay within the intensity band and tolerance level of the newborn. The second problem with multimodal interventions is that when the senses are not examined individually it makes the interpretation of such data confused and confounded. In addition, some of the most influential of all multimodal stimulation research has been conducted by White-Traut and her colleagues. Throughout the last two decades their findings have suggested that preterms demonstrate an improvement

in their behavioural state organisation, feeding progression and length of hospitalisation (Nelson et al., 2001; White-Traut et al., 2002; White-Traut et al., 2004) of which tactile stimulation is reported to play an integral role (White-Traut et al., 1997). The former finding not only demonstrates the difficulty in interpreting such results but it also begs the question of whether it is the tactile sense alone that is explaining the variance in these results. Therefore, the author of this thesis believes that in line with the development of the senses, the sensory threshold limits of preterm neonates and the minimising of confounding factors that the most appropriate stimulation programme for hospitalised preterm neonates should be unimodal and tactile.

(ii) - Types of unimodal (touch) therapies in the NNU

For the purpose of this chapter a brief description is given of the existing interventions which incorporate touch into their stimulation programme. Moreover, the main types of tactile stimulation for preterm neonates can broadly be separated into those which involve (1) holding the baby or placing of hands upon the baby (static/passive touch or skin-to-skin contact), and (2) those that actively touch the baby. During the descriptions that follow the favoured method of tactile stimulation intervention is proposed and several reasons are given for its benefit over other programmes.

(a) - Static/passive touch and Skin-to-Skin contact

Containment hold

Containment holding as the name suggests involves caregivers simply placing their hands upon the baby to reduce startles and distress. To date 3 types of containment

hold exist which are largely dependant upon the position of the baby when lying in their incubator or cot. Moreover, Jay (1982), Tribotti, (1990) and Harrison et al. (1996) all used containment holds which involved holding the head and either the baby's abdomen (supine position), lower back (prone position) or arm (babies on their side) respectively. Furthermore, all containment holds were sustained for approximately 15 minutes per session, 3-4 times daily and lasting between 3-10 days. The findings from this research suggested that babies required less supplemental oxygen, stability in TcPO₂ levels (oxygen saturation in the blood), greater weight gain, and decreased length in hospitalisation. However, a recent Cochrane review by Vickers et al. (2007) suggests that there is no evidence that gentle still touch is of benefit specifically to daily weight gain and length of hospitalisation. A detailed review of this article now follows and the review on types of therapies for preterms in the Neonatal Unit (NNU) resumes on page 30.

Vickers et al. (2007) Cochrane review

In their review Vickers et al.'s (2007) research questions examined, "...whether preterm and/or low Birthweight infants exposed to massage experience improved weight gain and earlier discharge compared to those infants receiving standard neonatal care," and "...whether massage has any other beneficial or harmful effects on this population." The authors included studies if they were (1) randomised trials (2) infants born <37 weeks or weight at birth <2500g, (3) received systematic tactile stimulation by human hands, and (4) where at least one assessed and reported outcome was either weight gain, length of stay, behaviour or development. No physiological or biochemical outcomes were recorded. The search strategy used the terms, massage, touch, tactile stimulation with infant – newborn, infant – premature and infant – low birth weight.

The analysis consisted of a total 14 articles but 3 of these articles were excluded (as the data was deemed unusable), of the used articles 3 used Gentle touch and 8 Massage therapy. Both Gentle touch and Massage were compared separately with standard routine care (the bold and italicized outcomes were analysed in both sets of comparisons). The analysis which compared Massage Vs Routine Care analysed the following outcomes; (1) *Daily Weight gain*, (2) *Length of Stay*, (3) *Brazelton Scale* (Habituation, orientation, range of states, motor maturity, state regulation, autonomic stability, number of abnormal reflexes), (4) Percentage time awake, (5) Percentage time in Movement, (6) weight at 4-8 month follow-up, (7) Body length at 4-8 month follow-up, (8) Head Circumference at 4-8 month follow-up, (9) Bayley Scale at 6 months (Mental and Motor), (10) Postnatal Complication scale, (11) Brazyl postnatal complications scale, (12) Newfoundland postnatal complications scale, and (13) NCAFS Infant Feeding Behaviours.

They studies which compared Gentle touch Vs Routine care analysed the following outcomes; (1) *Daily weight gain*, (2) *Length of stay*, (3) Neonatal Morbidity Score, (4) Days on supplemental oxygen, (5) Days of phototherapy, (6) Number of Blood transfusions, (7) Change in time in movement, (8) Change in behavioural distress, and (9) *Brazelton Scale* (habituation, orientation, range of state, motor maturity, state regulation and autonomic stability). A list of the included studies is provided in table 2.1 and compares these studies across several areas.

The analysis found that massage interventions improved daily weight gain by 5.1g (95% CI 3.5, 6.7g). However, there was no evidence that gentle, still touch was of benefit to infant weight gain (increase in daily weight gain 0.2g; 95% CI -1.2, 1.6g). Massage interventions also appeared to reduce length of stay by 4.5 days (95% CI 2.4, 6.5) though there were methodological concerns about the blinding of this outcome. There was also some evidence that massage interventions have a slight, positive effect on postnatal complications and weight at 4 - 6 months. However,

serious concerns about the methodological quality of the included studies, were said to weaken credibility in these findings.

Thus, the authors made several remarks about the significant findings reported above. Firstly, they suggested that one potential explanation for the increase in weight gain from receiving massage might have been the differential caloric intake between groups. Though no difference in formula intake was reported by several of the included studies (Field 1987, Scafidi 1993 or Wheeden 1993; and White 1976) which may suggest that massage leads to improved conversion of food into growth. However, the authors noted that not all studies reported caloric intake, which raised the question of whether the included studies were subject to a reporting bias.

The results for other outcomes such as hospital length of stay were purportedly less clear. Although a decrease in the length of stay of was observed the authors felt that there was a serious concern again for selective reporting bias. For example, only one study (White Traut 1983) pre-specified that length of stay was to be recorded which was said to raise suspicion that data were reported only if significant effects were found.

Therefore, the authors concluded that the evidence that massage for preterm infants is of benefit for developmental outcomes is weak and that these findings do not warrant its wider use. They also added that future research should assess the effects of massage interventions on outcomes such as medical complications or parental satisfaction.

Table 2.1 A table showing all included studies in the Vickers et al. (2007) Cochrane Review and associated information.

Author/Date	Massage (M) / Gentle Touch (GT)	Postnatal Age	Treatment		
			Duration (min's)	Frequency per day	Length (days)
Still, Gentle Human Touch					
Harrison (1996)	GT (still)	6-9 days	15 min	-	5 days
Harrison (2000)	GT (still)	6-9 days	10 min	3	10 days
McCarthy (1992)	GT (still)	7-16 days	20 mins		10 days
Unimodal					
Adamson-Macedo (1985)	M (RISS)	2-5 days	10 mins	2	7 days
Multimodal (e.g. Massage, kinesthetic, rocking)					
Field (1987)	M (Massage and kinesthetic)	When medically stable	10 mins massage 5 mins Kinesthetic	3	10 days
Scafidi (1993)	M (as Field did)	Mean 14-15	(as Field did)	3	10 days
Wheeden (1993)	M (as Field did)	Mean 25-31	(as Field did)	3	10 days
White (1976)	M (Tactile/Kinesthetic)	Mean 2	15 mins	4	-
Rice (1977)	M (RISS: stroking, rocking, holding and cuddling)	Starting day of discharge	15 mins	4	30 days
White-Traut (1983)	M (RISS)	2-3 days	10 min massage, 5 mins rocking,	4	3 days
White-Traut (1986)	M (RISS)	When infants reached 1750g	15 mins	1	10 days or until discharge

Of Included – Unusable data					
Rose (1980)	M – (Tactile, Auditory Vestibular)	9 months / starting with first 2 weeks of life	3 x 20 min periods	1	Mean 13 days
Solkoff (1969)	M (Rubbed)	12 hours after birth	5 mins	24	10 days
White-Traut (1993)	(RISS)	?	15 mins	1	4 days

Kangaroo Care

Similar to containment holding, 'kangaroo care' is recommended by BLISS (The Premature Baby Charity, 2005, p14-15) as a method of static skin-to-skin contact for both parents and babies. The main difference between the two approaches is that kangaroo care normally involves the baby resting upon the parents' bare chest and the baby only wears a nappy. The Kangaroo method actually began in Columbia through the work of Dr Edgar Rey-Sanabria a paediatrician who demonstrated marked increases in the survival rates of babies who were kept under the clothing and in skin-to-skin contact with their mothers in the absence of sufficient quantities of incubators. Many of the reported benefits of Kangaroo care include a regular heart rate, increased oxygen levels, increased weight gain, enhanced sleeping patterns (Furman et al., 2002; Ludington-Hoe et al., 2000; Ohgi et al. 2002; Ruiz-Pelaez et al., 2004), and a very increased likelihood to breastfeed (Anderson et al., 2003).

Studies into Kangaroo care have produced some of the only findings to address how tactile sensory nurturing interventions affect the baby's behavioural state during hospitalisation. A review carried out for this thesis, using the following search terms; 'touch', 'therapy', 'behaviour', 'behavioural state', 'massage', 'preterm', 'hospitalised', produced a total of four pertinent articles. Almost all of which involved the use of kangaroo care and all studies investigated only certain aspects of behavioural state (predominantly sleep and awake states). A very brief overview of these studies follows.

Messmer et al. (1997) were one of the first authors to examine Kangaroo care in relation to human neonates. In their study a total of 20 parent-neonate dyads were

recruited and behavioural state was measured through analysis of a specialist monitoring system which recorded heart and respiratory rate. The authors noted that during Kangaroo care there was a significant increase in the amount of time infants spent asleep. Additional studies conducted by Shiao (1999) using a sample of 44 mother-infant dyads and later by Chwo et al. (2002) who recruited 34 mother-infant dyads examined the effects of kangaroo care upon behavioural state specifically sleep and crying during the first 3 days following delivery. Both sets of authors reported that they found significant decreases in crying and a significant increase in the amount of time the infant spent in a quiet asleep state in contrast to their control groups. In addition, Ludington-Hoe et al. (2005) in their study examined 24 preterm neonates length of crying whilst receiving Kangaroo care either during or after a heel stick (taking of blood) procedure in comparison to no therapy. The authors reported that receiving Kangaroo care as opposed to not receiving any therapy significantly reduced the time the neonates spent crying. In addition, they also report that babies receiving kangaroo care spent significantly more time in a quiet asleep state.

(b) - Active touch of the baby (e.g. through means of stroking or rubbing)

Baby Massage

Within the context of its current definition baby massage as specified by Field et al. (2004) is described as a method of touch which uses moderate pressure (i.e. deep tissue) whereby the skin becomes slightly indented and discoloured by the accompanying pressure. Moreover, a large volume of studies have been conducted which have used baby massage with hospitalised preterms, preterms at home and fullterm newborns. The problems that occur from this research are several and deeply confounding perhaps most of all for its use with hospitalised preterm neonates. Thus,

there are 3 chief problems that arise from this research; (1) the conceptual ambiguity between the definition of massage and the actual types of touch used in baby massage, (2) the level of pressure that is applied to the skin during preterm massage, and (3) the sequence and non-systematic way in which massage has been applied to the baby.

Perhaps the most fundamental of all problems with baby massage is the conceptual ambiguity that surrounds its very meaning. The word massage in its most basic definition implies rubbing or kneading. However, there is a certain confusion and use of loose terminology which has led to a common misconception in the operational definitions of such tactile interventions in the literature. Moreover, the words massage, stroking, and rubbing are often used interchangeably (Adamson-Macedo et al., 1994) but can in no uncertain terms be construed as the same thing because they not only involve different actions but they also evoke different reactions from the babies themselves. Furthermore, Field and Field et al. (1992, 2004) has suggested that the most successful way of massaging babies involves firstly stroking from the top of the head to the nape of the neck and then back up again, then the shoulder region, followed by the back and then the arms and legs (a cephalocaudal pattern - from head to toe). The typical procedure also includes turning the baby from supine to prone to supine and which involves flexion and extension of the arms and legs over a 15 minute period. Clearly there is a diverse mixture of touch used in baby massage that involves multiple handling, stroking and movement of the upper and lower limbs. Therefore, because massage contains such a mixture of different types of touch and kinaesthetic stimulation it is difficult to pinpoint whether certain types of touch are more beneficial than others.

Secondly, and perhaps one of the most controversial issues with any tactile stimulation programme used with preterm neonates is the extent and amount of pressure that should be applied when touching the preterm baby. Baby massage by its definition as a moderate pressure touch therapy has been acknowledged by those practicing such interventions as inappropriate and not recommended for those preterms in the early weeks following birth (Bidmead and Farnes, 2004) and should only be initiated when babies can tolerate positive still touch, i.e. without displaying behavioural and physiological instability (Bond, 2002). Thus, baby massage may not be appropriate for the vast majority of hospitalised preterm neonates in contrast to other more gentle and less rigorous interventions. Indeed, Hayes and Adamson-Macedo (1998) have identified that the type of deep touch employed by massage is in fact not tolerated by hospitalised preterms and had to be stopped.

Thirdly, even those researchers at the leading edge of baby massage research have suggested that there have been too many different massage techniques used across studies (Field, 1998). In fact, diverse sequences of touching are seen within the literature; some for example may begin by touching the feet, others the hands or even the head (Bond, 2002). This non-systematic way of touching preterms may lead to unpredictable behaviour in the baby and findings that cannot be generalised across the field of massage research. Thus, due to the reasons outlined above baby massage is not seen as the most appropriate tactile stimulation intervention for use with hospitalised preterm neonates. This thesis instead favours an intervention using a more gentle form of touch than baby massage, uses a minimal number of touch types allowing for easy interpretation of data and follows a systematic touch pattern which

allows results to be generalised across studies. That tactile stimulation intervention is known as TAC-TIC.

2.3 - TAC-TIC THERAPY (Touching And Caressing-Tender In Caring)

(i) - Historical Overview of TAC-TIC Therapy

In the early 1960s the preterm infant was looked upon as too fragile to handle with a policy of minimal handling occupying special care baby units (Adamson-Macedo, 1990). A policy which left the preterm neonate and their parents deprived of any physical contact with each other. With the assumption that touching was both a biological and psychological need for premature newborns and their parents, Macedo (1984) set out to use a systematic method of communicating with preterms through the use of touch. In doing so Macedo adapted and developed further techniques originally developed by Rice (1977) who used a multimodal approach to infant stimulation. The Rice Infant Sensory Motor Stimulation Programme (RISS) combined auditory, visual, rocking and touch stimulation, which was similar to many other stimulation programmes of that time (Adamson-Macedo and Attree, 1994), but which made it difficult to establish which of the modalities resulted in the outcomes observed. At this point TAC-TIC became a unimodal approach, employing systematic stroking, which avoided bombardment of the preterm neonates' senses as in Rice's method. Furthermore, the stroking procedure used in TAC-TIC followed a cephalocaudal pattern (from head to toe) and became the first method of gentle fingertip or palm stroking to be designed especially for preterm neonates in intensive care (Adamson-Macedo and Attree, 1994). However, TAC-TIC completely

differentiates itself from other forms of infant touch therapy e.g. baby massage, and only uses touch in the form of stroking; defined as to pass the hand (or fingertips) softly in one direction over by way of caress (Standard Oxford English Dictionary, 1968).

(ii) - Principles of TAC-TIC

There are 4 major principles that underlie TAC-TIC; Gentleness, Rhythm, Equilibrium and Continuity (collectively known as G.R.E.C). The first principle ***Gentleness*** implies that stroking should be very light and as “gentle as a butterfly” (Macedo, 1984). Therefore, when stroking the neonate the fingertips should barely touch the skin and no discolouration should occur. Whilst carrying out TAC-TIC each movement and stroke should be given at the same speed and equal proportions of time should be allowed between each manoeuvre thereby achieving ***Rhythm***. Consequently, the later adds an element of repetition and periodicity to the therapy. It is also important not to over-stimulate or disturb the neonate and so ***Equilibrium*** should be maintained between both alerting and soothing movements. Finally, it is most important to always keep one hand in contact with the neonate’s body; this allows ***Continuity*** to be maintained throughout the transition of each separate movement and the overall duration of the therapy.

(iii) - Versions of TAC-TIC

Although the principles of TAC-TIC have remained the same throughout the therapy’s history the number of movements and the duration of the therapy within each session have not. The first and original version of TAC-TIC (Macedo, 1984) was designed for use with those preterms that were relatively healthy. This version

consisted of 22 movements, was administered 1-3 times daily, lasted approximately 10 minutes and was started from the 2nd or 3rd day after birth until discharge from hospital. Please see table 2.2 below for a brief comparison of all of the versions of TAC-TIC. Version 2 (De Roiste, 1991), on the other hand, was developed for those infants who were small and distressed preterms who were receiving mechanical ventilation. Due to the nature of the infant's health (risk status) version 2 was shortened in duration to only 3-4 minutes and performed twice daily. The third version of TAC-TIC (Hayes, 1996) was designed for extremely low-birthweight preterms (<1.0kg) consisting of between 17-20 movements (dependent on infant position) and was carried out for the same duration and number of sessions per day as version 2. However, the movements carried out are normally repeated 3 times during one session with the healthy infant, whereas in version 3 the movements are only performed once during a 3-4 minute session. In contrast to the original version, version 3 does not involve turning the baby over and includes no handling what-so-ever.

Table 2.2 Summary information of TAC-TIC versions

Version	Number of movements	Number of administrations per day and (duration)	Population Group
<i>1</i>	22	1-3 (10 mins)	Relatively Healthy
<i>2</i>	22	2 (3-4 mins)	Ventilated
<i>3</i>	17-20	2 (3-4 mins)	ELBW

(iv) - Outcomes of previous research using TAC-TIC therapy

(a) - Weight loss/gain and Sucking Behaviour

In the first published article using TAC-TIC (version 1) Adamson-Macedo (1985-6) recruited 66 relatively healthy preterm neonates of which 31 formed the experimental group (receiving TAC-TIC) and 35 the controls. The experimental group was then further divided into those babies who began receiving TAC-TIC therapy within the first 48 hours of life (Subgroup 1, N = 16) and those who began between 49 hours and 5 days after birth (Subgroup 2, N = 15). Each infant received TAC-TIC for a total of 10 minutes twice daily and both the experimental (including both subgroups) and control infants did not differ substantially in their mean birthweight (1.5 – 1.6kg) or gestational age (32 – 32.3 weeks). The studies main aim was to investigate weight loss and appearance of reflexes during the first week after birth.

The findings revealed that not only did those preterms in the experimental group lose significantly less weight when compared with the controls but those babies that began the study earlier (subgroup 1) also lost significantly less weight, indicating an effect of time. Adamson-Macedo (1985-6) suggested that further investigation was necessary to determine whether it was the age at which TAC-TIC was begun or the amount of stimulation received that was the crucial variable. The babies were also assessed for the appearance of reflexes at day seven and despite there being no significant differences it was suggested that the experimental group were better at sucking amongst others. Please also see table 2.3 at the end of this section for a brief overview and summary of studies which have used TAC-TIC therapy and there outcomes.

It was not until 1993, however, that De Roiste and Bushnell compared a group of 20 preterms (birthweight range = 0.78 – 2.73kg; Gestational age range = 26 – 35 weeks), 10 of which received TAC-TIC therapy and 10 who acted as controls, in their sucking behaviour, and performance and ability to learn on an instrumental conditioning task. The experimental group were given one session of TAC-TIC per day from the 3rd day of life until the day before they were discharged from hospital. In order to test the learning paradigm infants were given a specialised dummy to suck which recorded sucking pressure and duration of sucking. Once a predetermined threshold of pressure was achieved a pre-recording of the mothers' voice was activated for several seconds. It was found that infants in the experimental group showed significantly higher sucking pressures over the entire experiment which the author suggests may be the result of the tactile programme enhancing the maturity of the sucking reflex. This finding matched the observations noted earlier by Adamson-Macedo (1985-6). De Roiste and Bushnell (1993) also note that the finding of enhanced sucking development also supports many other tactile programmes that have shown improved feeding behaviour in various ways. All of these point towards a possible tactile-sucking-feeding mediating mechanism through which tactile programmes exert their effects. However, there was no significant evidence to show that infants improved in their learning ability in terms of their sucking pressure over the learning trials.

Having previously looked at the impact of TAC-TIC therapy upon the sucking behaviour of preterm neonates and in response to the proposals by Macedo (1984) that as a consequence of improved and accelerated sucking, tactile stimulation may enhance digestion through increased lingual lipase secretion and/or activity De Roiste and Bushnell (1995) next investigated the potential benefits of TAC-TIC to infant

weight gain. A sample of 20 low and very low birthweight (Gestation age ranged between 26 – 36 weeks) neonates were recruited. Half the sample formed the experimental group (n=10) who received TAC-TIC therapy (version 1) once a day from the 3rd day after birth until the day prior to discharge (mean hospital stay=30 days). The remainder of the sample formed the control group matched for birthweight, gestational age and Apgar scores (mean hospital stay=33 days). Overall, the infants were assessed for gastric pH, daily food-intake and daily weight-gain in addition to stomach lipase concentrations.

The findings revealed that due to insufficient quantities lingual lipase was unable to be measured. However, gastric pH demonstrated a significant difference between group (experimental or control) and the pH aspirates within each group before and after simulation or control period. The authors believe that this illustrates two main points. Firstly, due to the greater fall (becoming more acidic) in the pH aspirates of the neonates who received TAC-TIC, tactile stimulation does have an effect on preterm digestion. Secondly, that because there was also a significant drop in pH in the control group that the actual procedure of taking the aspirates may promote a greater acid secretion thereby lowering pH. However, Hayes (1996) found no such significant lowering in stomach PH in the ventilated preterm. Caution was therefore offered in the method of extracting such biological material. In addition, no significant differences were found between the experimental and control groups in terms of their food intake or weight gain. However, the much earlier work of Adamson-Macedo (1984) and subsequent work by De Roiste (1991) did find that babies who received TAC-TIC were bottle fed sooner, significantly younger at all suck feeds and moved from a cot to an incubator sooner.

(b) - Physiology, Behaviour and the Immune system

Following on from her work with the relatively healthy preterm Adamson-Macedo et al. (1994) went on to use TAC-TIC with a group of ventilated preterm neonates (N=11). As the infants were in a more critical condition a shortened version of TAC-TIC (2) was used; this consisted of 2 sessions per day lasting between 3-4 minutes. All infants were recruited to the study between 2-8 days after birth, were born between 24-36 weeks gestation age and had a mean birthweight of 1.4kg. All infants continued with TAC-TIC until they were detached from their monitors which yielded an average of 7 complete sessions per baby. In this study the authors set out to test the hypothesis that TAC-TIC therapy would not cause a fall in Transcutaneous Oxygen Tension ($TcPO^2$) which is an indicator of infant distress. It was found that $TcPO^2$ was not significantly different across any of the phases of the procedure e.g. before, during or after intervention which replicated earlier findings by De Roiste (1991) and later findings by Hayes (1996).

Leading on from these findings Adamson-Macedo et al. (1997) went on to run another two experiments; (1) to test further the hypothesis that TAC-TIC does not cause a significant sharp fall in $TcPO^2$ and (2) to compare TAC-TIC with Maternal Intuitive Touching (the order which babies received these interventions was counterbalanced). A total of 11 ventilated preterm neonates (mean gestational age=30 weeks, Birthweight=1.4kg) were recruited to test the first hypothesis and it was found that there was no significant decrease in $TcPO^2$ either before, during or after the intervention, which replicated earlier findings (Adamson-Macedo et al., 1994). Overall 7 ventilated preterm neonates (mean gestational age=33 weeks,

Birthweight=1.53kg) participated to test the second hypothesis and the results indicated two main points. Firstly, that Maternal Intuitive Touch (MIT) significantly decreased TcPO² from before-to-after and during-to-after intervention. Although this was not a particularly sharp fall the authors suggest that this may have been because patterned sequences of stroking movements (such as TAC-TIC) may be more beneficial than random touching. In fact, it is proposed that patterned sequences of stroking encompass more of the body which is contended to be more therapeutic (Macedo, 1984; Rice, 1977). Secondly, because TAC-TIC was not significantly better than MIT in terms of TcPO² percentage increase across all phases (before, during and after) it was suggested that this may have been the result of using a shorter version of TAC-TIC which may have been inadequate in terms of the quantity (no. of strokes) or quality of strokes (beneficial strokes not included).

Having already looked at the effects of TAC-TIC on preterm neonates' weight gain and sucking behaviour De Roiste and colleagues (1995) proceeded to teach parents the procedure of TAC-TIC in an attempt to examine the effectiveness of TAC-TIC as an aid to parent-infant interaction. In doing so the authors; (1) investigated the amount and kind of behavioural reactions of infants to the various strokes across the body, (2) compared whether both parents elicited the same responses from their infants and (3) asked whether parents enjoyed performing the therapy via a questionnaire. The authors used a total sample of 15 parent-infant dyads; babies mean age at recruitment was 36 weeks and 2.67kg in birthweight. On average the study began when the baby was 9 days old and lasted between 20-25 minutes per session. In this particular study both parents performed TAC-TIC one after the other and whilst one parent performed TAC-TIC the other, together with the investigator

recorded infant reactions to each stroke. The findings reported suggest that arm and leg movements were found to be the most common movements when stroking the infant. It is worth noting at this point that Hayes (1996) found that significantly more behaviour occurred whilst receiving TAC-TIC when compared to before and after the intervention. Moreover, Hayes (1996) also found that ventilated preterms spent around 70% of their time sleeping (compares to around 90% as a foetus) and displayed significantly more comfort behaviours whilst receiving TAC-TIC than controls.

De Roiste et al. may be criticised on a methodological level in this particular study as there was no mention of counterbalancing the order in which parents performed TAC-TIC. Furthermore, the authors noted that they wished to look at the amount and kind of infant reactions but procedurally explain that the occurrence of a reaction rather than the number of times it occurred was to be recorded which is contradictory in terms of their recording rule (e.g. instantaneous as opposed to a one-zero recording rule). Furthermore, the babies were not video recorded so there was a higher possibility of missing certain behaviours, only general behaviours were reported (e.g. movements of arms and legs), and there was no report of inter-rater reliability between parents and investigator observations

Over the last three decades the majority of literature has focused on the use of sensory interventions and their benefit to the neurological, psychological, behavioural and cognitive development of the ventilated preterm. However, none had systematically looked at the possible role of tactile stimulation in facilitating the Secretary immune system until Hayes et al. (1999). Using a sample of 32 very and extremely low

birthweight ventilated preterms, Hayes and Colleagues tested the hypothesis that TAC-TIC therapy facilitates and elicits the development of Secretory Immunoglobulin A (SIgA). Secretory Immunoglobulin A maybe a key factor in the prevention of infections. All infants received TAC-TIC therapy (version 3) twice daily for between 3-4 minutes from the third until the seventh day after birth. The results indicate that not only was SIgA detectable in the ventilated preterm but also that it was significantly higher in concentration after TAC-TIC therapy which the authors suggest enhances the Secretory immune system of the neonate. However, the authors acknowledge that increased secretion of SIgA following TAC-TIC has yet to establish whether infants experience a lower incidence of infection.

Carrying on from this work Hayes et al (2000) investigated the mediating role of cutaneous sensitivity in the form of TAC-TIC therapy in order to elicit beneficial psychoneuroimmunological coactions in the ventilated preterm, and consequently to promote equilibrium. Using a sample of 25 very and extremely low birthweight preterms, infants were examined either during a period of spontaneous activity or whilst TAC-TIC therapy (version 3) was administered. The authors used the Equilibrium model (Adamson-Macedo, 1997); which combines immunological (SIgA), Physiological (heart rate) and Behavioural data (pain or comfort behaviours) also known as the IM, P and NB axes respectively and to assign scores to each infant based on decreases or enhancements in two or more of these axes. The authors reported that infants who received TAC-TIC showed significantly more positive responses than matched sessions of spontaneous activity. In addition they report that overall TAC-TIC resulted in either stability or enhancement across all axes for 68% of all the neonates as opposed to negative decreases or disequilibrium.

(c) - Follow-up Studies

As a follow-up to her original work (Macedo, 1984), Adamson-Macedo et al. (1993) assessed 8 children who received TAC-TIC (mean age = 7) together with 6 of their originally matched controls (N=14). The children in this study were measured on their (1) intelligence and achievements using the Kaufman and Kaufman (1983) Assessment Battery for Children and (2) capabilities for free building and drawing using the Heloisa Marinho Card of Child Development (Marinho and Werner, 1985). In the later task children were given wooden bricks and drawing implements and asked to build and draw freely. The children in the experimental group originally received TAC-TIC twice a day for ten minutes each session, with a total of 3 sessions per week. Children in the overall sample (N=14) had all received similar resuscitation and oxygen requirements, consisted of both low and very low birthweight infants, and also included babies who had received ventilation for some period of time.

The findings of this study suggest that those children who received TAC-TIC during their hospital stay had significantly higher overall intelligence scores including sequential and simultaneous processing at age seven. Furthermore, the experimental group were reported to draw three dimensional structures and integrated scenes in comparison to the controls that drew in two dimensions (e.g. breadth and height or breadth and depth) and recognizable but unrelated forms. However, the children did not demonstrate significant differences in achievement or non-verbal tests which are reported to be due to confounding factors i.e. that the experimental group was not compared with a proper control group but a placebo.

De Roiste and Bushnell (1996) also conducted follow-up studies looking at both short-term (age at date of first all-suck feeding, move from incubator care into a cot and date of discharge from hospital) and long-term benefits (better mental and motor development at 15 months of age) of receiving TAC-TIC therapy. The short-term effects of TAC-TIC were studied using a total of 42 preterm infants (mean birthweight=1.91kg; gestational age=33), 21 who formed the experimental group and 21 the controls and included 6 infants who required mechanical ventilation. Overall 26 of the original sample (experimental and control group) were assessed at 15 months of age. The findings suggested that, in comparison to the control group, infants who received TAC-TIC received several short term benefits; including, progression to first all-suck feedings at an earlier age and earlier discharge home. However, experimental infants did not progress from an incubator to a cot earlier than controls. The long-term effects on the other hand suggest that there were significant differences in some aspects of mental development but not in their motor development. In this study mental development was measured with the Bayley Scales of Infant Development (BSID). The Mental Development component of the Bayley test evaluates several types of abilities, including: sensory/perceptual acuities, discriminations, and response; acquisition of object constancy; memory learning and problem solving; vocalization and beginning of verbal communication; basis of abstract thinking; habituation; mental mapping; complex language; and mathematical concept formation. De Roiste and Bushnell (1996) found that the experimental group performed significantly better on the Imitation and Vocalization subscales than the control group. The authors suggested that these differences may have been due to two interlinked reasons. Firstly, parent-infant interaction was modulated by the types of touch involved in the experimental group once they had seen it administered. In

particular, they argued that when mothers observed TAC-TIC being performed with their baby that their expectations for their infant's future development were raised. Thus, mothers were said to behave differently towards their infant following this event. Secondly, it was proposed that TAC-TIC therapy may enhance maternal sensitivity and responsivity because mothers model their subsequent behaviour towards their infant on what they observed during the experimental sessions. Therefore, because mothers are said to change the way they socialise with their baby this leads to enhanced social interactions leading the infant to engage in more effective dyadic expressive and verbal interaction. Hence the significant findings for these particular subscales.

(d) - Summary of Main TAC-TIC Findings

Over the past two and a half decades TAC-TIC (Touching and Caressing-Tender in Caring) has been used with preterms of Low (2.5kg), Very Low (<1.5kg) and Extremely Low Birthweight (<1.0kg). This research has also extended to those infants who are most at risk who require oxygen and mechanical ventilation. Over this time period several important benefits have been identified in relation to the physiological, immunological and behavioural processes of the preterm neonate. Firstly, that gentle light and systematic stroking in the form of TAC-TIC therapy does not adversely affect TcPO₂ levels (an indicator of infant distress) in either relatively healthy preterm neonates (De Roiste, 1991) or those babies receiving ventilation (Adamson-Macedo et al., 1994 and 1997). Secondly, preterms who received TAC-TIC lost significantly less weight during the first week of life and gained more weight overall than controls (Macedo, 1984 and 1985/6) although this was not supported later by De Roiste (1991). The possible mechanisms through which preterms gained more

weight was investigated further by the work of De Roiste and Bushnell (1993, 1995 and 1996). They found that relatively healthy preterms who received TAC-TIC demonstrated significant and enhanced sucking behaviour, greater acidity of stomach concentrations and progression to all suck feeds earlier as opposed to their controls. Greater stomach acidity following a session of TAC-TIC with the ventilated preterm was not observed (Hayes, 1996). Furthermore, Hayes (1999) identified that there were benefits to the immune system of the ventilated preterm in the form of significantly increased SIgA concentrations in the saliva. Generally, it was also found that babies who received TAC-TIC also were discharged from hospital sooner (De Roiste and Bushnell, 1996), moved from an incubator to a cot earlier (Macedo, 1984; De Roiste, 1991), displayed significantly more comfort behaviours than distress behaviours (Hayes, 1996) and possessed higher intelligence scores at 7 years of age (Adamson-Macedo, 1993).

(e) - Implications of Previous TAC-TIC Research to Future Studies

The research conducted so far using TAC-TIC therapy has almost exclusively focused upon the physiological, immunological and behavioural outcomes of the babies themselves. Thus far there has been no investigation of the possible benefits of TAC-TIC to the parents (specifically the mother) of the hospitalised preterm neonate either cognitively or emotionally. Also there has only been one study which taught parents how to administer TAC-TIC (De Roiste et al., 1995) and this solely looked at the basic differences between the types of maternal and paternal touch, few behaviours of preterms were reported and they used confounded observational techniques to record newborn behavioural responses. Nevertheless, De Roiste and her colleagues did acknowledge that the use of video equipment would have resulted in the analysis of

more discrete behaviours. However, in terms of the studies illustrated here which have used TAC-TIC therapy it is clear that whilst some have taught mothers how to use tactile sensory nurturing interventions with their baby they have not measured any potential impact that this might have on the mothers' cognitions and emotions. Instead, the research has focused upon the benefit to the baby, which has also been common in studies using other tactile interventions (e.g. baby massage), particularly in terms of weight gain although these findings remain somewhat inconclusive. Furthermore, it is also important to point out that no study, whether they have used TAC-TIC or another form of tactile intervention, has reported using baby toys as a form of tactile intervention either as a contrast to a touch therapy or as the main tactile intervention with preterm babies.

2.4 - CHAPTER SUMMARY

This chapter has identified that when a baby is born prematurely the sense of touch is one of the most mature of the senses at their stage of development. Hunt (1979) suggests that tactile modes of stimulation have optimal benefit for preterm infants and match the epigenetic sequence of development.¹ Therefore, this makes supplemental touch interventions particularly appropriate and vital to preterm development. However, it was noted that there is still much debate surrounding early stimulation programmes for hospitalised preterm neonates and that this has diversified into those which use (1) multimodal versus unimodal stimulation and (2) static/passive or skin-

¹ In terms of the developing foetus/baby, development or epigenesis of the senses occurs in a fixed sequence; including, tactile; propriovestibular; auditory, visual (Hunt, 1979; Gottlieb, 1983). By 8 weeks the foetus responds to touch around the lips and cheeks and by 14 weeks most of the body. In contrast the auditory sense which can be stimulated around 22-24 weeks and the visual sense does not fully function until several weeks following term birth. It is proposed that infants should not be exposed to sensory experiences earlier than what the normal developmental sequence would be (Lickliter et al., 1993). Therefore, since the sense of touch is the first to develop this is the most mature at birth even for preterm babies.

to-skin contact (e.g. Kangaroo care) and those which use more active types of touch (e.g. Massage or TAC-TIC). TAC-TIC (Touching and Caressing-Tender in Caring) therapy was proposed as the preferred and more appropriate touch stimulation programme for the hospitalised preterm neonate. Previous research using TAC-TIC therapy and their outcomes were outlined in detail above and identified both stability of the preterm neonates systems and benefits to their physiology, immunology and behaviour following intervention. It was last of all identified that research using TAC-TIC therapy is particularly sparse concerning the cognitive and emotional outcomes of the parents (specifically the mother).

Table 2.3 A Summary of Published Investigations into TAC-TIC Therapy and its Main Outcomes

Author and (Date)	Methods (N)	TAC-TIC details				Main Outcomes
		Version	Duration	Schedule	Length	
<i>Weight loss/gain and Sucking Behaviour</i>						
Adamson-Macedo (1985-6)	R (n=66)	1	10 min	Twice daily	14-21 days	It was reported that there was significantly less weight loss during the first week of life. Also, preterms who received TAC-TIC within the first 48 hours significantly lost even less weight than newborns that started after 48 hours.
De Roiste and Bushnell (1993)	R (n=20)	U	U	Once daily	Received until the day prior to discharge	Neonates in the experimental group possessed significantly higher sucking pressures which was suggested to enhance the sucking reflex and may be the result of a possible tactile-sucking-feeding mechanism.
De Roiste and Bushnell (1995)	R (n=20)	1	U	Once daily	Received until the day prior to discharge	The findings indicated that preterms in the experimental group demonstrated significantly lower pH aspirates (increased acidity) than controls.
<i>Physiology, Behaviour and the Immune system</i>						
Adamson-Macedo et al. (1994)	V (n=11)	2	3-4 min	Twice daily	Average 3 days	The results from this study indicated that there was no sharp fall in TcPO ₂ (which is an indicator of distress) either before, during or after intervention.
De Roiste and colleagues (1995)	R (n=15)	U	20-25 min	U	U	The authors reported teaching parents how to use TAC-TIC. They reported that mothers and fathers did not vary in the amount or type of touch and that newborn arm and leg movements were the most frequent behaviours.
Adamson-Macedo et al. (1997)	V (n=11/7)	2	3-4 min	U	U	This study replicated the previous findings of Adamson-Macedo et al. (1994) whereas maternal intuitive touch (MIT) significantly decreased TcPO ₂ .
Hayes and Adamson-Macedo (1998)	V (n=1)	3	3-4 min	Twice daily	9 days total	This study compared TAC-TIC therapy with either (1) TAC-TIC applied with a deeper touch and (2) simply holding the newborns head. Analysis revealed that there were significantly more distress behaviours in the TAC-TIC deep condition

Table 2.3 Continued

Hayes et al. (1999).	V (n=32)	3	3-4 min	Twice daily	From the 3-7 th day after birth	The authors reported that they were able to detect SIgA in the saliva of ventilated preterms and that it was significantly higher in the experimental group.
Hayes et al (2000)	V (n=25)	3	3-4 min	Twice daily	U	Using the ThEM model which combines immunological, physiological and behavioural data, the authors suggest that preterms demonstrated stability or enhancements across after receiving TAC-TIC and in comparison to newborns who were observed in spontaneous activity.
<i>Follow-up Studies</i>						
Adamson-Macedo et al. (1993)	U (n=14)	1	10 min	Twice daily	U	This study assessed various processing tests at the age of 7. It was suggested that the experimental group children possessed significantly higher intelligence scores amongst other cognitive benefits.
De Roiste and Bushnell (1996)	R (n=42/26)	U	U	U	U	This study reports that experimental infants began all-suck feedings sooner and were discharged home earlier than controls.

KEY: *R* = Relatively Healthy Preterms, *V* = Ventilated Preterm Neonates, *U* = Unspecified data

2.5 - Discussion of the Vickers et al. (2007) Cochrane Review

The proposals of Vickers and colleagues were based upon a systematic review of the literature which examined whether, “preterm and/or low birthweight infants exposed to massage experienced improved weight gain and earlier discharge compared to those infants receiving standard neonatal care,” and “...whether massage has any other beneficial or harmful effects on this population.” The results, and reviewer's conclusions, suggested that there was weak evidence that massage for preterm infants is of benefit for developmental outcomes and that these findings do not warrant its wider use within the neonatal unit.

However, there are several aspects of this review which raise concern and some of which may be serious flaws which should be addressed in any update. Firstly, at the most basic level the title of the review does not completely reflect what the study is about. In particular, the review itself chiefly compares 2 sets of touch therapies with routine care, i.e. Massage Vs Routine care and Gentle/static touch Vs Routine care. Nevertheless, the reviewers fail to make any reference to the Gentle/static human touch comparisons either in the title or their objectives.

Also, there is an issue concerning the types of studies included in this meta-analysis of which some represent a more serious problem. This issue may be classified into 2 further sub points. The first of these sub points relates to the misclassification of the types of interventions included in the review. One specific example of this is the inclusion of the Adamson-Macedo (1985-6) study. In this specific study the tactile intervention used with preterm babies was not a

massage therapy, it was in fact TAC-TIC. TAC-TIC, which is described in detail in this Chapter, clearly differentiates itself from massage therapy and does not include both rubbing and stroking of the baby (which was an inclusion criteria for the authors of the review).

The second, and potentially more serious, sub point concerns the characteristics of the studies compared. In fact, with the exception of the gentle/still touch therapies and Adamson-Macedo (1985-6), all other studies involved either ‘massage and kinaesthetic stimulation’ or ‘massage and stroking, rocking, holding, cuddling or talking’. The reviewers did acknowledge that they do include studies which incorporated, “studies of multi-modal intervention of which massage,” was a part. However, this represents a serious methodological flaw since it means not all studies incorporated the same variations of stimulation (e.g. tactile or auditory stimulation). In effect, what this infers is that some studies included massage and kinaesthetic stimulation whereas others included stimulation such as talking (see table 2.1). Therefore, several senses would be stimulated at the same time which means it would not be clear whether it was the physical touch causing any potential effects or whether it was other factors such as speaking to the newborn (A critique of multimodal therapies is already contained within this Chapter).

In addition, whilst factors such as length (no. of days received) or duration of the stimulation were relatively uniform in the included studies. One particular variable that was not uniform was the postnatal age at which the intervention began. In fact, in several studies they commenced the intervention as early as 2 days following birth whereas in others it was not started until almost 2 or 3 weeks

postnatally. The reason the onset maybe a particularly important issue is because it is normal for every baby to lose weight within the first week of life. Also, studies such as Adamson-Macedo (1985-6) have suggested that the earlier a tactile stimulation intervention is begun then the less weight the child is likely to lose. Babies also consume different amounts of food at different ages and also vary in the conversion of this food into weight. Thus, onset of the intervention should be a key variable to control for when conducting a review of this sort.

Therefore, whilst this particular review has not received any feedback criticisms this discussion may make some important recommendations for the reviewers to consider in any future update.

CHAPTER 3. – COGNITIVE AND EMOTIONAL MEDIATORS OF EARLY PARENTING

3.0 - OVERVIEW

The impact of preterm delivery on the process of parenting should not be underestimated whilst the baby is hospitalised. This Chapter illustrates, through relevant literature searches, that there is a profound lack of studies which examine a mother's cognitions and emotions whilst parenting a hospitalised preterm neonate. It is identified in this Chapter that there is an imbalance between those studies which examine, (1) mothers' perceptions in their ability to parent (self-efficacy), (2) the estimations of themselves as a mother (self-esteem) and (3) systematic studies that have looked at maternal-infant attachment, and those studies which examine the issues related to preterm cognitive and physical development. In this thesis a mother's parenting is seen as comprising three separate constructs; namely, Self-Efficacy, Self-Esteem and Postnatal Attachment. The following sections give a background description of each construct in turn, their potential importance for study within the context of the neonatal unit, makes reference to relevant empirical studies where appropriate and indicates the number of studies which have investigated the three aforementioned constructs in relation to tactile intervention studies.

3.1 – COGNITIVE MEDIATORS OF EARLY PARENTING

(i) – Self-Efficacy Theory

What is Self-Efficacy and why is it important?

Whether a person believes in their ability to successfully perform a particular behaviour (Coleman and Karraker, 1997) is the central tenet of Self-Efficacy theory (Bandura, 1977) and is in essence, a person's own judgments in their ability to perform, manage and accomplish a task or range of tasks within a specific context (Bandura, 1986). Moreover, Self-Efficacy beliefs are important because they influence how people think, feel and act (Schwarzer, 1992) and are considered to be a major determinant of human motivation. Furthermore, because peoples' Self-efficacy beliefs influence their thought patterns, emotions and actions (influence human behaviour) (Koul & Rubba, 1999) this puts them in a pivotal role where interventions may play a particularly important part.

Thus, it is through self-reflection that individuals are said to evaluate their own experiences and thought processes. The integration of various sources of information provides people with knowledge about their ability to perform specific behaviours in specific contexts. This information will dictate how efficacious people feel at performing certain activities. Self-efficacy beliefs have been shown to be independent of actual ability levels (Bandura, 1997). Therefore, it is not the number of skills that someone has that is important but what they believe they can do with the skills that they have under a variety of different circumstance. Moreover, if people believe that they can cause an event they become more inclined to act and feel more committed to this decision. Also, a

person with high self-efficacy may choose to partake in more challenging activities, may set themselves higher goals, and are more likely to persevere when confronting obstacles or adverse situations (Pajares, 2002)

The importance of Self-efficacy to Social Cognitive Theory

Before this particular section on self-efficacy goes any further it is necessary to briefly explain from which theoretical perspective that self-efficacy has emerged and its importance. Please note that it is not intended to give an exhaustive review of the original theory that self-efficacy is set within but instead to give a brief overview.

Overview of the Social Cognitive Theory

Self-efficacy theory has its roots within the much broader theoretical perspective of Social Cognitive Theory as postulated by Albert Bandura (1986). Social Cognitive Theory (SCT) is reported by Bandura to be a multifaceted causal structure that deals with the way in which people develop their competencies and how they regulate their behaviours/action. In contrast, self-efficacy plays a central role in the government of human thought, motivation and behaviour (action). Also, Self-efficacy is a type of self-reflective thought that affects one's behaviour (Bandura, 1977;1989).Moreover, within the context of SCT a persons' behaviour is depicted within a triadic and dynamic process which involves reciprocal interactions with internal personal factors of the person (e.g. cognitive, affective and biological events) and the external environment. Through feedback and reciprocity, a person's own reality is formed by the interaction of the environment and their cognitions. Thus, humans function as contributors to their

own motivation, behaviour, and development within a network of reciprocally interacting influences. Within this SCT perspective, humans are characterised in terms of five basic and unique capabilities: symbolizing, vicarious, forethought, self-regulatory, self-reflective (Bandura, 1986; 1989). It is these capabilities that provide humans with cognitive means by which to determine behaviour.

Sources of Self-Efficacy

Within the theoretical framework of self-efficacy theory a person's beliefs are said to be derived from four principle sources of information conveyed by direct and/or mediated experience. These four sources of efficacy information are known as; Enactive Mastery Experience (i.e. a person's prior experience with a particular activity or task), Vicarious experience (i.e. how much time spent on the activity in question and how people are influenced by watching others perform tasks), verbal persuasion (i.e. from influential others e.g. Friends/family) and physiological and affective states (i.e. The person's somatic senses or their own body). Performance attainments are viewed as having the strongest impact on self-efficacy beliefs, but other sources of information such as vicarious experiences, social persuasion, and emotional arousal can also be influential (Bandura, 1982, 1986).

Parenting/Maternal Self-Efficacy

What is it?

Parenting Self-Efficacy is defined as beliefs or judgements about one's competency or ability to be successful in the parenting role (Hess et al., 2004) and may be a critical mechanism guiding mothers' interactions with their hospitalised

preterm neonates. Parenting Self-Efficacy has been studied by a number of different researchers (Aunola et al., 1999; Coleman & Karraker, 1997; and Gondoli & Silverberg, 1997). However, parenting within the context of a neonatal unit is not only different from the normal birth experience but parents must also complete tasks under a range of different circumstances and environments. Moreover, some parents may feel they are capable of performing even the most complex of parenting tasks. Whereas, other parents may possess relatively weak expectations of their parenting ability and find many tasks difficult to complete especially when confronting obstacles or adverse experiences. However, the central concern of this thesis is those beliefs or judgements of competency for parenting by mothers only. Maternal self-efficacy is defined as being, “specific to a women’s perceived performance in the maternal role, and the beliefs she has in her ability to respond contingently to the signals of her infant,” (Teti & Gelfand, 1991).

Empirical studies using Maternal Self-Efficacy in the neonatal unit?

It is the belief of the author of this thesis that maternal self-efficacy may be a critical mechanism guiding mothers’ interactions with their babies during their time in the neonatal unit. For that reason, a literature search was conducted² with the terms; ‘maternal / parenting,’ ‘self-efficacy,’ ‘preterm / premature / premature baby’ and ‘hospitalised’ only 2 articles were found. The first of these articles was a publication by the author of this thesis (please see publication [Barnes and Adamson-Macedo, 2004] in the Appendices) and investigated the work which is

² using the following databases: Allied & Complementary Medicine - 1985 to date, British Nursing Index - 1994 to date, CINAHL - 1982 to date, DH-DATA - 1983 to date, EMBASE - 1974 to date, King's Fund - 1979 to date, MEDLINE - 1996 to date and PsycINFO - 1806 to date

presented in Chapter 5 (Phase-2). The other study found from our literature search related to hospitalised but expectant mothers (Gray, 2001) and was therefore not pertinent to this review.

Therefore, it would appear that there is little evidence to suggest that maternal self-efficacy may be important within the context of the neonatal unit. Nevertheless, additional searches were also carried out in order to broadly examine the literature available, and were as follows (with the number of articles found indicated in parentheses; (1) 'self-efficacy and preterm / fullterm' (19/6), (2) 'maternal / parenting, self-efficacy and preterm (16/10) or fullterm' (5/4), (3) 'maternal / parenting self-efficacy and premature (15/7) or premature baby' (1/0). Thus, a total of 86 articles were found overall but 52 of these were duplicated within the various searches outlined above which left just 29. However, not all of the studies found were pertinent and some of the ones which were relevant are reported below. In addition, Motigny and Lacharité (2005) in a recent review specific to 'parenting self-efficacy' found only 60 articles within the period 1980-2000. Research within this time frame has largely been conducted within the late 80s and 90s by both nursing researchers and psychologists.

Moreover, the research produced up until the end of 2005 using mothers of fullterm and preterm newborns, toddlers and young children at home has cumulatively suggested that if the infant is a persistent crier (Papouseck and von Hofacker, 1998), suffers from colic (Barr, 1998; Stifter and Bono, 1998), is viewed as a difficult or irritable (Halpern and McLean, 1997), has some sort of medical condition or disease like cerebral palsy (Gross et al., 1989; Sanders et al., 1997) then the mother is likely to be of lower self-efficacy. In addition, maternal

anxiety, depression, stress and infant temperament (Teti et al., 1990; Teti and Gelfand, 1991; Gross et al., 1994; Porter and Hsu, 2003) have been more commonly studied and associated with mothers feeling less competent as parents. In addition, mothers' perceptions of insufficient milk supply (McCarter and Kearney, 2001), breastfeeding intention (Mitra et al., 2004), infant soothability (Lerkes and Crockenberg, 2002), posttraumatic stress disorder (Soet et al., 2003) and parenting stress (Raikes and Thompson, 2005) have all been found to mediate with maternal self-efficacy. Furthermore, parental self-efficacy and parenting competence have been found to be moderated by parent knowledge of development (Reiner et al., 2004) and as a possible predictor of child functioning (Jones and Prinz, 2005). Teti and Gelfand (1991) have suggested that maternal efficacy beliefs mediate the effects of depression, social support and infant temperament on parenting behaviours (Teti and Gelfand, 1991). Studies using infants within the first year of life have found that maternal prior experience (Gross et al., 1989), social support (Younger et al., 1997; Reich et al., 2004), and parity (Zahr, 1991) are positively related to maternal self-efficacy. Also, several authors have investigated the longer term impact of a low maternal self-efficacy. For example, Lerkes and Crockenberg (2002) found that mothers who were of a low self-efficacy were more likely to display less sensitive behaviour towards their infant (especially when their infant was highly distressed), were more likely to give up when trying to soothe their infant and also exacerbate infant distress. Sanders and Woolley (2005) in their study examined the relationship between maternal self-efficacy, dysfunctional discipline practices and child conduct problems. They found that mothers who were low self-efficacy were less likely to develop successful discipline practices leading to a higher incidence of child

conduct problems as compared to mothers who were high in self-efficacy. Jones and Prinz (2005), on the other hand, in a review of the literature suggest that there is strong evidence that a low maternal self-efficacy is linked to lower perceived parental competence, negative child behaviour, low school achievement and maltreatment. The authors of the review also note that low self-efficacy may impact upon parenting practices and behaviours, child functioning and may be an indicator of child risk. From a theoretical perspective, it is more likely to be expected that mothers who do possess a low self-efficacy would perceive themselves as less likely to successfully carry out parenting tasks and would be more likely to give up when confronting obstacles. The relative impact of a low maternal self-efficacy may be considered somewhat moderate risk (e.g. leading to child conduct problems) to relatively high (e.g. where children may be maltreated). Therefore, it would appear to be critical to identify mothers who are at risk of low maternal efficacy and to provide appropriate interventions in order to avoid such consequences.

(ii) – Maternal Self-Esteem

What is Maternal Self-Esteem and what Empirical studies have been carried out?

Self-esteem is that aspect of the self which is concerned with how people evaluate themselves and can stem from their work, community, social or family life. Furthermore, this construct assumes not only a cognitive evaluation process, but also an affective one (such as pride and shame) attached to the self-evaluation (Wells and Marwell, 1976; McGrath and Meyer, 1992). Thus, general self-esteem refers to a global evaluation of self (Harter, 1993; Leerkes and Crockenberg,

2002) and is defined as the value a woman attaches to her reflected appraisal of herself as a mother (McGrath and Meyer, 1992).

When conducting a literature search for this study (using the identical databases to those used for the self-efficacy search) the following results were found using the terms (with the number of articles found indicated in parentheses); ‘maternal, self-esteem and either preterm (41), fullterm’ (1), premature (39) or premature baby’ (1). Thus, a total of 82 articles were found overall but 27 of these were duplicated within the various searches outlined above which left 55. Further investigation of these articles revealed that 53 were not directly pertinent to this thesis (i.e. because the babies were often several months old and were non-hospitalised) which left a total of 2 relevant articles.

The first of these articles was a publication by Chen and Wang (2002) and investigated psychosocial differences between primiparous Taiwanese mothers who had given birth either vaginally (n=194) or by caesarean section (n=81). All participants were recruited at 6 weeks postpartum and the main finding from this study suggested that there were no significant differences in perceived self-esteem between either of the samples including other factors such as stress and depression. These authors also reported that there were no differences between the different types of caesarean (i.e. planned/emergency) and types of anaesthesia (general/epidural) were not significant factors influencing psychosocial outcomes for caesarean delivery. The authors suggested that the non significant findings may be the result of greater social support given to those mothers who experience caesarean section.

The other article found in the search outlined above was conducted by Chen and Conrad (2001) who investigated the relationship between maternal self-esteem and maternal attachment in mothers of relatively stable hospitalised premature infants (N=32). The authors administered the Maternal Self-report Inventory (measuring maternal self-esteem) the Rosenberg Self-Esteem scale (measuring global self-esteem) and the Leifer's How I Feel About My Baby Now Scale (measuring maternal attachment). However, due to inadequate internal consistency of the How I Feel About My Baby Now Scale the main hypothesis could not be tested

In addition, self-esteem can derive from self-evaluations based on competence or whether people possess characteristics that are deemed as culturally positive or negative e.g. being a good parent. Moreover, it may be an important factor influencing mother's feelings of self worth as parents during hospitalisation and the neonatal period. However, studies using mothers of preterm babies who are no longer hospitalised are suggesting that a low self-esteem may be linked to negative maternal perceptions of infant health and whether infants are considered to be fussy or difficult (McGrath et al., 1993). Some evidence suggests that maternal self-esteem is critical among parental attributes that maximize developmental outcomes in infants and contribute to successful parenting behaviours (Mercer, 1990). Also, a low self-esteem may contribute towards a delay in mothers to deal with the psychological task of re-initiating the parent-baby relationship (Farrow and Blisset, 2005) which was abruptly interrupted as in the case of preterm delivery. Other research has indicated that mothers who have a low maternal self-esteem also have poorer perceptions in their readiness to

parent, possess less positive parenting styles and have higher levels of perceived parenting stress (Chang et al., 2004). Similarly, Clark and Graham (2006) suggest that if a mother has a low maternal self-efficacy then this will often lead to higher anxiety, stress and depression. Moreover, the emerging mother-infant relationship particularly the mother's ability to interact and care for her preterm infant is viewed as central to the mother's development of maternal self-esteem (Als, 1986; Shea, 1984).

Also, perhaps the most widely reported factors that affect the quality and level of maternal self-esteem is newborn characteristics (McGrath and Meyer, 1992), such as behaviour, and the amount of social support a mother receives (Shea and Tronick, 1988). Moreover, whilst some authors believe that infant behaviour has both direct and indirect effects on maternal self-esteem others (McGrath et al., 1993) note that infant behaviour has only been shown to have indirect effects. Zahr et al. (1991) also support the later assertion and suggest that in the majority of cases most investigators have not found a relationship between observed parental behaviours, infant characteristics and maternal self-esteem. However, Shea and Tronick (1988) did find that infant behaviour was related to maternal self-esteem but this was not the case when they controlled for maternal social support. In a similar study, Amankwaa et al. (2007) also report that infant behaviour is not related to maternal self-esteem when controlling for maternal social support. Therefore, there appears to be limited evidence to suggest that there is a link between infant behaviour and maternal self-esteem and that any relation is most likely explained by other variables such as social support. Other studies that have examined baby characteristics (McGrath et al., 1993) have

suggested that the greater the gestational age of the infants the higher the mothers' self-esteem.

In similar studies infant feeding has also been associated with low maternal self-esteem (McGrath and Meyer, 1992). The former authors report that for parents there is a considerable emphasis placed upon oral intake and weight gain in the neonatal unit, and the use of these as indicators to determine the progress and readiness for discharge. Similar to the pressures of infant feeding and weight gain Shea and Tronick (1988) report that the development of maternal self-esteem is largely dependent upon the mothers' success in interacting and caring for her infant. They suggest that the more competently the baby can communicate effectively their needs then the more this facilitates care taking which in the long run enhances mother's self-esteem. Moreover, variations in the babies' alertness, activity levels and response to stimulation are reported to affect the infants' interaction with his or her mother (Scanlon et al., 1983).

3.2 – EMOTIONAL MEDIATORS OF EARLY PARENTING

(i)– Postnatal Maternal Attachment

What is Postnatal Maternal Attachment?

Attachment, as Ainsworth (1969) pointed out, relates to something inside the organism, which may be distinguished from the behaviours that mediate it. Ainsworth equated this subjective experience with love and so did Bowlby (1969) and Harlow and Harlow (1965). Parental affectionate attachment is perhaps most

important because research has cumulatively recognised it as a major contributor to the child's healthy growth and development (Koniak-Griffin, 1993). It is reported that when the attachment relationship is disturbed this may lead to a disturbances which affect parent-child relationships (Bates and Bayles, 1988). The majority of literature regarding maternal attachment has been suggested to mainly focus upon observed maternal behaviours (Carson and Virden, 1984; Davis and Akridge, 1987; Tulman, 1985) or as mother-infant interaction scores (Fuller, 1990). Furthermore, attachment has been less often measured by questionnaires particularly in relation to maternal perceptions or experiences about interactions her infant (Mercer, 1985; Mercer and Ferketich, 1990). It is generally well accepted that individuals internal models of attachment remain relatively stable across the lifespan (Bowlby, 1973; 1980; 1982; Scharffe and Bartholemew, 1994) in the absence of appropriate interventions. Maternal attachment has been defined as the unique, affectionate relationship that develops between a woman and her baby and which persists over time (Muller, 1994). Parental attachment behaviours are said to exist as a response to the infant's behaviours. Although there is often no reference made to behaviours outside those which are in response to the infant (e.g. in the form of extra tactile stimulation).

Conversely, a different approach to parent-infant relationships was spearheaded by Klaus and Kennel (1976, 1982) under the rubric of 'bonding'. Bonding was described as the process by which parents come to feel an emotional investment in individual offspring. Although the later formulation (Klaus and Kennel, 1982) considered bonding to be a lifelong process, the early work focused on effects of initial contacts of parents and infants, particularly mothers. It was suggested that

optimal mother-infant relationships were fostered by close contact during a brief period after delivery thought to be ‘critical’ or ‘sensitive’ for bonding (Goldberg and DiVitto, 2002). In particular, Bowlby (1969) discussed the critical period for bonding and concluded that this could only happen when mother and baby were together in the first few hours following birth. It has since been recognised that the process of attachment can take place even when there has been a considerable period of separation (Graham, 1995). However, systematic studies measuring affectionate attachment in parents of preterm babies, during the neonatal period are hitherto unknown.

Thus, when conducting a literature search for this thesis (using the identical databases to those used for the self-efficacy and self-esteem search) with the terms; ‘maternal-to-infant,’ ‘Attachment,’ and either ‘preterm / premature / premature baby’ and ‘hospitalised’ no articles were found. It is important to note that the majority of the literature focuses upon observable attachment behaviours. However, the focus of this thesis is upon self-reported maternal attachment experiences through the use of questionnaires. Moreover, only one such article was found which had developed a measure of maternal attachment. Condon and Corkindale (1998) have gone one stage further and propose that there are certain indicators of attachment that mediate between the core attachment experience and the behaviours that mothers display towards their infant. These four indicators of attachment proposed by Condon and Corkindale (1998) are not suggested to be definitive but that they may help gauge the relative strength of attachment in mothers. These four indicators are known as; Pleasure in proximity, Tolerance, Need-gratification and knowledge acquisition. In essence, pleasure in proximity

is seen as a desire to be around and interact with the baby as opposed to avoiding the newborn through separation. Tolerance is best described when referring to mothers with strong attachments who are said to be 'tolerant' of infant behaviours that would otherwise result in resentment and that if mothers have a strong attachment they will be self-sacrificing. The third indicator of attachment is need gratification which involves satisfying the baby's needs which are said to take priority over the mothers. The final indicator is knowledge acquisition which suggests that mothers with a strong attachment will possess a strong curiosity to understand their child.

However, one other study was found which carried out a small retrospective study interviewing mothers when their preterm babies were 5.5 months old and were at home (Niven et al., 1993). Most of the 30 mothers reported that they experienced difficulties in attachment during the baby's hospitalisation, particularly in the immediate postnatal period; difficulties included shock, fears about baby's survival and previous reproductive problems. Other feelings articulated were guilt, loss and a sense that the baby was not really theirs. Therefore, these feelings may affect the quality of attachment and jeopardise a process, which was seen by Bowlby (1988) as the foundation for the development of all-subsequent relationships or attachments.

However, research into the longer term impact of a low maternal attachment is scarce but has indicated that maternal attachment contributes to infant attachment and the life-long relationships that form between mother and child (Raval et al., 2001) and that these attachments are likely to remain stable across several

generations (Benoit and Parker, 1994). Therefore, knowing mothers' attachment feelings is extremely important should they be particularly low. Crawford (1982) established that mothers who have low maternal attachment often go on to develop less clear relationships with their baby when they are born prematurely a finding which was echoed by Bokhorst et al. (2003). Similarly, Egeland and Heister (1995) also suggest that children in their study, whose mothers were lower in Attachment, poorly adapted to social situations such as day-care.

3.3 – CHAPTER SUMMARY

The central purpose of this chapter was to highlight that a mother's cognitions and emotions, specifically maternal self-efficacy, self-esteem and attachment, may play a particularly important role in the parenting of mothers of hospitalised preterm neonates. Thus, whilst these constructs may be important with mothers of preterms it is clear from the literature reviews carried out above, that there is extremely little or no studies investigating maternal self-efficacy, self-esteem or attachment of mothers of hospitalised preterm neonates. Therefore, it becomes apparent that where there are distinct gaps in the literature it makes the interpretation of any potential findings particularly difficult and instead reliant upon the relevant theory for an explanation.

CHAPTER 4. THEORETICAL BACKGROUND AND OUTLINE OF RESEARCH

4.1 - THEORETICAL BACKGROUND

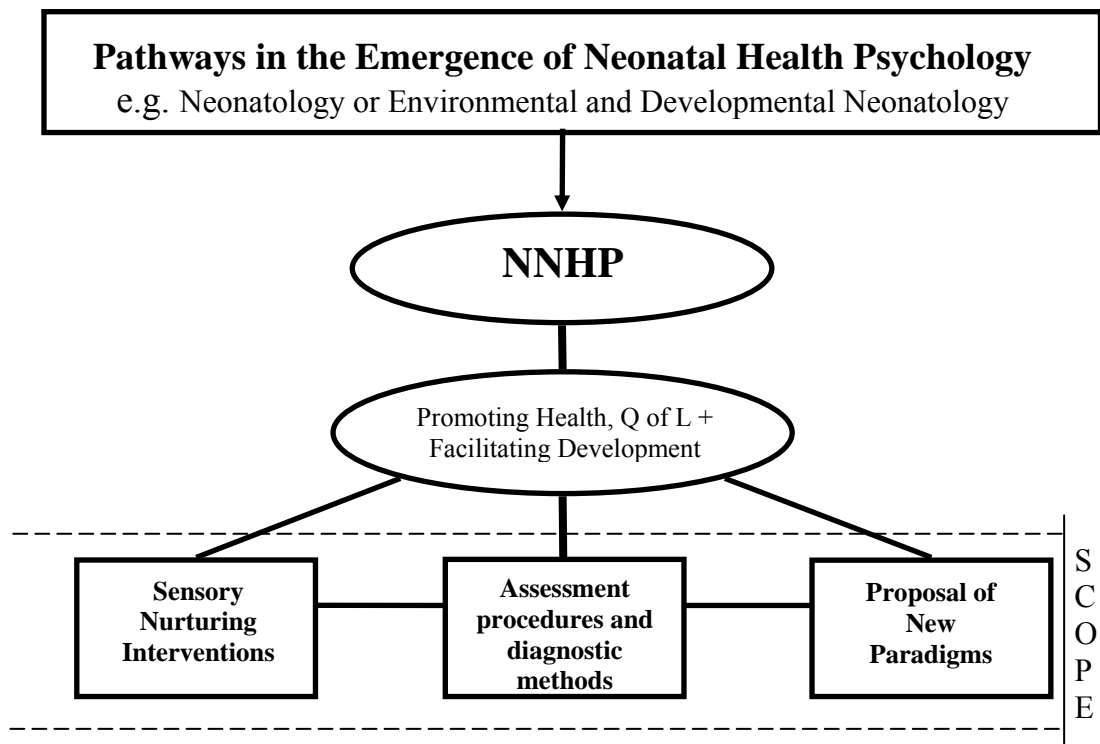
The study of the preterm neonate is the main area of study within the new sub-discipline known as Neonatal Health Psychology (NNHP). NNHP is currently defined as the, “scientific study of biopsychosocial and behavioural processes in health, illness and health care of the preterm (and fullterm) neonate during his/her first 28 days of life, and the relationship of such processes with later outcome,” Adamson-Macedo (2004). NNHP was first proposed in 1997 and is based on several assumptions one of which proposes that the preterm neonate, even those born extremely early, have a mind and are therefore capable of mental life (Adamson-Macedo, 1998). In this thesis it is accepted that preterm newborns are capable of mental life and this issue will not be dealt with further. The assumption that preterm newborns have a mind is a contested issue but one which Adamson-Macedo (1998) succeeds in illustrating. Furthermore, it is also suggested that mind emerges at the same time that tactile sensibility is present. In fact, the tactile sense is reportedly present as early as 7.5 weeks gestation and continues to be one of the most mature of the senses even in prematurely born babies. However, the importance of the tactile sense and early tactile stimulation has been dealt with in greater depth in earlier chapters (see Chapter 2).

In addition, NNHP represents a theoretical framework in which the pathways of its emergence are diverse and interdisciplinary as a sub-discipline of Health Psychology. NNHP draws on social, cognitive, clinical, physiological, developmental, and organisational psychology and from several other disciplines,

especially epidemiology, physiology, immunology, and clinical medicine (Adamson-Macedo, 2000). In actuality the pathways in its development can be traced along four separate paths, namely; Prenatal and Perinatal Psychology and Medicine, Neonatology, Environmental Neonatology (Gottfried and Gaiter, 1985), and Environmental and Developmental Neonatology (Wolke, 1987). Moreover, Adamson-Macedo (2000) has demonstrated that the former mentioned disciplines have been particularly important in identifying and studying for example, that the foetus is capable of learning and therefore by proxy the preterm newborn, or the study of newborn special care facilities and their impact upon the medical and developmental status of sick infants (Environmental and Developmental Neonatology), or the developmental changes and progress of the preterm baby within the hospitalisation period extending to all ages. Thus, whilst the roots of NNHP are diverse the fundamental ethos of NNHP is the support and assessment of the preterm neonate from a biopsychosocial and behavioural perspective. As illustrated in figure 4.1 the scope of NNHP covers 3 major areas, specifically; Sensory Nurturing Interventions (e.g. TAC-TIC therapy, see Chapter 2), Assessment procedures and diagnostic methods (e.g. the Neurobehavioural Assessment of the Preterm Infant [NAPI] Korner et al. [1991]; Constantinou [2002]) and proposals for new paradigms. However, the primary focus of NNHP is the preterm (and Fullterm) baby during the first 28 days of postnatal life. It is important to note at this point that the work reported in this thesis has for the first time investigated simultaneously 2 of the proposed avenues of research (Sensory nurturing interventions and Assessment procedures and diagnostic methods). One of the most fundamental features of NNHP is that for the first time a framework is

provided from which to study the preterm (and Fullterm) baby during the neonatal period.

Figure 4.1. A diagram showing the pathways in the emergence and scope of Neonatal Health Psychology (NNHP)



It is important to mention the 2 theoretical concepts that this subdiscipline draws upon: Gottlieb's (1991) theory of experiential canalization within the context of Systems Development theory, and Bandura's Social Cognitive theory (1986). The former of these two theories is briefly described below and the latter is dealt with in Chapter 3. Although it is not intended to give an exhaustive review of Gottlieb's theory here a more detailed exposition can be found in Chapter 7.

Gottlieb's theory of experiential canalization

Gottlieb's (1991) theory of experiential canalization is said to have contemporary continuity with NNHP (Adamson-Macedo, 1998). This is perhaps first and foremost because NNHP, consistent with a developmental systems approach, has adopted the view that the preterm neonate as an emergent, coactional and hierarchical system (Adamson-Macedo, 1997). Generally speaking, the developmental systems view conceptualises individual development as hierarchically organised and multilevel. Interaction is seen as a bidirectional phenomena whereby interactions may exist between the various systems either horizontally (from gene to gene) or vertically (from organism to environment). Gottlieb (2007) suggests that epigenesis is probabilistically determined and that development is not a linear process. Therefore, in terms of the developmental approach, developmental expression is not predetermined by a person's genetic make-up and means instead that developmental outcomes are less definite and uncertain, which is often referred to as the norm of reaction (Gottlieb, 1992). Instead, development is an active system in which the individual and the environment coact to produce development (McGaha, 2002). Therefore, it is the relationship between the components of the systems that are said to result in development and the interconnectedness of these systems means that any level of the system can affect any other (e.g. the environment on behaviour). Moreover, it is the relationship between two components which instigates development not merely the components themselves. The coactions between these systems result in experience and this may result in, (1) anatomical, (2) physiological or, (3) behavioural development (Gottlieb, 1976). Behavioural outcomes of development

are a consequence of at least two specific components of coaction (e.g. person-person, sensory stimulation-sensory system, activity-motor behaviour).

However, it is said that whilst the probability of certain outcomes may be high, changes can be introduced that lead to different outcomes (McGaha, 2002). The notion that development can be changed is an important one, especially within the context of developmental systems theory, this thesis and the hypotheses which will be tested. Gottliebs (1991) theory of experiential canalization is relevant to the research reported in this thesis for several reasons. Firstly, Gottlieb's (1991) theory is one of the chosen theories adopted by Neonatal Health Psychology (NNHP), which was selected on the basis of comprehensive interdisciplinary plausibility (Adamson-Macedo, 2004). Secondly, this theory has already been successfully used within the same setting as the research reported in this thesis to explain how coactions between sensory nurturing interventions effect systems of the preterm neonate. Finally, this theory maybe of particular importance in explaining how modifications in the environment (e.g. such as the introduction of tactile sensory nurturing interventions) may lead to certain developmental outcomes for preterm neonates and changes in maternal cognitions and emotions.

Moreover, at the beginning of this Chapter it was proposed that this thesis would investigate how mothers and their hospitalised preterm neonates could be supported through their early experiences which could be canalized in a positive way to promote health and development. Many studies to date have recognised that the sense of touch may play a vital role in relation to the development and support of the preterm baby which is highlighted in Chapter 3. In fact, since the

late 1970s researchers have developed several forms of touch therapy (e.g. static touch, baby massage, or stroking only [TAC-TIC, see Chapter 2]) although the literature has mainly focused upon benefits to preterm weight gain (Rice, 1977; Macedo, 1984; Field, 1992; Anderson et al., 2003), weight loss (Adamson-Macedo, 1985-86), length of hospitalisation (Macedo, 1984; Oehler, 1996; Harrison et al., 1996) and effects upon behavioural state (Macedo, 1984; Furnman et al., 2002). Although the findings reported about preterm weight gain following gentle/static touch are not widely supported (Vickers et al. (2007)). However, little systematic evidence has been forthcoming in the literature that investigates whether mothers' psychological states, in particular their cognitions and emotions, are affected by tactile sensory nurturing interventions when they are the ones that deliver the intervention to their own baby instead of an investigator. It is important at this stage in the chapter to briefly explain what cognitions and emotions will be investigated in this thesis before stating the main assumptions and hypotheses that will be tested. Therefore, a brief outline follows of the specific cognitions and emotions under investigation although a more comprehensive justification for their inclusion in this thesis is provided in Chapter 3.

Thus, maternal-to-infant attachment, for example, is an emotional construct considered to be the emotional bond of affection that a mother experiences towards her newborn baby. A mother's affectionate attachment to her infant is recognised as a major contributor to the mother's adaptation to the parenting role and also the child's healthy growth and development (Mercer and Ferketich, 1994). Moreover, maternal-to-infant attachment has often been assessed in terms

of overt behaviours between the mother and her newborn which is said to risk losing sight of the experiential dimension of attachment (Condon and Corkindale, 1998).

In addition, maternal self-esteem, is a cognitive construct which is based upon a woman's self-evaluations of herself as a mother and has been linked with maternal adaptation to motherhood and parenting behaviour. In addition, a mother's self-esteem is said to affect parenting in terms of the interactive relationship between a mother and her newborn. Thus, when a mother has lower self-esteem she is expected to be less facilitative in her parenting and that she is more likely to disrupt physiological regulation of her baby and their ability to interact with the environment (Shea and Tronick, 1988).

Finally, maternal self-efficacy also a cognitive construct is perhaps best described as a mother's perceptions in her ability to perform, manage and accomplish tasks or activities related to parenting. Recent research suggests that maternal parenting self-efficacy beliefs are central determinants of parenting behaviour (Teti and Gelfand, 1991), and empirical research suggests that self-efficacy may also mediate the effects of certain parent and child variables on the quality of parenting (Kendall and Bloomfield, 2005). Coleman and Karraker (1997) suggest that research into maternal self-efficacy significantly illustrates the gravity of its impact upon understanding personal satisfaction or adjustment to parenting.

The availability of measurements of maternal self-esteem, parent-to-infant attachment and maternal self-efficacy have all been limited which is highlighted

in chapter 4 and has been critical to the production of this thesis. However, whilst comprehensive and valid measures of maternal self-esteem and maternal-to-infant attachment do exist (Shea and Tronick, 1988; Condon and Corkindale, 1998 respectively) and have been used with mothers of preterm neonates, scales measuring maternal self-efficacy have not. Moreover, as a necessary prerequisite to conducting the main study (Phase-3) within this thesis a measure of maternal parenting self-efficacy was constructed for use with mothers of hospitalised preterm neonates and its development is reported in chapter 5 (Phase-1).

Moreover, having briefly outlined the cognitions and emotions to be investigated in this thesis the main assumptions will now be addressed. Thus, this thesis is based upon 3 main assumptions which are as follows:

- (1) the preterm neonate is viewed as an emergent, coactional and hierarchical system (Adamson-Macedo, 1997) as proposed in NNHP and which is based on Gottlieb's (1991) theory of experiential canalization.
- (2) the relationships between the environment, mother and preterm neonate can be explained through the concept of horizontal and vertical coactions.
- (3) Maternal Psychological states can be mediated by structured or non-structured tactile sensory nurturing support programmes.

Therefore, in light of the main assumptions above, this author aims to provide research-based evidence on the benefits of environmental support to babies (e.g. weight gain) and their mothers (e.g. cognitions and emotions) during hospital confinement; so that evidence-based decisions can be made in the neonatal unit to improve the quality of environmental care.

The possibility that mothers' cognitions and emotions may be affected by environmental mediators in the form of structured or non-structured tactile sensory nurturing interventions has not been hitherto the subject of systematic investigation. Thus, within the scope of Neonatal Health Psychology (NNHP), the empirical work to be reported in this thesis has investigated the role of tactile sensory nurturing interventions as mediators of (1) Maternal Parenting Self-Efficacy, Self-Esteem, and Attachment, and (2) of hospitalised preterm neonates' behavioural state, weight gain [WG] and days in unit [DIU]. In addition, the relationship between (i) Self-Esteem, Attachment, and Maternal Parenting Self-Efficacy, and (ii) between 1 and 2 above were also investigated. The above mentioned main hypotheses or sub-hypotheses will be investigated and explained from the perspective of Gottlieb's (1991) experiential canalization theory. In particular this research also aims to examine; (1) the vertical coactions which may occur between tactile sensory nurturing interventions (i.e. TAC-TIC therapy) and the systems of the preterm neonate (i.e. changes in behavioural state or weight gain), and (2) horizontal coactions which may occur between the mother and her preterm baby (i.e. person-person) resulting in behavioural outcomes of development.

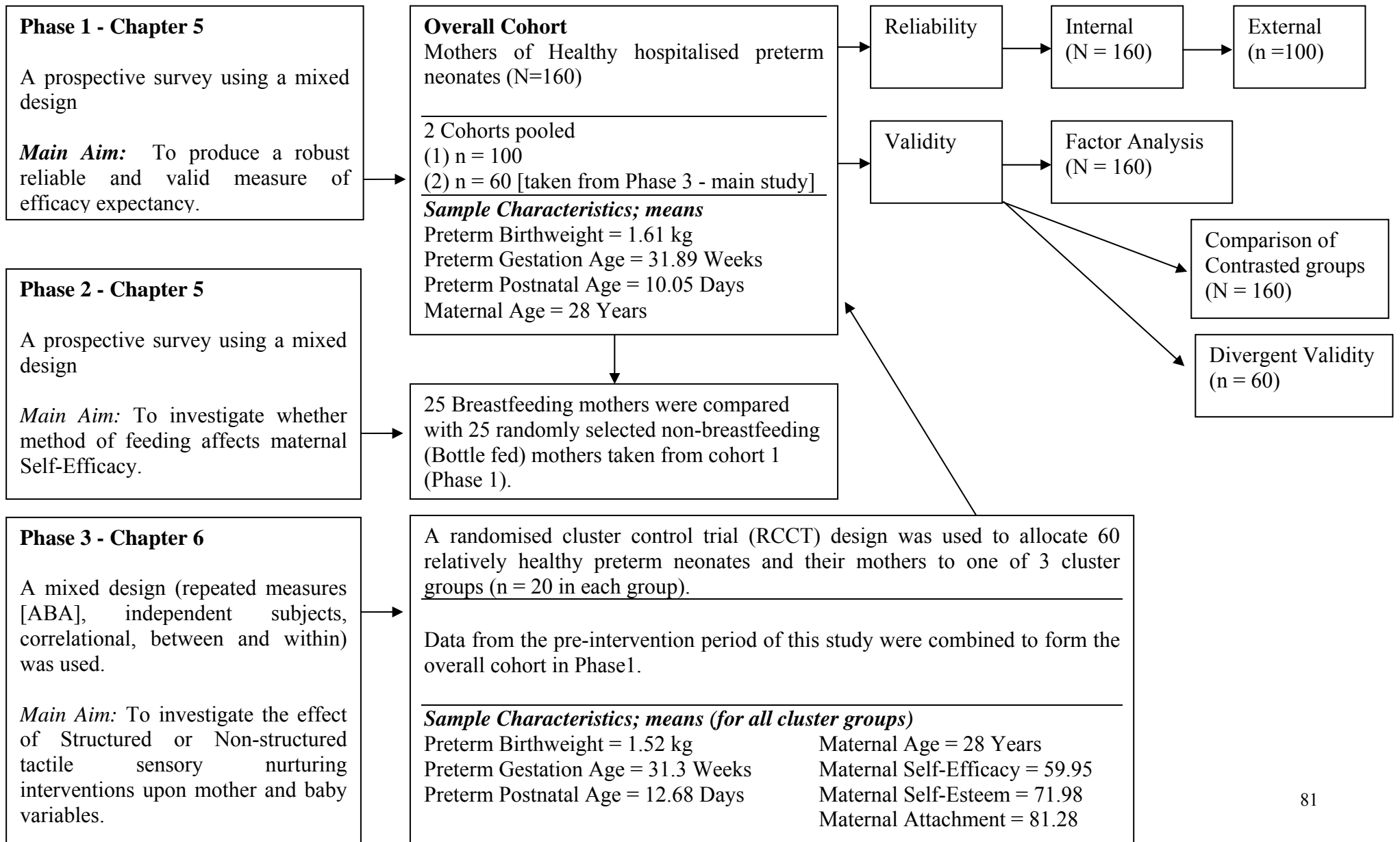
4.2 – OUTLINE OF STUDIES

The research to be reported here is divided into 3 distinct phases and recruited an overall sample population of 160 mothers and their babies (which does not include 37 mothers who were recruited to pilot test the questionnaire developed in Chapter 5, Phase-1). Accordingly, an outline of each phase, including: study designs, the number of participants recruited and brief sample characteristics can be seen in figure 4.2 below. Participants in the first 2 phases of this study were an opportunity sample recruited as part of a prospective survey using a mixed design. Participants recruited in phase-3 were done so using a randomised cluster control trial (RCCT) design; thus it was the cluster group that was randomised and whosoever in the neonatal unit (mother and baby) who fitted the inclusion/exclusion criteria who were approached and requested to participate. The main inclusion/exclusion criteria ensured that only mothers with non-ventilated hospitalised and relatively healthy preterm babies within the first 28 days following birth (neonatal period) were recruited and this was the same across all study phases.

As previously outlined in this chapter, the main study (Phase-3) utilises scales previously developed by other authors to measure maternal self-esteem (Shea and Tronick, 1988) and maternal postnatal attachment (Condon and Corkindale, 1998) in mothers of preterm newborns during the neonatal period. However, there was no appropriate validated tool to measure the self-efficacy of mothers of hospitalised preterm neonates. Therefore, before the main and subsidiary hypotheses could be tested, it was first of all necessary to develop and test a

measure of maternal self-efficacy with our target population. Thus, in Phase-1 of Chapter 5 the development and testing of this measure; the Perceived Maternal Parenting Self-Efficacy tool (PMP S-E) is reported in section 1. In the second section of Phase-1 the relationships between the sources of self-efficacy (Enactive mastery experience, Vicarious experience, verbal persuasion and physiological and affective states) outlined by Bandura (1997) were investigated in relation to overall self-efficacy beliefs. Moreover, in line with self-efficacy theory the results from Phase-1 indicated that mothers' previous experience with childbirth and parenting had the strongest relationship with their overall self-efficacy beliefs. Leading on from phase-1, Phase-2 investigated whether mothers' self-efficacy beliefs might be affected by how they feed their baby during hospitalisation. Feeding being one of the few tasks that mothers are able to carry out. Therefore, in Phase-2 a sub-population of those participants recruited from Phase-1 were used in analyses; twenty-five breastfeeding mothers were compared with twenty-five randomly selected non-breastfeeding (bottle fed) babies on their perceptions to successfully perform activities related to parenting their preterm neonate. Finally, in Phase-3 a quasi-experimental method was employed and a randomised cluster control trial (RCCT) was used to recruit mothers and their babies equally to one of 3 groups; either a structured (TAC-TIC or Toy group) or non-structured (Placebo/Control) sensory nurturing intervention. All the main and sub-hypotheses were then tested.

Figure 4.2 – A figure showing an outline of the study phases, the participants recruited and brief sample characteristics.



4.3 ORIGINALITY OF THIS RESEARCH: Contributions and Implications

It is clear from the literature reviewed in Chapters 2 and 3 that tactile sensory nurturing intervention studies, one of the areas within the scope of Neonatal Health Psychology (NNHP), have not considered whatsoever, the effect that this type of intervention might have upon the parents themselves; specifically the mother, when they are the ones who administer the supporting programme to their own baby. Instead, many of these studies have exclusively focused upon how the sensory nurturing intervention, performed by the investigator, impacts upon the health and development of the baby. Thus, this research aims to contribute to new knowledge within the scope of Neonatal Health Psychology (NNHP). Therefore, further evidence of the applicability of NNHP as a theoretical framework, to study the preterm baby during his/her first 28 days of postnatal life and during hospital confinement is expected to be provided.

It is anticipated that several other important contributions will emerge on both a practical and theoretical level from this research. These will of course be related to the empirical work documented in Chapters 5 and 6 and the main and subsidiary hypotheses. An example of some of the intended contributions is given below. Thus, for example, the tool developed in chapter 5 Phase-1, 'the perceived maternal parenting self-efficacy' (PMPS-E) tool will provide a way to assess the cognitions of mothers parenting ability during hospitalisation with their preterm baby. This tool will also contribute to the scope of NNHP, within early Assessment procedures and Diagnostic methods, as a new way to assess mothers, based upon the robust theory of self-efficacy. In addition, the work presented in Chapter 5 Phase-2 will present some evidence of the effect of breastfeeding on maternal cognition, in particular perceived maternal parenting self-efficacy. Finally, the

work presented in Chapter 6 Phase-3 aims to supply evidence that maternal psychological states (cognitions and emotions) can be changed positively during a short period of time. This work will also make recommendations about the current definition of NNHP and potential influences of the family within the context of this thesis. The contributions of this work are further discussed in greater detail in Chapter 7 and provide evidence for a new addendum to the definition of NNHP to include the family which is proposed in the final conclusions of this thesis (section 7.4).

CHAPTER 5. – Perceived Maternal Parenting Self-Efficacy (PMP S-E) of Mothers of Hospitalised Preterm Neonates (Phase 1 and 2)

5.0 CHAPTER OVERVIEW

The following chapter is divided into 2 main phases of the same study (both with 2 main sections). Phase 1 of this study involves (1) the development and testing of a new scale to measure the perceived maternal self-efficacy beliefs of mothers of hospitalised preterm neonates, and (2) an investigation into the possible mediators of perceived maternal parenting self-efficacy at this time in relation to Bandura's efficacy theory. Leading on from Phase 1, Phase 2 of this study investigated whether (1) situational factors such as how the mother was feeding her baby would mediate maternal self-efficacy beliefs at this time and (2) whether the mothers type of feeding was independently or multiply caused by factors established to mediate maternal self-efficacy in phase 1. The results are discussed in terms of Bandura's self-efficacy theory and the current knowledge concerning preterm neonates.

Study 1: Phase 1 –

The Perceived Maternal Parenting Self-Efficacy (PMP S-E) Tool: Development and Testing with Mothers of Hospitalised Preterm Neonates.

5.1 – Phase-1 Overview

In Phase 1 of the following chapter 4 main issues will be addressed; (1) the necessity for and the development of a questionnaire to measure perceived maternal self efficacy beliefs, (2) how the questionnaire in this chapter differs from pre-existing measures, (3) a report on the psychometric properties of the new maternal self-efficacy questionnaire and (4) an exploration of the potential affects of the sources (mediators) that influence self-efficacy beliefs. In particular, the results section of Phase 1 is divided into 2 main sections; The first main section of the results is also the larger of the two and deals with the testing of the questionnaire to measure maternal parenting self-efficacy (although some important information is also reported in the methods section). The second section, and smaller of the two sections, deals with the potential mediators of perceived maternal parenting self-efficacy which are based upon the sources of information which may mediate efficacy beliefs. The results suggest that the Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire has good initial psychometric properties for its use with mothers of hospitalised preterm neonates and the overall findings of Phase 1 are discussed in terms of Bandura's self-efficacy theory

5.2 - INTRODUCTION

In the previous chapters (2 and 4) it was established that mothers experience a significantly stressful time whilst in the neonatal unit and must adapt in order to create a sound basis for future mother-child interactions. It is during the hospitalisation of their baby that mothers of preterm neonates begin a uniquely different start to parenting than women of fullterm born babies. At this point, fundamental judgements will be made about what a mother believes she is capable of doing for and with her baby which may shape all her future interactions with the child. The importance of mothers' perceptions of their competency for parenting (maternal self-efficacy) was discussed in detail in the previous chapter. Also, it was suggested that a mothers' efficacious beliefs are the result of chiefly four sources (mediators) of efficacy information, namely, Enactive Mastery Experience, Vicarious Experience, Verbal Persuasion, and Physiological and affective states. Furthermore, it was established through a review of the literature that there is no reported data exploring mothers' efficacious beliefs during their time in the neonatal unit. Therefore, knowing whether or not a mother of a hospitalised preterm feels competent within the various sub domains of parenting would allow health care professionals to pinpoint areas where mothers are likely to require further support. The current chapter explores the necessity for a robust questionnaire to measure parents' perceptions of their ability to understand and care for their hospitalised preterm newborn and which is sensitive to the various levels and tasks within parenting at this time. Therefore, the following sections of the introduction offer a detailed review of pre-existing maternal self-efficacy measures and the types of efficacy they measure (e.g. task-specific), why these existing measures may not be appropriate to explore mothers' efficacy beliefs in the neonatal unit and therefore the need for a new measure of maternal efficacy.

(i) - Maternal/Parenting Self-Efficacy measures

There is substantial variability in both the conceptualization and measurement of the maternal/parental Self-Efficacy construct. Coleman and Karraker (2000) clearly illustrate this point and identify four distinct formulations of efficacy theory (Task-Specific, Domain-Specific, Domain-General and General Self-Efficacy) which have important implications for its measurement. Firstly, Task-Specific Self-Efficacy refers to a person's perceptions in their ability to successfully complete a specified task within a specific domain e.g. a mother's ability to feed her baby. There are several examples of Task-Specific Self-Efficacy scales within the literature and these include the Breastfeeding Self-Efficacy scale (Dennis and Faux, 1999) and Childbirth Self-Efficacy Inventory (CBSEI) (Lowe, 1993). Secondly, Domain-Specific Self-Efficacy refers to all of those tasks which make up that particular domain of functioning. For example, in the case of parenting, we would expect parents to have perceptions in their ability to feed, clean and soothe their baby, among others. Thirdly, Domain-General (also sometimes referred to as Global) Self-Efficacy measures a person's efficacy beliefs in one domain of functioning but does not specify the tasks or activities under which they must be performed (Bandura, 1997, p49). Finally, General Self-Efficacy measures broad efficacy beliefs across several varied domains of functioning. However, Bandura (1997, p48) argues that General or Domain-General scales suffer from a "...questionable relevance to the domain of functioning being explored," and should be avoided as they lack the predictiveness of domain- or task-specific measures.

Moreover, a literature search was conducted for this study to find those scales measuring maternal / parenting Self-Efficacy (using the following databases: Allied &

Complementary Medicine - 1985 to date, British Nursing Index - 1994 to date, CINAHL - 1982 to date, DH-DATA - 1983 to date, EMBASE - 1974 to date, King's Fund - 1979 to date, MEDLINE - 1996 to date and PsycINFO - 1806 to date). The main terms '*maternal*' or '*parenting*' and '*self-efficacy*,' were used within all searches in conjunction with different terminology for (1) premature or fullterm babies ('*preterm*,' '*premature*,' '*premature baby*,' or '*fullterm*') and (2) self-report measures ('*measurement*,' '*questionnaire*,' '*scale*,' or '*tool*'). Please note that the terms '*measurement*,' '*questionnaire*,' '*scale*' and '*tool*' are all used interchangeably and synonymously within this article.

A total of 10 maternal/parental efficacy scales were found through the search outlined above and in conjunction with those identified within the reviews by Coleman and Karraker (1997), and de Montigny and Lacharite (2005). Just over half of the 10 scales (6) were based upon Bandura's (1977) Self-Efficacy theory. The other 4 scales referred to parents' perceptions of their parenting ability, self-agency or efficacy but appeared to make no reference to Self-Efficacy theory as postulated by Bandura (1977). A brief description of both Bandurian and Non-Bandurian efficacy scales follows (Some of this information is summarised in Table 5.1).

(ii) - Bandurian Self-Efficacy scales

(a) The Toddler Care Questionnaire (TCQ; Gross and Rocissano, 1988)

The TCQ was the first Bandurian scale developed to exclusively measure maternal Self-Efficacy and consists of 36 items on a 5-point Likert scale. The authors recruited a total sample of 50 mothers of non-hospitalised 1-3 year olds to test the internal and external reliability of the measure (Alpha = 0.93 [pilot] and 0.95, Test-retest = 0.87). However, no

evidence was given on the scales validity. The authors did report that the TCQ was designed for focusing nursing interventions with mothers who possess low levels of confidence in parenting a toddler. Furthermore, Gross and Rocissano refer to maternal Self-Efficacy as synonymous with the word confidence which is conceptually ambiguous. However, the distinction between maternal Self-Efficacy and other related concepts is not within the remit of this paper (please see Bandura, 1997; and de Montigny and Lacharite [2005]).

(b) Infant Care Survey (ICS; Froman and Owen, 1989)

The ICS consists of 51 items each measured on a 5-point Likert scale and was developed with a sample of 142 mothers and fathers of non-hospitalised newborns up to 1 year of age. The authors state that the Face validity of the scale was assessed by a panel of nursing staff and that internal reliability was significant ($\text{Alpha} = 0.975$). Factor analyses results were reported to tap a single unifying construct. Similar to the TCQ the ICS is considered to be a domain-general measure of maternal Self-Efficacy. Furthermore, the items on the ICS are not individually worded statements, instead mothers are asked to rate how confident they feel about carrying out each of a series of behaviours e.g. ‘knowing immunisation schedules’. In addition, Froman and Owen (1989) note that their scale would be of particular value to health-care visitors who may study the longitudinal relationship between parents’ efficacy beliefs and their health-care actions toward their infant within the first year of life.

(c) Parenting Self-Efficacy scale (Wells-Parker et al., 1990)

The parenting Self-Efficacy scale developed by Wells-Parker and colleagues (1990) consists of just 5 items and is part of a larger questionnaire to measure Occupation, Economic and Marriage Self-Efficacy using a 7-point scale. This type of scale represents a more general Self-Efficacy measure. A total of 122 women were recruited in this study (81% having children under the age of 21) in which the the internal reliability (Alpha = 0.77) and Construct Validity were tested (Factor Analyses and correlates with other scales). The authors report that their scale may be useful in understanding coping and experienced stress in various life roles.

(d) Maternal efficacy questionnaire (MEQ, Teti and Gelfand, 1991)

The Maternal efficacy questionnaire developed by Teti and Gelfand (1991) comprises of 10 items each measured on a 4-point Likert scale. The measure developed by these authors is domain-specific and contains items such as, ‘how good do you feel you are at feeding, changing, and bathing your baby?’ The authors of this measure recruited a sample of 86 mothers (48 who were depresses) of 3-13 month old children and tested the internal reliability (Alpha = 0.79 [pilot] and 0.86) and Concurrent Validity ($r = -0.75$). The authors of this study suggest that maternal Self-Efficacy is a mediator between maternal competence and psychosocial variables and may play a crucial role in determining parenting behaviour.

(e) Parent expectations survey (PES; Reece, 1992)

The PES consists of 24 items measured on a 10-point scale and was initially developed and tested with 82 primiparas mothers of 1-3 month olds. The authors of this scale report the internal reliability (Alpha = 0.91-0.92), Content validity, Concurrent validity ($r=0.46-0.64$)

and some evidence is presented regarding the Predictive validity. This measure is considered to be domain-specific and contains items such as, 'I can manage the feeding of my baby'.

(f) Parental efficacy questionnaire (Kendall and Bloomfield, 2005)

This Parental efficacy questionnaire developed by Kendall and Bloomfield (2005) consists of 82 items, 9 subscales (Affection/emotion, Play, Empathy/understanding, Routines/goals, Control, Boundaries, Pressures, acceptance, and Learning/Knowledge) and is measured on a 10-point scale. Initial development of this questionnaire used focus groups with both parents and professionals to construct appropriate items and subscales. The authors recruited a total of 58 mothers and 5 fathers of children up to 6 years of age. The internal (Alpha = 0.95 – Total Scale and between 0.81-0.93 across subscales) and external reliability (Test-retest = 0.58-0.88 across subscales) was reported but no evidence was presented in terms of the validity. Similar to the PES and MEQ this measure is considered to be a domain-specific Self-Efficacy scale. The authors suggest that their tool can be used across different client groups and in the evaluation process of effective parenting programmes.

(iii) - Non-Bandurian efficacy scales

(a) Parenting Sense of Competence Scale (PSOC; Gibaud-Wallaston and Wandersman, 1978) adapted by Johnston and Marsh (1989)

The PSOC is perhaps the most widely used of all parenting competence or efficacy scales and examines both parental satisfaction (9 items) and efficacy (8 items) measured on a 6-point scale. The efficacy section of the questionnaire is most like a Domain-general Self-Efficacy scale and contains items such as, 'Being a parent is manageable, and any

problems are easily solved.’ The internal and external reliability are reported (Alpha = 0.72, test-retest = 0.46-0.82) and there is some evidence for Concurrent Validity ($r = 0.48$). A two factor structure has recently been reported by Ohan et al. (2000) with a sample of 110 participants.

(b) Parenting Stress Index (PSI; Abidin, 1983)

The PSI contains 13 items measured on a 6-point scale and forms part of a larger measure designed to evaluate the relative magnitude of stress in the parent-child system. Similar to the PSOC the PSI is also considered to be a Domain-general Self-Efficacy scale. The internal (Alpha = 0.74) and external reliability ($r=0.69$) for the parenting subscale is adequate. The content, construct and criterion related validity are reported by Abidin in depth in the manual.

(c) Maternal Confidence Questionnaire (MCQ; Parker and Zahr, 1985)

The MCQ is a tool which consists of 14 items measured on a 5 point scale and was the only scale that was developed and tested with mothers of preterm babies at 4 and 8 months of age. The internal and external reliability are acceptable (Alpha = 0.89, Test-retest = 0.69) as was the Concurrent Validity ($r = 0.68$ and 0.53). The MCQ is a Domain-specific questionnaire and includes items such as, ‘I can feed my baby adequately.’

(d) Maternal Self-Efficacy measure (Fish et al., 1991)

The information that the authors give about this scale makes it difficult to determine whether it was based upon Self-Efficacy theory (Bandura, 1977) or another concept of parenting efficacy. However, this scale consists of 18 items, 3 subscales (un-named) and is measured on a 6-point scale. This measure was administered to 83 mothers as part of a

longitudinal study and prior to a 5 month lab visit. The internal reliability was adequate (Alpha = 0.82 – Total Scale and between 0.70-0.76 across subscales) but no evidence was presented regarding the validity of the measure.

(iv) - Overview of Bandurian and Non-Bandurian Scales

Following the brief description of the scales above 4 important facts should be noted. Firstly, none of the scales reviewed here have been designed and tested with mothers of hospitalised newborns. Secondly, with the exception of Parker and Zahr (1985), none of the scales reviewed have been developed and tested for use with mothers of preterm babies. Thirdly, Bandura (1997) strongly recommends that measures of Self-Efficacy should be Domain-specific rather than Domain-General or General measures. Only four of the scales reviewed could be classed as Domain-specific measures; namely Parker and Zahr (1985), Teti and Gelfand (1991), Reece (1992) and Kendall and Bloomfield (2005). Finally, it is clear that the majority of the scales have tested a very limited number of the psychometric properties. Moreover, whilst all of the scales reported here measured internal reliability, only half reported external reliability (5), less than half conducted factor analyses (4) or concurrent validity (3), and only a few reported face (1) or content validity (2) or the use of focus groups (1). Therefore, overall this review indicates that there is no domain-specific maternal parenting Self-Efficacy scale that has been specifically developed and robustly tested for use with mothers of hospitalised preterm neonates. Thus, the purpose of this article is to report the preliminary findings and psychometric testing of the Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire.

Table 5.1. Measures of Maternal and Parenting Efficacy

Scale and Author	Infant Age Group (Sample Size)	Type of Scale (e.g. Domain-Specific)	Items (Subscales)	Reliability		Validity	Criterion-related Validity		Construct Validity		
				IR	ER	FV/CV/FG	Conc	Pred	Conv	Div	FA
<i>Bandurian Efficacy Scales</i>											
<i>Toddler Care Questionnaire</i> (Gross and Rocissano, 1988)	1-3 years (n=50)	Domain-General	36 (-)	X	X	-	-	-	-	-	-
<i>Infant Care Survey</i> (Froman and Owen, 1989)	0-12 months (n=142)	Domain-General	51 (6)	X	-	FV	-	-	-	-	X
<i>Parenting self-efficacy scale</i> (Wells-Parker et al., 1990)	any age (n=122)	General	5 (-)	X	-	-	-	-	-	-	X
<i>Maternal efficacy questionnaire</i> (Teti and Gelfand, 1991)	3-13 months (n=86)	Domain-Specific	10 (-)	X	-	-	X	-	-	-	-
<i>Parent Expectations Survey</i> Reece (1992)	1-3 months (n=82)	Domain-Specific	24 (-)	X	-	CV	X	X	-	-	-
<i>Parental Efficacy Questionnaire</i> (Kendall and Bloomfield, 2004)	0-6 years (n=63)	Domain-Specific	82 (9)	X	X	FG	-	-	-	-	-
<i>*Perceived Maternal Parenting Self-Efficacy Questionnaire (PMP S-E)</i>	0-1 month (n=160)	Domain-Specific	20 (4)	X	X	FV/CV	-	-	-	X	X
<i>Non-Bandurian Efficacy scales</i>											
<i>Parenting Sense of Competence Scale</i> (Gibaud-Wallaston and Wandersman, 1978)	-	Domain-General	8 (-)	X	X	-	X	-	-	-	X
<i>Parenting Stress Index</i> (Abidin, 1983)	-	Domain-General	13 (-)	X	X	CV	X	-	-	X	X
<i>Maternal Confidence Questionnaire</i> (Parker and Zahr, 1985)	4-8 months, Preterm	Domain-Specific	14 (-)	X	X	-	X	-	-	-	-
<i>Maternal self-efficacy measure</i> (Fish et al., 1991)	5 months, Fullterm (n=83)	Unclear	18 (3)	X	-	-	-	-	-	-	-

*The scale developed in this study

Key: IR = Internal Reliability; ER = External Reliability; FV = Face Validity; CV = Content Validity; FG = Focus Group; Conc = Concurrent Validity, Pred = Predictive Validity, Conv = Convergent Validity; Div = Divergent Validity; FA = Factor Analysis

5.3 - METHOD

(i) - Initial Development of the Perceived Maternal Parenting Self-Efficacy

(PMP S-E) questionnaire

(a) - Item Generation

Initially, items for the Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire were generated through (1) a review of the literature, (2) the expertise and specialist knowledge of the authors, and (3) from adaptation and further development of the two most relevant scales with aims similar to our own research; namely, Parker and Zahr's (1985) Maternal Confidence Questionnaire; and Teti and Gelfand's (1991) Maternal efficacy questionnaire. A review of self-efficacy literature and key Bandurian texts (1977, 1997) suggested that all self-efficacy items/questions should be phrased in a specific way. In particular, Bandurian efficacy scales should contain items that follow 2 key rules. Firstly, items should be task specific (see 5.2 [i] above). Secondly, items should be phrased in terms of whether a person 'can do' or believes that they are good at performing a particular activity or task. With this in mind, items on Zahr, and Teti and Gelfand's questionnaires³ were extrapolated to the context of the neonatal unit and the kinds of activities and tasks that mothers may partake in during the neonatal period. A total of 100 items were initially generated through this process. Items that were either too similar or considered inappropriate were eliminated and were condensed into 25 questions.

The 25 items were then grouped into four conceptually unique subscales of successful parenting and were as follows; Care Taking Procedures (defined as a mother's perceptions

³ Please note that these authors developed their questionnaires for use with toddlers many months old, in the home environment and not hospitalised preterm newborns.

of her ability to perform the activities/tasks related to the baby's basic needs, e.g. feeding), Evoking Behaviour(s) (defined as a mother's perceptions of her ability to elicit a change in the baby's behaviour, e.g. soothing the baby when upset), Reading Behaviour(s) or Signalling (defined as a mother's perceptions of her ability to understand and identify changes in her baby's behaviour, e.g. I can tell when my baby is sick), and Situational Beliefs (this tapped mothers' beliefs about their ability to judge their overall interaction with their baby). Responses to each item were recorded on a four point Likert scale ranging from 'strongly disagree' (score 1) to 'strongly agree' (score 4) and were chosen on the basis of similar scales measuring Self-Efficacy (e.g. Teti and Gelfand, 1991, Dennis and Faux, 1999). It should also be noted that a low score on this scale indicates a lower sense of perceived maternal parenting Self-Efficacy.

(b) - Pilot Study (n=37)

The PMP S-E questionnaire (25 items) was then piloted with a sample of 37 mothers of relatively healthy hospitalised preterm neonates to test the initial psychometric properties of the scale and whether further revision was necessary. Preliminary analyses revealed that the internal reliability of the questionnaire was statistically significant ($\text{Alpha} = 0.78$) indicating an adequate level of internal consistency. However, item analysis revealed that there were 5 poor items, which was confirmed later by item-whole correlations and these were then removed from the scale.

(c) - Content Validity (n=10)

In order to assess the content validity of the PMP S-E questionnaire the remaining 20 items were then presented to 10 mothers of relatively healthy hospitalised preterm neonates.

Participants were asked to rate whether (1) they felt each item related to parenting within

the context of the neonatal unit, and (2) each item was clear and easy to understand. All of the questionnaire items were reported to fulfil the above criteria.

(ii) - Main Study (N=160)

Following the pilot study it was decided to further test the Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire with a new cohort and larger sample in order to examine the internal/external reliability and construct validity.

Design

This is a prospective survey using a mixed (between/within and correlational) design.

Aim

The primary aim of this study was to produce a reliable and valid self-report questionnaire that would measure efficacy expectancy of mothers parenting hospitalised preterm neonates.

Participants

An opportunity sample of 165 relatively healthy and hospitalised mother-preterm dyads were recruited from two Neonatal Special Care Baby Units in The Midlands area. In order to examine whether any differences existed between the participants recruited from either hospitals used in this study an unrelated t-test was employed. The results indicated that the sample used from either hospital did not differ between (1) babies' birthweight ($t= 1.219$, $df= 158$, $p= 0.225$), gestation age ($t= 0.716$, $df= 158$, $p= 0.475$) or postnatal age ($t= 1.713$, $df= 158$, $p= 0.089$) and (2) maternal age ($t= 1.405$, $df= 158$, $p= 0.162$) or Self-Efficacy

scores ($t = -0.276$, $df = 158$, $p = 0.783$); thus the samples were pooled. There were a total of five mothers (3%) who declined to participate in this study. A majority of the sample were white (86%) and first time mothers (56%); with a minority who either worked (44%) or smoked (31%) during their pregnancy; of those that worked 32% smoked.

Mothers were recruited to the study if they had given birth to a preterm baby (<2.5kg in birthweight [BW] and <37 weeks gestational age [GA]) and who was within the neonatal period (the first 28 days of postnatal life). Mothers were not recruited if they did not speak English (as the scale was only developed in English and no finance was available for translation at this time), or if their baby had any genetic anomalies, congenital malformations, gastrointestinal disturbances, central nervous system dysfunction, were medically unstable, receiving parenteral nutrition only, or receiving oxygen therapy. The sample characteristics for this group are shown in Table 5.2 below.

Table 5.2. Mean, standard deviation (S.D.), range and modal values for maternal/child characteristics.

Factor	Mean (S.D.)	Range	Mode
<i>Birth weight (Kg)</i>	1.61 (0.47)	0.49 – 2.48	1.5
<i>Gestation age (Weeks)</i>	31.89 (2.57)	25 – 36	32
<i>Postnatal age (Days)</i>	10.05 (6.38)	0 – 24	9
<i>Maternal age (Years)</i>	28 (5.92)	15 – 42	26

Materials

The final version of the Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire consisted of 20 items (scoring ranges between 20–80); with four theorised subscales (outlined above). The questionnaire took around 10 minutes to complete. In addition, the Maternal Self-Report Inventory (Shea and Tronick, 1988) and the Maternal Postnatal Attachment scale (Condon and Corkindale, 1998) were used to test the divergent validity.

Procedures/Data analyses

Once hospital ethics committee approval had been given, the study was explained verbally (and via a Patient Information Sheet) to mothers, and written consent was requested. All 160 mothers recruited to the study were used to test the construct validity (with the exception of divergent validity, n=60) and internal reliability of the PMP S-E questionnaire and 100 of these were additionally asked to complete the questionnaire at two separate time points (external reliability, separated by a period of 10 days). Additional information collected from mothers included maternal and infant characteristics e.g. Maternal age, years in education, Partner status, type of delivery, type of feeding, and Baby birthweight, gestation age, and postnatal age. These details were taken to examine whether mothers within different hospitals or groups came from comparable populations. In addition, information was also taken about maternal parity, self-reported visiting (where mothers estimated the average daily amount of time [in hours] they visited their baby in the neonatal unit), self-reported ratings of support (mothers rated how supported they felt by their partners, other family or friends, and hospital staff on a scale from 1-10 [1 being the lowest level of support and 10 being the highest]) and whether they had had a previous preterm delivery. These details were taken because they allowed the author to assess

several theoretical dimensions of self-efficacy theory within this population group. In particular, as outlined in the introduction of this chapter and in Chapter 4, maternal efficacy beliefs derive from four principal sources of information. Several of these sources of information were measured through the questions asked above i.e. Enactive Mastery Experience (e.g. Parity or previous birth of a premature baby), Vicarious Experience (No. of hours spent visiting their baby), Verbal Persuasion from influential others (self-reported ratings of support).

Data were then analysed using an Unrelated t-test, Cronbach's Coefficient Alpha, Pearson's Product Moment, One-way Factorial ANOVA, Factor Analysis and the version of the proportion / percentage of agreement test as outlined by Nevill et al. (2001). For those readers who are unfamiliar with the latter test they should note the following; it is similar to test-retest reliability but whereas the Pearson's test identifies if there is a good relationship between pre and post test responses it is said to be powerless in identifying phenomena such as systematic bias. Thus, to avoid the latter Nevill et al. (2001) recommend an examination of the individual responses of participants between pre and post test for each item and that scores should vary by no more than +/- 1 with at least 90% of participants scoring within this range.

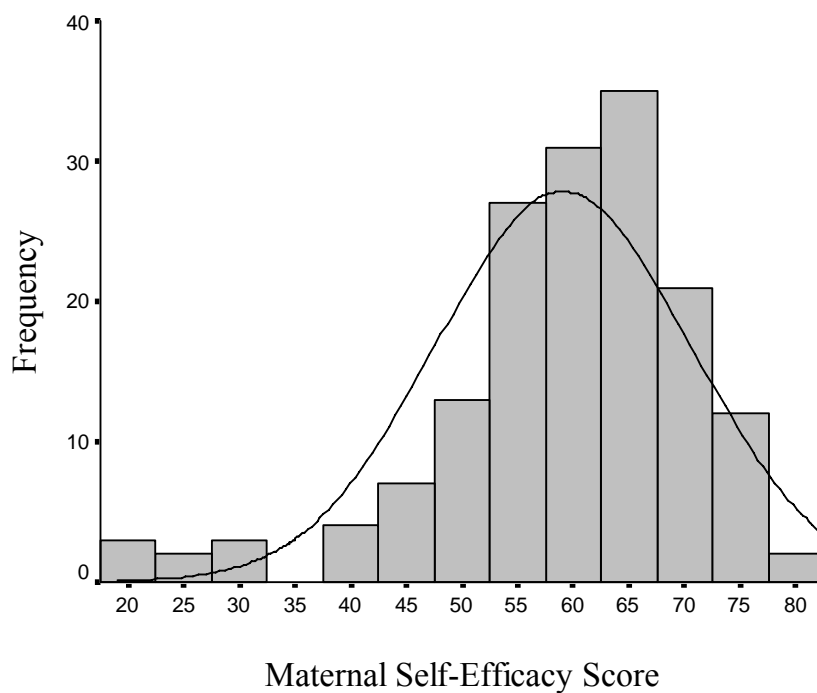
5.4 - RESULTS

Section 1 - design and testing of a questionnaire to measure maternal parenting self-efficacy

This study aimed to produce a reliable and valid self-report questionnaire that would measure efficacy expectancy of mothers parenting hospital

lised preterm neonates. Overall, there was a large variability found in maternal Self-Efficacy with scores on the PMP S-E (Perceived Maternal Parenting Self-Efficacy) questionnaire ranging from 20-76. Figure 1 (below) shows the distribution of maternal parenting Self-Efficacy scores during the neonatal period. The overall study population mean Self-Efficacy score was 59 (s.d. = 11.44), the median was 61, and the mode was 59. The degree of spread of the scores would seem to suggest that the PMP S-E questionnaire has a reasonable degree of discrimination despite a slight negative skew.

Figure 5.1 -. Distribution of Maternal Parenting Self-Efficacy Scores



(i) Validity

(a) Construct Validity

The PMP S-E questionnaire was assessed for construct validity using the following three methods: factor analysis, comparison of contrasted groups and divergent-construct validity (also known as discriminant). Please note, Froman (2001) recommends that Factor analyses should be conducted with a minimum of 5 participants per item. This means that the current sample should be made up of at least 100 participants.

(b) Factor Analysis (n=160)

In the first instance, a factor analysis was conducted using a principal components analysis in combination with a varimax rotation yielding 4 factors with eigen values exceeding 1. Following this initial assessment items above 0.3 were assigned to factors dependent upon (1) the overall magnitude of the item loading on one factor versus another, and (2) the conceptual fit of the item on that factor / subscale (please see table 5.3 below). Factor 1 had an eigen value of 8.235 and explained 41% of the variance, Factor 2 had an eigen value of 1.496 and explained 7.48% of the variance, Factor 3 had an Eigen value of 1.314 and explained 6.57% of the variance, and Factor 4 had an eigen value of 0.255 explaining 6.27% of the variance. The emergence of these four distinct factors were congruent with the corresponding four subscales theorised a priori and which had been based upon the review of the literature, relevant scales and through the authors specialist knowledge.

(c) Comparison of Contrasted Groups (n=160)

The second method to examine the construct validity of the PMP S-E questionnaire was to contrast those groups of participants who were thought to be either high or low in accordance with the construct being tested. Bandura (1997) suggests that Self-Efficacy beliefs derive from four principle sources of information; Enactive Mastery Experience (a persons' previous experience with a task or activity), Vicarious Experience, Verbal

Persuasion, and Physiological and Affective States; the first of which is said to be the most influential because it provides the most authentic evidence of whether a person has whatever it takes to succeed (Bandura, 1997). Therefore, it was hypothesised that multiparous women would have significantly higher Self-Efficacy than primiparous women. A one-way factorial ANOVA revealed that women who had previously given birth to a child (Mean = 61.39, s.d. = 11.62) did indeed possess significantly greater Self-Efficacy ($F[1,159] = 5.511$; $p < 0.02$, $\eta^2 = 0.03$) than women who had given birth for the first time (Mean = 57.18, s.d. = 11.01). To investigate the matter further the Self-Efficacy of those women who had previously given birth to fullterm babies were compared with those who had given birth previously to a preterm baby. Therefore, it was hypothesised that mothers who had previously given birth to a preterm baby would have a significantly higher Self-Efficacy than the women who had not. However, a one-way factorial ANOVA revealed that women with a previous preterm baby (mean=62.96, s.d.=11.44) did not show significantly higher Self-Efficacy ($\eta^2 = 0.07$, observed power = 0.085) than those women with a previous fullterm baby (mean=64.46, s.d.=6.64).

(d) Divergent Validity (n=60)

The final method used to investigate construct validity was to test whether the scores on the PMP S-E questionnaire were unrelated to those on tests and measures of unrelated constructs (divergent-construct validity). As predicted the PMP S-E demonstrated significant but weak correlations with the Maternal Self-Report Inventory (Shea and Tronick, 1988; $r=0.4$, $p < 0.05$) and the Maternal Postnatal Attachment scale (Condon and Corkindale, 1998; $r=0.31$, $p < 0.01$)

Table 5.3 Factor analysis loadings and patterns of scoring on the Perceived Maternal Parenting Self-Efficacy (PMP S-E) tool for all subscales and items.

Item No.	Item	Overall Population Responses/Patterns of scoring [frequency (%)]				Factor Analysis Loading
		Strongly Disagree	Disagree	Agree	Strongly Agree	
Factor 1. Care taking procedures						
16	I am good at keeping my baby occupied.	29 (18.1)	21 (13.1)	94 (58.8)	16 (10)	.40
17	I am good at feeding my baby.	13 (8.1)	10 (6.3)	90 (56.3)	47 (29.4)	.77
18	I am good at changing my baby.	4 (2.5)	8 (5)	78 (48.8)	70 (43.8)	.69
19	I am good at bathing my baby.	41 (25.6)	26 (16.3)	59 (36.9)	34 (21.3)	.73
Factor 2. Evoking behaviour(s)						
5	I can make my baby happy.	6 (3.8)	10 (6.3)	97 (60.6)	47 (29.4)	.46
8	I can make my baby calm when he/she has been crying.	6 (3.8)	13 (8.1)	86 (53.8)	55 (34.4)	.73
9	I am good at soothing my baby when he / she becomes upset.	4 (2.5)	10 (6.3)	91 (56.9)	55 (34.4)	.82
10	I am good at soothing my baby when he / she becomes fussy.	15 (9.4)	16 (10)	94 (58.8)	35 (21.9)	.69
11	I am good at soothing my baby when he / she continually cries.	20 (12.5)	20 (12.5)	84 (52.5)	36 (22.5)	.65
12	I am good at soothing my baby when he / she becomes more restless.	14 (8.8)	13 (8.1)	98 (61.3)	35 (21.9)	.63
14	I am good at getting my babies attention.	11 (6.9)	21 (13.1)	97 (60.6)	31 (19.4)	.58

Note: Continued on following page

Table 5.3 Continued...

Factor 3. Reading behaviour(s) or signalling						
1	I believe that I can tell when my baby is tired and needs to sleep.	15 (9.4)	8 (5)	83 (51.9)	54 (33.8)	.41
2	I believe that I have control over my baby.	5 (3.1)	39 (24.4)	81 (50.6)	35 (21.9)	.65
3	I can tell when my baby is sick.	10 (6.3)	30 (18.8)	92 (57.5)	28 (17.5)	.64
4	I can read my baby's cues.	9 (5.6)	22 (13.8)	112 (70)	17 (10.6)	.61
13	I am good at understanding what my baby wants.	14 (8.8)	33 (20.6)	96 (60)	17 (10.6)	.49
15	I am good at knowing what activities my baby does <u>not</u> enjoy.	24 (15)	33 (20.6)	75 (46.9)	28 (17.5)	.60
Factor 4. Situational Beliefs						
6	I believe that my baby responds well to me.	3 (1.9)	10 (6.3)	80 (50)	67 (41.9)	.69
7	I believe that my baby and I have a good interaction with each other.	5 (3.1)	13 (8.1)	86 (53.8)	56 (35)	.64
20	I can show affection to my baby.	3 (1.9)	0 (0)	48 (30)	109 (68.1)	.74

(ii) - Reliability

(a) Internal Reliability (n=160)

The Cronbach's Coefficient alpha was used to calculate the internal consistency for the PMP S-E questionnaire and was statistically significant (0.91); exceeding the recommended .70 for new instruments (Nunnally and Bernstein, 1994; Bland and Altman, 1997). The questionnaire demonstrated no significantly higher alpha values if any item were deleted from the scale. In addition, item-whole correlation revealed that all items significantly correlated with participants' total scores (ranging from 0.3-0.77).

(b) External Reliability (n=100)

To test the external reliability of the PMP S-E questionnaire, mothers completed the scale at two time points during the neonatal period. The mothers who fitted the inclusion/exclusion criteria for the study were asked to complete the questionnaire once on the day of recruitment and then again 10 days later. Clark-Carter (1997, p27) notes that measures with good reliability will produce a very similar result between the two time points tested. Thus, test retest reliability using Pearson's Product Moment was strongly correlated between the two time points ($r^s = 0.96$, $p < 0.01$). Mothers' mean Self-Efficacy score for time 1 was 58.51 (s.d. = 12.57) and 59.41 (s.d. = 12.50) at time 2. This finding was replicated across all four subscales: Care taking procedures ($r^s = 0.92$, $p < 0.01$); Evoking behaviour(s) ($r^s = 0.92$, $p < 0.01$); Reading behaviour(s) or signalling ($r^s = 0.93$, $p < 0.01$); and Situational Beliefs ($r^s = 0.88$, $p < 0.01$). In addition, Nevill et al.'s (2001) percentage/proportion of agreement test identified that all items on the Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire were above the recommended 90% threshold and within a range of +/- 1 from test to re-test score (See table 4 below). Also, it should be noted that there were no significant differences between mothers' Self-Efficacy

scores and the number of weeks after birth that they completed the questionnaire ($\eta^2 = 0.015$, observed power = 0.21).

Table 5.4 - Proportion (frequency) and percentage of agreement for all items on the PMP S-E questionnaire.

Item No.	PA +/- 1 (%)	PA (%)	Item No.	PA +/- 1 (%)	PA (%)
<i>1</i>	90 (90)	69 (69)	<i>11</i>	95 (95)	56 (56)
<i>2</i>	92 (92)	66 (66)	<i>12</i>	92 (92)	52 (52)
<i>3</i>	91 (91)	53 (53)	<i>13</i>	93 (93)	57 (57)
<i>4</i>	92 (92)	58 (58)	<i>14</i>	92 (92)	61 (61)
<i>5</i>	93 (93)	62 (62)	<i>15</i>	90 (90)	59 (59)
<i>6</i>	90 (90)	67 (67)	<i>16</i>	91 (91)	63 (63)
<i>7</i>	94 (94)	68 (68)	<i>17</i>	93 (93)	68 (68)
<i>8</i>	91 (91)	61 (61)	<i>18</i>	90 (90)	56 (56)
<i>9</i>	91 (91)	64 (64)	<i>19</i>	90 (90)	60 (60)
<i>10</i>	90 (90)	54 (54)	<i>20</i>	94 (94)	54 (54)

Section 2 - The potential mediators of perceived maternal parenting self-efficacy

As outlined in chapter 4 there are four proposed sources from which people are said to formulate their self-efficacy beliefs (Enactive Mastery Experience – prior experience, Vicarious experience –time spent on task, Verbal persuasion from influential others and physiological and affective states; the first which is said to have the most affect upon

efficacious beliefs). In the present section of the current chapter it is the sources of self-efficacy that will be investigated as the main mediators to the formation of efficacy beliefs (with the exception of physiological and affective state which was not measured in this study). Data collected from the participants recruited in section 1 of this chapter also included information about mother parity (how many other children mothers had), how much they visited their baby (self-reported visiting procedure) and self-reported ratings of whether they felt supported on a scale of 3-30 (which comprised 3, 10-point scales for Partner, Professionals and relatives). These 3 individual items were taken as measurements of 3 of the 4 sources of self-efficacy information (i.e. Enactive Mastery Experience, Vicarious Experience and Verbal Persuasion [in the form of self reported ratings of social support] respectively). Initial correlations indicated that PMP S-E score was significantly correlated with (1) mothers prior experience with childbirth ($r=0.184$, $p=0.02$) and (2) Mothers' visiting procedure ($r=0.215$, $p=0.006$) but not mothers self-reported social support. The significant correlations are illustrated in Figures 1 and 2 below. It was not, however, surprising that social support was not correlated with mothers PMPS-E score as 75% of the study population (124[75%] / 160[100%]) scored overall between 25 and 30 (mean=27 [s.d.=4.2]) which was skewed towards feeling completely supported by all people (Partner, professional and relatives) during their time in the neonatal unit. The figures 5.1 and 5.2 show the relationship between (1) Maternal parity (in this case whether mothers had previously given birth or not), (2) Maternal visiting procedure (divided into those who visited ≤ 4 hours [group 1], between 5-8 hours [group 2] and between 9-12 hours [group 3]) and PMP S-E score. Figure 5.1 is a positive correlation and shows that the more children mothers had (or higher parity), the higher their maternal self-efficacy was likely to be. Figure 5.2, also a positive correlation, shows that the more

time mothers spent with their baby in the hospital per day, the higher their self-efficacy was.

Figure 5.2. Correlation of mothers' prior experience with childbirth and their self-efficacy scores.

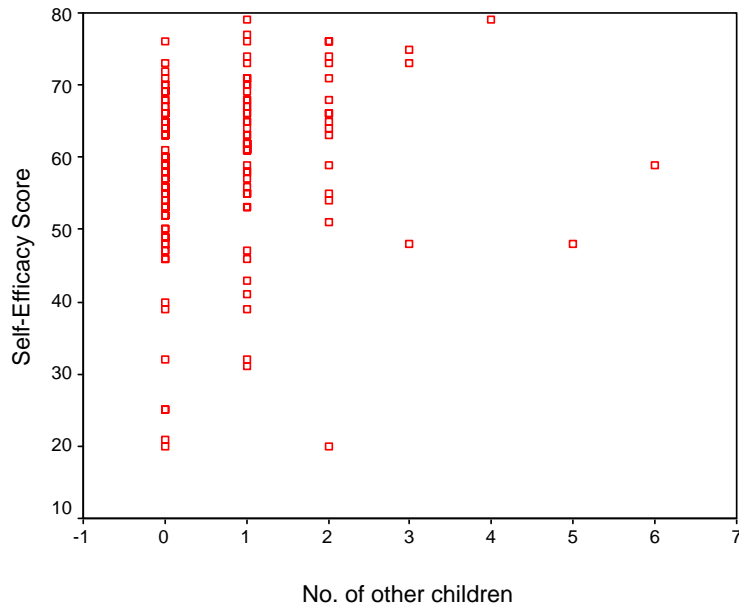
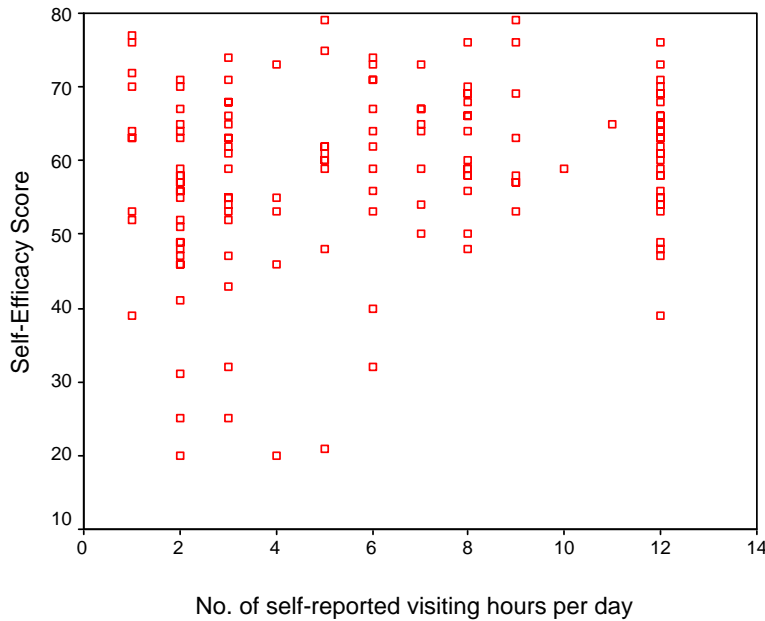


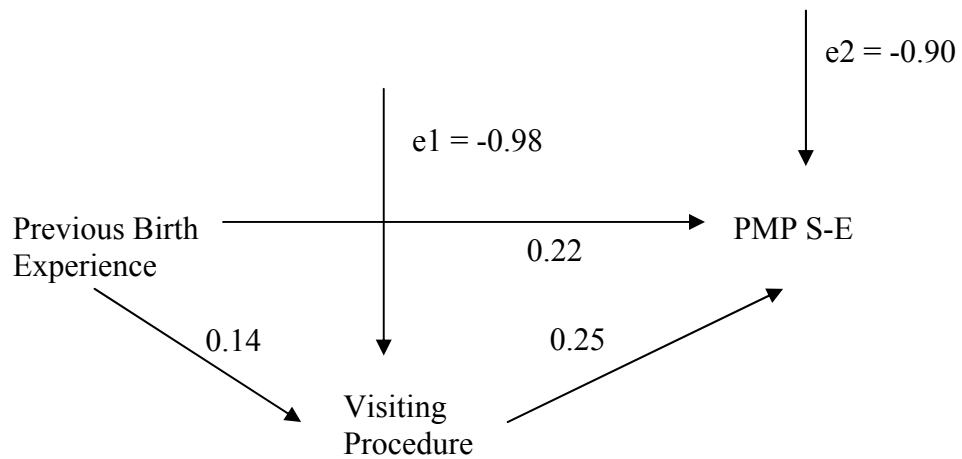
Figure 5.3. Correlation of self-reported visiting procedure and their self-efficacy scores.



Moreover, the data from section 1 of this Chapter (that self-efficacy was significantly different between those mothers for whom it was their first baby and those for whom it was not) in conjunction with the significant correlations above it was decided to explore these relationships further through multivariate analyses; specifically Path Analysis. Path analysis was chosen because it allows researchers to explore and understand potential relationships between variables both directly and indirectly and provide information about how one variable may predict another (Clark-Carter, 1997). The path analysis in this chapter was based on the assumption that previous experience with childbirth (seen as the most authentic evidence of a person's efficacy beliefs) has the strongest direct relationship influencing overall Perceived Maternal Parenting Self-Efficacy (PMP S-E), and that indirect relationships may also exist from previous childbirth experience to PMP S-E through mothers' Vicarious experience with parenting (visiting procedure). In the path diagram below the variables towards the left are thought to influence variables towards the

right as noted by Howitt and Cramer (2000). The completed path diagram for PMP S-E is below (see figure 5.2). The analysis suggests that there are direct pathways from (1) Previous Birth Experience, and (2) Visiting Procedure, to PMP S-E with no apparent indirect pathways. Furthermore, examination of the ‘effect’ coefficients suggests that even when the coefficients for each direct path to PMP S-E are compared the most significant coefficient is Previous Birth Experience (0.26).

Figure 5.4. Path diagram for PMP S-E with path coefficients



5.5 –DISCUSSION

The 2 main aims of this study were (1) to produce a reliable and valid self-report questionnaire that would measure efficacy expectancy of mothers parenting hospitalised preterm neonates and (2) to investigate the potential mediators of a mother's efficacy beliefs at this time. The results would certainly seem to indicate that the scale has good preliminary psychometric properties for its use with its target population group. In addition, this study has thus far indicated that the Perceived Maternal Parenting Self-Efficacy Questionnaire (PMP S-E) is unique in comparison to other measures of parenting Self-Efficacy (1) in terms of the population group it was designed to be used with and in conjunction with its domain specificity, and (2) the degree to which its psychometric properties have been tested above and beyond all other existing Bandurian Self-Efficacy scales. Moreover, the necessity for the development of the PMP S-E questionnaire, how it differs from existing measures of parenting Self-Efficacy, and the advantages of such a scale to Neonatal Health Psychology (NNHP) and the medical team within a Neonatal Unit are discussed further below.

Moreover, the development of a new scale to measure parenting Self-Efficacy was deemed necessary, firstly, because the majority of scales reviewed in this study measured efficacy expectancy at the 'Domain-General' or 'General Self-Efficacy' level. Bandura (1997, p48) notes that the latter mentioned measures of Self-Efficacy should be avoided as they are said to possess a questionable relevance to the domain of functioning being explored and they often consist of a confounded mixture of items which may also assess the emotional and motivational effects of efficacy beliefs. In contrast, domain-specific measures are said to be much better predictors of a person's behaviour which suggests that the PMP S-E

questionnaire is a more theoretically robust and adequate test for measuring Self-Efficacy theory.

One of the other chief reasons that a new parenting Self-Efficacy scale was necessary was that no other scale had previously been developed and tested for use with mothers of hospitalised preterm neonates. Moreover, whilst there were domain-specific parenting Self-Efficacy scales in existence, these measures were primarily developed and tested with newborn toddlers and children who were no longer hospitalised (Teti and Gelfand, 1991; Reece, 1992; Kendall and Bloomfield, 2004). Indeed, whilst there are undoubtedly some common elements to the parenting of any newborn baby, toddler or child, the parenting of a hospitalised preterm will obviously involve a different repertoire of tasks. Therefore, in line with Self-Efficacy theory our measure aimed to be specific to the tasks, activities and sub-domains of parenting of a hospitalised preterm neonate.

Perhaps the most fundamental difference between the PMP S-E questionnaire and other Domain-Specific measures of Self-Efficacy is the extent to which the psychometric properties have been tested. Evidence from this article and other recent reviews (Coleman and Karraker, 2000) illustrate the limited psychometric testing of existing scales. Moreover, the scale developed in this study demonstrated several psychometric benefits over existing parenting Self-Efficacy measures. Firstly, and at the most basic level, the PMP S-E questionnaire contained clear, understandable and pertinent items relative to the domain of functioning being explored as identified through Content validity. In contrast to measures such as Teti and Gelfand's (1991) maternal efficacy questionnaire which show certain confounded items and that demonstrate questionable validity. For example, item 8 on their measure asks mothers, 'how good do you feel you are at feeding, changing, and

bathing your baby?’ It is clear that whilst this particular item asks mothers about their general caretaking ability it also assesses a variety of different tasks. Moreover, this item may actually represent three separate sub-domains of parenting; feeding, changing and bathing. Thus, mothers may perceive themselves as relatively efficacious at feeding their baby but doubt their ability to bathe or change their newborn. The PMP S-E questionnaire on the other hand clearly contains items which measure just one task or sub-domain of parenting at a time which is a strong advantage.

Secondly, initial psychometric testing of the PMP S-E questionnaire items revealed that internal consistency (internal reliability) of the scale was well above the recommended criterion of .70 alpha for new instruments (Nunnally and Bernstein, 1994) and no significantly higher alpha value were obtained if any item was deleted. However internal consistency is only one part of reliability testing. Thus, the test-retest reliability of the PMP S-E questionnaire was also measured. Moreover, Clark-Carter (1997, p27) notes that measures with good reliability will produce a very similar result between the two time points tested. The test regularly used to measure external reliability is the Pearson Product moment. However, Nevill et al. (2001) argue that the latter test is powerless at identifying phenomena such as systematic bias. This is primarily because correlation coefficients measure the relationship between total scores which have been produced by summing items together. Nevill and colleagues suggest that in the process of summing items to produce a summary statistic/total score there is a danger that poor reliability or stability may be missed. This is because items may average or cancel each other out when summed together which may result in no overall net change in total score and result in systematic scoring biases being overlooked. Therefore, correlations cannot detect individual item score changes from pre- to post-test. Instead, the test advocated by Nevill and colleagues

is a method of checking the proportion/percentage of agreement of each item between test and retest for each participant within a reference value of +/- 1. Therefore, this test allows investigators to see if any one particular item may be unstable as identified by greater numbers of participants scoring outside the reference value range from pre- to post-test. Therefore, in this study the authors examined both ways of testing the external reliability. Moreover, the PMP S-E questionnaire performed significantly in both of the formerly mentioned tests and thus indicated that mothers' answers remained stable over time. However, less than half of the pre-existing Bandurian parenting Self-Efficacy scales examined both forms of reliability.

Thirdly, in-depth analysis of the PMP S-E questionnaire's construct validity indicated that our scale showed significant divergent validity from two other related but separable constructs (Maternal Self-Esteem and Attachment). It is worth noting that no other measure reported measuring this form of validity. Conversely, several of the parenting Self-Efficacy measures did report data on the concurrent validity of their scales (correlates with other measures of Parenting Self-Efficacy). However, the authors of this study were unable to test whether the PMP S-E questionnaire was correlated with other measures of parenting Self-Efficacy (Concurrent validity) or other Self-Efficacy domains (e.g. Convergent Validity). The later tests were not carried out primarily because there was no comparable questionnaire with the one developed in this study and using other scales developed to measure parenting Self-Efficacy of mothers of non-hospitalised toddlers or children would not have been appropriate.

Furthermore, the construct validity was also tested by contrasted group analysis whereby mothers thought to be either high or low on the construct being measured were compared.

As predicted, the results revealed that multiparous women possessed significantly higher self-efficacy than women for whom it was their first child. This finding is in line with Bandura's (1977, 1997) formulations that a person's prior experience with a particular task, in this case parenting, is the most authentic evidence of whether they believe they can succeed or not. In addition, of those mothers who had given birth previously, those who had given birth to other preterms did not possess significantly different self-efficacy scores from those mothers who had previously given birth to fullterms. This would seem to suggest that previous experience with childbirth is significant enough to increase Parenting Self-Efficacy beliefs but no further increase or decrease is evident if that previous experience has resulted in the birth of a preterm or fullterm newborn. However, it is important at this point, whilst discussing the finding of a difference between PMP S-E and previous birth experience, to diverge from the discussion on the reliability/validity of the PMP S-E questionnaire to mention the findings found in section 2 of the results. Moreover, in contrast to the previous finding the relationships between the various sources (mediators) of self-efficacy information and overall self-efficacy beliefs were investigated in depth in section 2. These results illustrated that previous birth experience was correlated and possessed the strongest direct link with mothers' PMP S-E score. This finding would therefore appear to contribute to Bandura's formulation that previous experience has the strongest affect upon overall efficacy beliefs. Furthermore, no indirect link was found between previous birth experience (enactive mastery experience) through visiting procedure (vicarious experience) or to mothers' overall efficacious beliefs. However, this issue will be explored further when we consider the contextual effect of type of feeding upon mothers' efficacious beliefs in the following chapter.

Finally, the construct validity of our scale was also tested through factor analysis. It is also noteworthy that less than half of the measures reviewed in this article reported carrying out the latter procedure and none of the domain-specific scales used this procedure at all. However, the authors of this study developed 4 subscales a priori which were subsequently detected using the aforementioned statistical approach. The result from Factor Analysis supply further evidence for the construct validity of the PMP S-E questionnaire. However, there is some debate surrounding the participant numbers required to successfully perform factor analysis. Froman (2001) notes that the lower range of participants required for a meaningful analysis should be between 5 participants per item (N=100 with our scale) or 20 participants per factor expected (N=80 with our scale). The higher range of participants can vary between 10 participants per item up-to several hundred overall. Therefore, future testing with this questionnaire should aim to use at least 10 participants per item to avoid potential confounding factors.

Moreover, the authors of this study feel that there are several benefits and applications of this research on both a theoretical and practical level. Firstly, the maternal Self-Efficacy construct has multiple applications within the health care environment on a number of different levels, for both the health care provider and recipient. The perceived maternal parenting Self-Efficacy (PMP S-E) questionnaire could provide important screening information for neonatal staff. This would provide health care professionals with a screening tool to assess the unique needs of new mothers. In addition, mothers with a low maternal Self-Efficacy may be identifiable and this may provide a pre-emptive safety net to help guide those mothers in tasks they feel less competent. Secondly, similar to the Toddler Care Questionnaire (Grass and Rocissano, 1988) the PMP S-E questionnaire may be used to focus interventions with mothers who possess low levels of parenting Self-

Efficacy. In particular, our measure may be used, for example, to evaluate the effectiveness of sensory nurturing interventions in enhancing maternal parenting Self-Efficacy of mothers of hospitalised preterm neonates. Finally, within the context and scope of Neonatal Health Psychology, our scale contributes towards new early assessments and will add new knowledge to the study of the preterm neonate and the caregiver system.

5.6 – Phase-1 Summary

As identified in chapter 4 and Phase 1 of the current chapter there was no appropriate scale in existence which measured mothers' parenting self-efficacy beliefs for their hospitalised preterm neonate. As reported above this study had two main aims. The first involved the production of a questionnaire to measure efficacy expectancy of mothers parenting hospitalised preterm neonates. The second, to investigate the potential mediators of a mother's efficacy beliefs at this time. Overall, analyses of the Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire suggests that (1) the scale is measuring what it is supposed to (i.e. the Self-Efficacy construct in mothers of relatively healthy preterm neonates), (2) that the questionnaire is a psychometrically robust measure of Parenting Self-Efficacy and that (3) this scale will be a vital tool to be used by Neonatal Health Psychologists and other health care professionals to identify mothers in need of further support in the Neonatal Unit. In addition, through the investigation of the second main aim of this Phase it was found that mothers' previous experience with child birth had the strongest effect upon overall self-efficacy beliefs.

Study 1: Phase-2

Perceived Maternal Parenting Self-Efficacy (PMPS-E) of Mothers who are Breastfeeding Hospitalised Preterm Neonates

5.7 Phase-2 Overview

In the following Phase of this Chapter the task of feeding a preterm neonate, particularly breastfeeding, is identified as one facet of the parenting process and the many problems encountered when breastfeeding are highlighted. Research is herewith presented that investigates whether (1) the type of feeding a preterm neonate receives is a mediator of a mother's Perceived Parenting Self-Efficacy (PMP S-E) and (2) whether the mother's type of feeding is independent of or multiply caused by factors previously established to mediate maternal self-efficacy (i.e. previous experience with childbirth, Phase-1). The reason why it was investigated whether a mothers feeding type mediated her parenting self-efficacy beliefs was primarily because feeding is one of the few tasks mothers can do with their baby in a neonatal unit. Exploring the relationship between type of feeding and efficacy beliefs will provide a greater depth and understanding of maternal self-efficacy for this population group.

5.8 - INTRODUCTION

It is well accepted that parental psychological well being is very important for the developmental competence of the normal infant. As outlined in Chapter 2 early delivery (< 37 weeks) marks the disruption of the biological agreement between the psychobiological relationships of the mother and the foetus (Zichella, 1992), which may affect the process of parenting and development itself. There are many tasks and activities that are encompassed within the role of parenting. Breastfeeding a preterm neonate may be identified as just one of the facets or tasks which is part of the parenting process.

(i) Breastfeeding a Preterm Newborn in the NNU

The medical benefits and importance of breastfeeding to both mother (Labbok, 1999) and child (Protheroe et al., 2003) have been well established. Nevertheless, according to the most recent figures, the UK is reported to have one of the lowest rates of breastfeeding in Europe (The National Assembly for Wales, 2003). The Unicef Baby Friendly initiative (2003) recommends that much more additional efforts are required to support mothers in the initiation and continuation of lactation. In addition, mothers of preterm infants (babies born <2.5kg and <37 weeks gestational age) have been particularly noted as less likely to initiate breastfeeding than mothers of term infants (Biancuzzo, 2003). Consequently, there has been a large amount of research generated to investigate the factors that affect a mothers' intention to breastfeed (Colin and Scott, 2002), and the duration which she continues to breastfeed thereafter (Kaufman and Hall, 1989; Kessler et al., 1995). However, research concerned with the psychological effects of breastfeeding upon mothers of preterm neonates is hitherto unknown.

Past research has shown that breastfeeding a preterm newborn, as opposed to a healthier infant, can be a very difficult process (Fisher and Baum, 1983) and also one which is less likely to occur (Silvestre et al, 1996). Lang (2002) notes that the mother of a preterm newborn is often emotionally vulnerable just as her baby is clinically vulnerable especially when it comes to breastfeeding. Moreover, when breastfeeding, mothers and preterms are likely to encounter a range of problems and obstacles such as fixing and feeding her baby to the breast (Fisher and Baum, 1983), a delay in the initiation of expressing of breast milk and caesarean section (Black and Hylander, 2000), and a lack of coordination in sucking, swallowing and breathing for the baby (Lang, 2002). Moreover, for the preterm baby sucking is not usually established before about 32 weeks of gestation (Bromberger, 2004). At this age even the more proficient of babies will be very weak and tire quickly from trying to suck on the breast. Babies have to suck much harder to get milk from a breast as opposed to a bottle. Also, mothers may also not be physiologically ready to provide the much-needed breast milk they may often produce insufficient quantities for their baby's demand which often will be supplemented by formula. Furthermore, for some mothers expressing milk can be difficult and demanding, and may heighten their anxiety and sense of inadequacy if it does not go well. Thus feeding their baby or producing a sufficient milk supply to meet the baby's demand may be one of the few ways a mother feels she can contribute to the development of her child. More often than not, in order to feel competent in this situation, mothers will need to acquire new skills to understand and interact appropriately with their small infant, and their success in doing so will affect their emotional adjustment to the birth of their preterm baby (Forrest, 1993).

Thus, it may be suggested that the problems encountered when breastfeeding may greatly affect a mother's parenting ability. Thus, the task of breastfeeding may lead many mothers

of preterm neonates to feel that they are not in control of the situation; this may affect their perceptions of their parenting self-efficacy. Moreover, Self-Efficacy is acknowledged as one of the strongest predictors of health behaviours and it may play an important role in facilitating the parenting of mothers who are breastfeeding their preterm neonates.

(ii) Breastfeeding and Self-Efficacy Theory

When conducting a literature search for this study (using the following databases: Allied & Complementary Medicine - 1985 to date, British Nursing Index - 1994 to date, CINAHL - 1982 to date, DH-DATA - 1983 to date, EMBASE - 1974 to date, King's Fund - 1979 to date, MEDLINE - 1996 to date and PsycINFO - 1806 to date) with the terms; 'breastfeeding' or 'feeding', 'parenting' and 'self-efficacy' only 3 pertinent articles were found. The articles found instead related to mothers efficacious beliefs towards breastfeeding only. Nevertheless, the findings were interesting and suggested that mothers who perceived themselves as efficacious at breastfeeding breastfed for a significantly longer duration (Blyth et al., 2002), that they have an adequate milk supply (McCarter-Spaulding and Kearney, 2001) and were more likely to have previous breastfeeding experience (Dennis and Faux, 1999). However, no study has previously examined the effects of a mothers' type of feeding (including breastfeeding) upon her overall parenting self-efficacy.

However, in this chapter the author has chosen to look at (1) how mothers' parenting self-efficacy beliefs (PMP S-E) may be mediated by the type of feeding a mother is giving her hospitalised preterm newborn (e.g. breastfeeding or bottle feeding), and (2) whether the

sources of self-efficacy information (e.g. enactive mastery experience) affects the relationship between a mothers' type of feeding and her perceived self-efficacy. Please note that this study is not so much concerned with whether a mother believes she is competent in her type of feeding but whether her choice to breastfeed may affect her perceived ability to parent her child born preterm. This study tested the hypothesis that the Perceived Parenting Self-Efficacy (PMP S-E) of mothers who are breastfeeding their preterm neonate is lower than their non-breastfeeding counterparts.

5.9 METHOD

Design

A prospective survey with a between subjects design was used.

Aim

The aim of this study is two fold; to investigate (1) a mother's Perceived Maternal Parenting Self-Efficacy (PMP S-E) is significantly mediated by the type of feeding she has chosen to give her preterm neonate, and (2) whether a mother's PMP S-E is independently or multiply explained by the type of feeding she has chosen to give her baby and/or previous childbirth experience.

Participants

One-hundred mothers of relatively healthy preterm neonates (<2.5kg and <37 weeks gestation age), with no congenital malformations, within the first 28 days of postnatal life were recruited from two hospitals within the West Midlands to form part of the cohort used in Chapter 5 of this thesis. Twenty-five of these mothers were exclusively breastfeeding

(i.e. all milk was given to the infant through the mothers' breast and no milk was expressed and provided via a bottle to the baby) their babies and Seventy-five were not. From the sample of non-breastfeeding mothers twenty-five were randomly selected (all bottle fed babies were given formula milk). The characteristics for these two groups are shown in table 5.5 below. However, it should be noted that in the breastfeeding group 15 were first time mothers and this figure was 11 in the bottle fed group. In addition, in the breast fed group for 8 mothers it was their second baby and for 2 it was their third. In the bottle fed group for 7 mothers it was their second baby, 5 mothers their third and 2 mothers their fourth.

Table 5.5. Mean and standard deviation values by group (N=50) for maternal and infant variables at birth.

	Group	
	Breastfeeding <i>Mean (S.D.) n=25</i>	Non-Breastfeeding <i>Mean (S.D.) n=25</i>
Birthweight (kg)	1.28 (0.45)	2.10 (0.26)
Gestation Age (weeks)	30.14 (2.53)	33.96 (1.49)
Postnatal Age (days)	9.15 (7.68)	5.4 (3.7)
Maternal Age (years)	28.04 (7.45)	26.12 (6.24)

Materials and Procedures

The Perceived Maternal Parenting Self-Efficacy (PMP S-E) questionnaire previously validated by the authors was used; it consists of 20 items and four subscales (Caretaking procedures [e.g. feeding their baby], evoking changes in their baby's behaviour [e.g. soothing their baby], reading their baby's behaviour or signalling [I can tell when my baby

is sick], and situational issues [e.g. I believe that I have control over my baby]). All items are on a four-point Likert-type scale and range from ‘strongly agree’ to ‘strongly disagree’. Thus, mothers can have a potential self-efficacy score of between 20–80. Internal and external reliability of the PMP S-E questionnaire is high and statistically significant.

Once hospital ethics committee approval had been given, the study was explained to mothers (Patient Information Sheet), written consent was requested and it took around fifteen minutes to complete the questionnaire.

Data Analyses

Data were analysed using factorial Analysis of Variance, Analysis of Covariance, Spearman’s Rho Correlation and Partial correlations

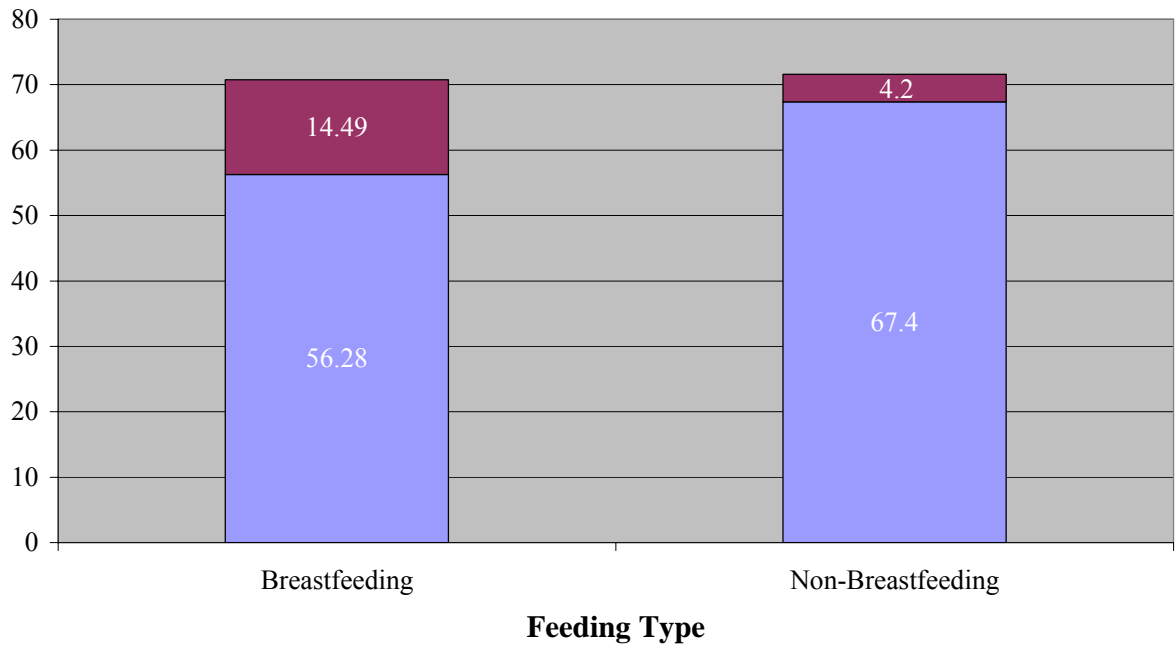
5.10 RESULTS

This study set out to investigate 2 main aims; (1) whether a mothers' parenting self-efficacy beliefs (PMP S-E) may be mediated by the type of feeding a mother is giving her hospitalised preterm newborn (e.g. breastfeeding or bottle feeding), and (2) whether the sources of self-efficacy information (e.g. enactive mastery experience) affects the relationship between a mothers' type of feeding and her perceived self-efficacy. Therefore, this results section will be presented in terms of these main aims and will examine the former of the two first.

Section 1- Mothers' type of feeding as a mediator of PMP S-E

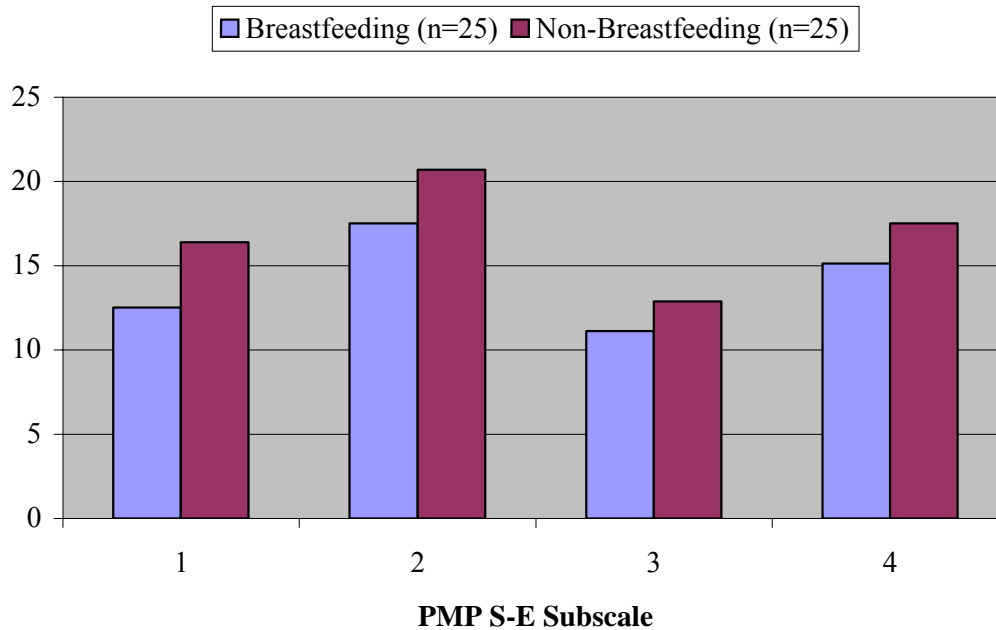
Moreover, in this study a one-way factorial ANOVA was carried out and revealed that Perceived Maternal Parenting Self-Efficacy (PMP S-E) was significantly lower in mothers who were breastfeeding [$F(1, 49) = 13.57$; $p < 0.001$, $\eta^2 = 0.22$], as predicted. Gestation age (GA) was used as a covariate (as gestation age is positively correlated with maternal self-efficacy) and ANCOVA results suggested that the variance in maternal self-efficacy scores were independently explained by breastfeeding [$F(1, 49) = 4.21$; $p < 0.04$, $\eta^2 = 0.09$]. Figure 5.3 (below) shows that the mean PMP S-E scores were lower in the breastfeeding group.

Figure 5.5 Perceived Maternal Parenting Self-Efficacy (PMP S-E) total score in relation to group membership.



Furthermore, a one-way factorial ANCOVA was also used to compare the mean PMP S-E subscale scores for breastfeeding mothers against non-breastfeeding mothers (Gestation age as a covariate). Figure 5.4 (below) shows that mothers in the breastfeeding group had significantly lower scores on subscales 1 (Caretaking procedures; $F(1, 49) = 4.198$; $p < 0.04$, $\eta^2 = 0.24$), 2 (Evoking changes in their baby's behaviour; $F(1, 49) = 4.78$; $p < 0.034$, $\eta^2 = 0.15$), 3 (Reading their baby's behaviour or signalling; $F(1, 49) = 4.66$; $p < 0.03$, $\eta^2 = 0.15$), and 4 (Situational Issues; $F(1, 49) = 3.78$; $p < 0.006$, $\eta^2 = 0.4$).

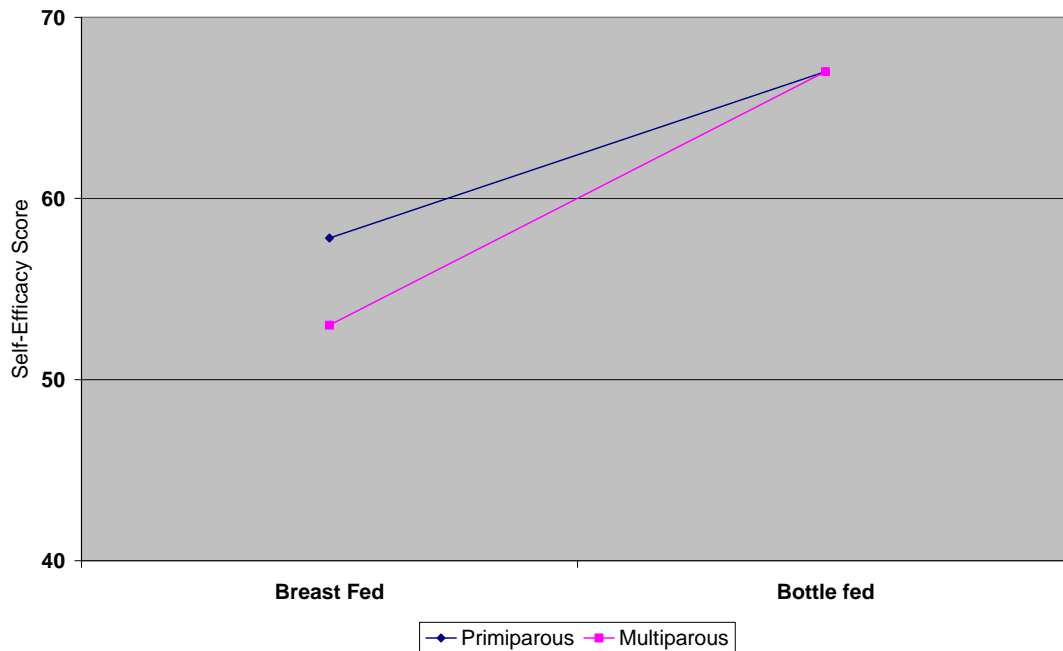
Figure 5.6 Perceived Maternal Parenting Self-Efficacy (PMPSE) subscale score in relation to group membership.



Section 2 – Is a mother’s PMP S-E independently or multiply explained by type of feeding and/or previous childbirth experience.

Thus, due to the finding in Chapter 5, that a mothers’ PMP S-E is mediated by her previous experience with childbirth, and in conjunction with the formerly identified relationship between a mothers’ type of feeding and her PMP S-E, it was examined whether PMP S-E was either independent of or multiply caused by type of feeding and previous birth experience. Primiparous mothers who were breastfeeding their baby had a mean self-efficacy score of 57.82 (s.d. 13.33) and this was 67.18 (s.d.2.48) for bottle feeding mothers. Multiparous mothers who were breastfeeding their babies had a mean self-efficacy of 53 (s.d.17.19) and this was 67.57 (s.d. 5.27) for bottlefeeding mothers. Moreover, a between subjects analysis was conducted using a 2 (birth experience; primi- or multi-parous) x 2 (feeding type; breast or bottle) ANCOVA to examine whether there was a significant interaction between these two variables. The results indicated that there was a significant interaction between the birth experience and feeding type of the mother and her self-efficacy ($F=4.3$, $df=1$, $p=0.03$). The interaction plot is shown in Figure 5.7 below.

Figure 5.7 Perceived Maternal Parenting Self-Efficacy (PMPSE) subscale score in relation to group membership.



In order to investigate this further, a series of partial correlations revealed that when controlling for a mothers previous experience with childbirth the mothers type of feeding still possessed a significant relationship with PMP S-E ($r=0.39$, $p=0.006$) that was not too dissimilar from the original zero-order correlation. However, when using partial correlations and controlling for the mothers type of feeding, a mothers previous experience with childbirth was no longer statistically related to PMP S-E (n/s). This finding was further supported by a series of one-way ANOVAs that revealed a mothers prior experience with childbirth (e.g. first baby/not first baby, $\eta^2=0.05$, observed power = 0.19), and amount of time the mother spent with her baby (visiting procedure, $\eta^2=0.06$, observed power = 0.36) could not significantly explain the variance in maternal self-efficacy score.

Therefore, these results suggest that a mothers' PMP S-E is independently caused by the type of feeding a mother gives her baby.

5.11 –DISCUSSION

The study reported here suggests that mothers' perceptions of their parenting self-efficacy, whilst in hospital, is mediated by the task of breastfeeding. Moreover, the findings of this study not only suggest that breastfeeding mothers had significantly lower overall Perceived Maternal Parenting Self-Efficacy (PMP S-E) scores, but also scored significantly lower on each of the four subscales, as compared to their non-breastfeeding counterparts. This finding would seem to suggest that breastfeeding a preterm neonate during hospital confinement may adversely affect mothers' perceptions of their efficacy in all aspects of parenting; this may be explained in accordance to self-efficacy theory as outlined in the introduction.

Furthermore, it was also examined whether PMP S-E was either independent of or multiply caused by the type of feeding and/or previous birth experience of the mother. Firstly, a between subjects analysis was conducted using a 2 (birth experience; primi- or multiparous) x 2 (feeding type; breast or bottle) ANCOVA to examine whether there was a significant interaction between these two variables on maternal self-efficacy. The interaction suggested that there was no effect of parity if the mothers were bottle feeding, and that there was an effect of parity when mothers breastfed their babies. However, further analysis using partial correlations and one-way ANOVAs indicate that a mothers'

PMP S-E was in fact independently caused by the type of feeding a mother gives her baby when controlling for birth experience.

As stated in Chapter 4 a person's self-efficacy beliefs are assembled and drawn from four principle sources of information (Bandura, 1977, 1997). During this study the authors were able to test three of these principle sources and these included: (1) Enactive mastery experiences – in this case whether or not the mother had previously given birth i.e. prior child care experience, (2) vicarious experience – or in this study, how much time the mothers devoted to being with their newborn i.e. time when they could practice their parenting skills, and (3) verbal persuasion – in this instance whether mothers were supported or unsupported by a partner. However, none of these principle sources of information could significantly explain the variance in breastfeeding mothers perceived parenting self-efficacy scores (PMP S-E). In addition, the relationship between a mothers type of feeding and her PMP S-E suggested that mothers self-efficacy beliefs were independently explained by type of feeding when controlling for previous birth experience. Therefore, the reason why mothers who breastfed obtained lower PMP S-E scores may rest with the fourth principle source of information i.e. physiological feedback and affective states. Thus, although the former source of self-efficacy was not directly measured in this study several conclusions from this finding may be draw as outline in the following paragraph.

Moreover, Bandura (1997) notes that somatic indicators of personal efficacy may be particularly important when people must cope with stressors. Mothers of preterm babies must confront many adversities including adjustment to the environment of the neonatal unit (Redshaw, 1997). A mother's experiences with breastfeeding her preterm newborn

maybe one such way she can monitor how her own body performs and thereby affect her own efficacy beliefs to carry out the task of breastfeeding. For example, if a mother experiences difficulties in fixing their baby to the breast (Fisher and Baum, 1983), she produces insufficient quantities of milk or her baby has a lack of co-ordination in feeding ability (Lang, 2002) then this may negatively affect a mother's perceptions of her parenting abilities. In addition, Laufer (1990) noted that a successful breastfeeding experience builds up a mother's competence and self-esteem and it may be suggested that the opposite also applies i.e. that mothers who have unsuccessful breastfeeding experiences diminishes their competence in parenting. However, as previously noted this study was not designed to observe mothers experiences with feeding their newborn; thus we are unable to establish whether breastfeeding mothers in our sample were successful or unsuccessful in this activity. Future research should use measures such as those developed by Dennis and Faux (1999) to examine the relationship between a mothers' perceptions of her breastfeeding self-efficacy and parenting self-efficacy.

5.12 PHASE-2 SUMMARY

Phase 2 of this Chapter has indicated a significant lack of investigations into maternal parenting self-efficacy regarding preterm neonates during their hospitalisation period. It was highlighted that the environment of the neonatal intensive care unit is where many traumas are encountered by mothers of preterm neonates. The study reported here suggests that the task of breastfeeding, as one aspect of parenting, may be one which is open to many problems and a more complex task for some mothers to do than others. Mothers who are breastfeeding, as compared to their non-breastfeeding counterparts, maybe influenced more by their somatic indicators which may in turn affect their efficacy beliefs in all aspects of parenting. Moreover, it would appear that breastfeeding mothers need more support in the areas of caregiving procedures, evoking changes in their babies' behaviour, reading their babies' signalling and situational issues. Future research in this area should aim to observe mothers whilst feeding and measure their perceptions of their feeding as-well as their parenting abilities. These findings have implications for Neonatal Health Psychologist's and Nursing practice and research within Neonatal Units particularly with regard to the facilitation of breastfeeding.

CHAPTER 6. – COGNITIVE, EMOTIONAL AND ENVIRONMENTAL MEDIATORS OF EARLY PARENTING

6.0 – OVERVIEW

Building upon the literature provided in the previous chapters, a justification is provided here which explains why other types of tactile intervention such as kangaroo care were not used and also provides a description of why other types of tactile intervention were e.g. the inclusion of a Toy group. Following this the Results section will provide information on the testing of all main and subsidiary hypotheses set out in Chapter 1 (which are also replicated below). Accordingly, the results section is divided into 4 main sections which are based upon the main and subsidiary hypotheses. The results are discussed in light of earlier literature reviews (Chapters 2 and 3) and in the absence of relevant empirical work the appropriate psychological theory will be used to explain findings.

6.1 – INTRODUCTION

The central aim of this thesis is to search for research-based evidence on the benefits of environmental support to both babies (e.g. increased weight gain or awake periods) and their mothers (e.g. higher perceptions of themselves as a mother) during hospital confinement. In chapter 2 (Early tactile stimulation) detailed information was provided on the kinds of environmental supports already in use with newborn babies (e.g. tactile interventions such as kangaroo care). It was also proposed in the same chapter that the more appropriate and preferred method of tactile intervention was TAC-TIC (Touching and Caressing-Tender in Caring). However, the study reported in the preceding chapter

describes how 3 intervention/placebo groups were used, including; (1) a placebo control group where mothers engaged in unstructured spontaneous touch with their baby, (2) a Toy group where mothers utilised a hand held finger puppet to interact with their baby, and (3) TAC-TIC group. Nevertheless, this raises 2 very important points which are dealt with below.

Firstly, it is important to explain why an intervention such as kangaroo care or baby massage were not included as controls. Moreover, as justified in Chapter 2 baby massage was not used as a control because it has been acknowledged by those practicing such interventions as inappropriate and not recommended for those preterms in the early weeks following birth (Bidmead and Farnes, 2004) and should only be initiated when babies can tolerate positive still touch, i.e. without displaying behavioural and physiological instability (Bond, 2002). Although other reasons were given in chapter:2 why this therapy may not be appropriate for preterms some other important points include: (1) there are no systematic massage procedures, (2) TAC-TIC has underlying consistent principles and is systematic, and (3) TAC-TIC is the only method of tactile therapy with continuous scientific evaluation since 1984. Kangaroo care on the other hand is widely used with both mothers and fathers and their preterm babies in the neonatal unit. However, using kangaroo care as a control in this study would have introduced a key confounding variable. That is that during kangaroo care the baby is taken from the incubator or cot and placed upon the mother/father's bare chest when they may or may not talk to their babies. The other 2 intervention/placebo control groups in this study do not involve either the handling of the baby, removing the baby from incubator/cot or talking to the baby. Therefore, neither the Baby massage or Kangaroo care were considered as viable comparison groups.

Secondly, it is also important to justify the inclusion of a group where mothers could use toys to interact with their babies. The toy was chosen as a method of interaction for mothers for two chief reasons. First of all, and perhaps more simplistically, a toy is something commonly used and bought as gifts for newborn babies even though we may not expect the babies to interact with a toy all by themselves. In other words, a toy is a familiar object to many parents and may not be considered too out of the ordinary when asked to use with their baby. The other reason a toy was used was because of the current theoretical knowledge regarding how newborn babies process, encode and retain sensory information around them. In fact, in a recent study by Adamson-Macedo and Barnes (2004) they tested a new type of novel toy stimulus with healthy fullterm newborns in the home environment during the first 3 months of life. Although the authors primarily investigated how fullterm babies manipulated this stimulus, they noted that babies were actively exploring it and that this may have implications for the promotion of physical and mental health of newborns in general. It was originally intended to use new toy stimulus with the preterm babies in this research but it was not fully piloted at the time recruitment was due to begin in this study. Thus another size appropriate toy was used instead.

In addition, it was established in the previous chapters that few studies exist which have examined maternal self-efficacy, self-esteem and attachment during the neonatal and hospitalisation period with mothers of preterm babies. However, the purpose of the proceeding text is to report on any literature which has investigated the effect that (1) performing a tactile intervention upon a preterm baby, would have upon (2) maternal self-efficacy, self-esteem or attachment. Hence, a literature search was conducted and looked for any study which had sought to investigate the latter.

Thus, when conducting a literature search using the terms; (1) 'tactile,' or 'touch,' (2) 'preterm / premature / premature baby' (3) 'Therapy' and either (i) 'self-efficacy'; 1 article was found, (ii) 'self-esteem'; had 1 article, or (iii) 'maternal-to-infant attachment' also had 1 article. The first of these articles was an article by Barlow et al. (2006) to examine the effectiveness of an intervention for parents of children with disabilities which focused on parents' self-efficacy as well as a number of other psychological factors and perceptions. Through a Training and Support Programme (TSP) parents (N=95) were taught a simple massage skill to be used in the home environment. The authors reported that there were statistically significant positive effects on parents' self-efficacy for managing children's psychosocial wellbeing and also their self-efficacy in administering the massage therapy.

The second article (self-esteem) was an article by Hart et al. (2003) which explored social interaction in parenting during health visitor led baby massage classes. The aim of the study was to evaluate a group parent education programme that focused on teaching baby massage skills to parents. The programme was delivered by a health visitor in an area of special action in one health trust. Self-esteem was measured through a postal questionnaire, along with several other variables. The authors reported to find a positive relationship between parents' perceived level of self-esteem and sense of competence as a parent and the social interaction activity of reading and chatting with their babies. The final study found during the search above (attachment) was conducted by Cox and Bialoskurski (2001) although they just observed mother-infant behaviours and did not measure mothers' perceptions of their attachment to their baby. Therefore, two main conclusions can be drawn from this literature search. Firstly, there is very little research which investigates the effect that performing a tactile intervention upon a preterm newborn

has upon a mothers' cognitions and emotions. Secondly, these studies have all been conducted when the baby is no longer hospitalised.

6.2 – METHOD

Aims

The aim of this chapter is to investigate how mothers and their hospitalised preterm babies can be supported so that their early experience can be canalized in a positive way to promote health and development.

Design

An experimental method and a mixed design (repeated measures [ABA], independent subjects and correlational), will be used (please see table 6.1 below for an overview of the design).

Table 6.1. Overview of the study period design

Pre-Intervention (A)	Supporting programme/Intervention (B)	Post-Intervention (A)
(M1)*		(M1)*
Maternal Self-Efficacy Self-Esteem Attachment	<i>Cluster 1 – PLACEBO/CONTROL (n = 20)</i>	Maternal Self-Efficacy Self-Esteem Attachment
	<i>Cluster 2 – TOY (n = 20)</i>	
	<i>Cluster 3 – TAC-TIC (n = 20)</i>	
Day 1	Days 1 – 10	Day 10

**Maternal Measurements (M)* and Implementation period*

Hypotheses

H1 (Main Hypothesis) – It is predicted that the difference between mothers’ post-supporting programme/intervention measurements (Self-Efficacy, Self-Esteem and Attachment) will be significantly explained by the Intervention/Developmental Support group.

H2 (Subsidiary Hypothesis) – It is predicted that the differences between the length of time spent in behavioural states (e.g. Low Activity), the amount of time the baby spends in the neonatal unit (DIU) and weight that they gain (WG) during the study period, will be significantly explained by the membership of Intervention/Developmental Support group.

H3 (Subsidiary Hypothesis) – It is predicted that there is a significant relationship between maternal self-efficacy, self-esteem and attachment.

H4 (Subsidiary Hypothesis) – It is predicted that there is a significant relationship between each of the variables tested in H3 (self-efficacy, self-esteem and attachment) and H4 (behavioural state, Days in Unit (DIU) and weight gain (WG)).

Participants, recruitment and allocation procedure

A random cluster control trial (RCCT)⁴ was used to allocate 60 relatively healthy (30 in each hospital) (non-ventilated) preterm babies to one of the three cluster groups (20 in each) as outlined in table 6.1 (two developmental support and one placebo/control group).

The full procedure can be seen below although a brief summary follows.

⁴ Randomised cluster control trial: is a randomised control trial in which the investigator randomly allocates units (e.g. Participants or hospitals or Physicians) to one or more intervention groups and a control group (Eccles et al, 2003).

In line with the protocol for conducting a RCCT the following occurred when recruiting participants to this study. Firstly, a cluster/group was randomly selected (e.g. TAC-TIC), then mothers and babies who fitted the inclusion/exclusion criteria were approached and given information (via an information sheet and verbal explanation) about participating in that particular group. Mothers (and fathers if present) were not informed about the other clusters/groups (e.g. placebo/control or Toy). Mothers were then given a minimum of 24 hours to acknowledge whether they would like to take part and a longer period of time was given if requested. Once parental informed written consent was received the specific cluster/group protocol was performed for 10 days followed by 7 or more days of 'wash-out'. The 'wash-out' period refers to the time that it takes for all mothers and babies participating within that group (e.g. TAC-TIC) to have completed the study and have then been discharged from the hospital (this also includes mothers who for example had not participated in the study [i.e. because they did not meet the inclusion criteria] but may have been aware of what mothers were doing in that cluster/group). When all mothers had been discharged the next cluster/group could be randomly selected (e.g. Toy group) and all mothers and babies meeting the inclusion/exclusion criteria were then recruited to that particular cluster/group.

The sample characteristics for all cluster groups (Developmental Support or Placebo/Control) are shown in table 6.2 below. Please note that the attrition rate was 2% for the control group and 0% in the Toy and TAC-TIC group. In addition, 15% (n=9) of the population were Black Afro-Caribbean and 85% were White (n=51). Also, the mothers were recruited from one of two hospitals, one in Shropshire the other in the West

Midlands, which both accommodate an average of around 300 babies each per year. However, many of these babies would not have been recruited based upon the inclusion/exclusion criteria.

Table 6.2 – Mean (s.d.) values for maternal Preterm characteristics by cluster (Developmental Support or Placebo/Control) group.

	Developmental Support Group Mean (s.d.) or frequency			Overall Population Mean (s.d.) or frequency
	Control (n=20)	Toy (n=20)	TAC-TIC (n=20)	(N=60)
Mother-Preterm Characteristics				
Babies' Sex	M=11 / F= 9	M=12 / F= 8	M=8 / F= 12	M=31 / F= 29
BW (kg)	1.6 (0.34)	1.43 (0.47)	1.44 (0.28)	1.52 (0.38)
GA (weeks)	32 (2.2)	30.2 (2.9)	31.4 (1.7)	31.3 (2.48)
PA (days)	13 (3.9)	13.5 (3.9)	11.7 (4.2)	12.68 (4)
MA (years)	28 (6.3)	28.6 (5.7)	27.6 (5)	28 (5.6)
Baseline Maternal Pre- supporting programme/intervention Measurements				
Self-Efficacy	60.55 (9.5)	58 (8.9)	61.3 (9.4)	59.95 (9.2)
Self-Esteem	83 (5.9)	69.5 (12.4)	70.5 (9.3)	71.98 (11.19)
Attachment	76 ((10.9)	81 (10)	79.8 (5.5)	81.28 (7.44)

Key: BW=Birthweight; GA=Gestation Age; PA=Postnatal Age; MA=Maternal Age

Inclusion/Exclusion Criteria

The criteria for participant selection were infants being preterm (<2.5kg in birthweight [BW] and <37 weeks gestational age [GA]), and within the neonatal period (the first 28 days of postnatal life). Mothers were not recruited if they did not speak English (as the scale was only developed in English and no finance was available for translation at this time), or if their baby had any genetic anomalies, congenital malformations, gastrointestinal disturbances, central nervous system dysfunction, who were medically unstable, receiving parenteral nutrition only, or receiving oxygen therapy.

Measurements

In this study mothers were given the same pre/post supporting programme/intervention questionnaire which comprised of three separate constructs (self-efficacy, self-esteem and attachment) and a factual section (measuring factors such as babies' birthweight etc) or (M1) as can be seen in table 6.1. The measurements comprised of the Perceived Maternal Parenting Self-Efficacy questionnaire (PMPS-E; Developed and tested in Chapter 5, Phase-1), the short form of the Maternal Self-Esteem Inventory (MSRI) developed by Shea and Tronik (1988) and the Parent-to-infant attachment questionnaire developed by Condon and Corkindale (1998). As information is provided on the PMPS-E questionnaire in Chapter 5 a very brief description will only be given of the other 2 measures. Moreover, the MSRI short form has 26 items measured on 5 individual subscales (Caretaking ability [6], General ability and preparedness for mothering role [8], Acceptance of baby [3], expected relationship with the baby [5], and Feelings concerning pregnancy, labour and delivery [4]). In addition, the parent-to-infant attachment questionnaire is a 19 item scale with 3 subscales (Quality of attachment [9], Absence of hostility [5], and Pleasure in interaction [5]). In this study the MSRI had a total pre-intervention item alpha of 0.84 and the attachment questionnaire was 0.69. Please note that behavioural state was measured using Eckerman and Oehler's (1992) behavioural coding scheme and comprises both a sleep state (e.g. crying, awake or asleep) and an activity level (e.g. a lot, little or none [no specific movements are monitored only general body activity]) component. Therefore, Eckerman and Oehler's behavioural states are classified into 3 specific levels of activity and include; *low* (Sleep, negligible activity), *medium* (Little or no body movement in an alert visually attentive state), *high* activity (Little eye opening, much or moderate body movement, possible crying) and also include *crying* as an additional state. The definitions of these behavioural classifications can also be seen in Appendix I and were chosen

because they do not include transitional states which are notoriously difficult to classify. In addition, graphic examples of the behavioural states using babies from this study (approval given via informed consent) can be seen in Appendix III.

Procedures

As this research was conducted in two separate hospitals ethical approval was also sought and successfully gained from (1) The Wolverhampton Local Research Ethics Committee, and (2) the Shropshire Local Research Ethics Committee following approval by the University of Wolverhampton Psychology and School Ethics Committee. As outlined above, once mothers agreed to participate the study period lasted over a 10 day period. At the beginning (day 1) and end (day 10) of the study mothers were asked to fill-in the same questionnaire (see measurements above). This was then followed by 10 consecutive sessions (1 per day), where the mother and her baby were filmed for 9 minutes per session. The 9 minutes session comprised 3 phases of equal duration; 3 minutes baseline, 3 minutes supporting programme, and 3 minutes after the supporting programme, in that order. Throughout the remainder of this thesis the terms baseline, supporting programme and after supporting programme are used to refer to these 3 distinct phases in which preterm behavioural state was recorded. During the first (baseline) and the last 3 minutes (after supporting programme) of each session the baby was filmed alone in spontaneous activity and what happened in the middle 3 minutes (supporting programme/intervention) depended upon what cluster group (supporting programme) the mothers belonged to (see intervention group/developmental support programmes below). In addition, exactly halfway through the 10 sessions mothers were shown a sample of the video footage played back to them (chosen at random) and were asked to comment on their babies behaviour together with the investigator. Also, the baby's weight was monitored at the onset and

closure of the study period (Weight gain; WG) and the total number of days that they spent in the unit until discharge (Days in Unit; DIU).

Intervention Group/Developmental support programmes

In Cluster group 1 (The Placebo/Control group) the mothers and babies received neither of the developmental support programmes outlined below but mothers were filmed during spontaneous activity with their baby for the same amount of time as the supported groups (i.e. 3 minutes supporting programme/intervention phase). Mothers were asked only to use touch to interact with their baby and that this was to be done however they normally touched their baby. No further instruction was given on how they might go about this. However, mothers were asked (1) not to handle (e.g. pick up or turn over), (2) perform any activities such as feeding or changing, or (3) stimulate any of the other senses of the baby (e.g. talking to the baby), which was requested of all mothers in all cluster/groups.

In Cluster group 2 (Toy group) the mothers were asked to select one of ten toys (as seen in picture 1 below) individually and then this toy was used throughout the duration of the study period (10 days). Mothers were asked to use the toy they selected to interact with their baby in whatever way they liked. Similar to the placebo/control group no instruction was given to mothers on how they should use the toy. In all circumstances mothers of male babies chose toy number 1 (see picture 6.1) and for female babies chose toy number 2 (picture 6.1).

In Cluster group 3 (TAC-TIC - Touching And Caressing; Tender In Caring) mothers were taught and followed a specific protocol of touching their baby known as TAC-TIC (Appendix 2, TAC-TIC, Parents version). This is the fourth and most recent version of

TAC-TIC and has been used with relatively healthy preterms (i.e. those whose condition is relatively stable and who are not receiving oxygen therapy or mechanical ventilation), does not involve undressing the baby as opposed to the other versions and consists of 14 individual stroking movements which are repeated continuously 3 times during a 3 minute session (one per minute). This simplified version of TAC-TIC was specifically designed to be carried out by the mother in comparison to all other versions which have predominantly been carried out by the investigators. Mothers were firstly taught how to touch their baby (using the set protocol, Appendix 2) on a doll by the investigator immediately prior to beginning the first session with their own baby which took no more than 10 minutes. The information provided to mothers was only procedural and involved the investigator describing and demonstrating the way in which the babies should be touched. Mothers were asked to also adhere to the principles of TAC-TIC i.e. gentleness,/lightness, rhythm, equilibrium and continuity. Once mothers felt they had practiced enough they proceeded with the first session of the 10 day study period (1 session per day). Mothers were monitored by the investigator throughout the practice session and the main study to ensure they touched their baby as shown by the investigator. Mothers were only given further information if they deviated from the protocol of performing TAC-TIC after the session was finished.

Data Analysis

In this study the collected data were analysed in one of two ways; (1) empirical data were analysed using SPSS version 12, and (2) Video data was observed and analysed using specialist behavioural analysis software (The OBSERVER video-pro, version 4). It should be noted that this version of the Observer software can measure both frequency and/or duration of behaviours. In this study the durations of 4 different types of behaviours were

recorded if seen in the video footage, namely; Low Activity (LA), Medium Activity (MA), High Activity (HA) and Crying (CR). Overall, there were 60 participants recruited overall this yielded a total of 600 individual sessions (10 per participant each 9 minutes in duration) which accumulated to 90 hours of video footage. Inter observer reliability was performed on 10 randomly selected babies (100 sessions) achieving a 94% level of agreement. The person performing inter observer reliability was blind to the hypotheses of the study. Intra observer reliability was slightly higher at 98%. Please note that the Observer software is used to calculate the inter- and intra-observer reliability. The computer can perform this operation with both frequency and durations of behaviour and compares whether two independent observers (in the case of inter-observer reliability) classify the same behaviour occurring at the same moment of time within a predetermined reference value (e.g. +/- 1 second). Therefore, the process for checking agreement between raters for both frequencies and durations is very similar. When establishing agreement for frequencies the software checks that a specific behaviour (e.g. a baby reaches for and grasps their own foot—not measured in this study) occurred at a specific time and computes the number of occasions that this occurred. In the case of checking for the percentage agreement between durations of behavioural states (e.g. when the baby is asleep – low activity), the software verifies when a specific behavioural state was said to begin and end and sums the total amount of time spent in each behavioural state.

Picture 6.1 – Toys (finger puppets) mothers could choose from in cluster group 2.



6.3 – RESULTS

Please note that the following results are divided into 3 distinct sections and which are based upon the 4 hypotheses as set out in the Methods section. Therefore, section 1 will address hypothesis 1, section 2 will address hypothesis 2 and so on. However, before analysis was begun it was necessary to assess the data for cleanliness and whether any significant differences lay between (1) the participants recruited from the two hospitals and (2) the experimental/developmental and control groups.

In order to investigate whether any differences existed between the participants recruited from either of the 2 hospitals in this study a chi-square and an unrelated t-test were used. The results indicated that the sample used from either hospital did not differ between; (1) babies' sex ($\chi^2=0.067$, $df=1$, $p=0.796$), birthweight ($t= 1.061$, $df= 58$, $p= 0.293$), gestation age ($t= 0.516$, $df= 58$, $p= 0.608$) postnatal age ($t= 159$, $df= 58$, $p= 0.874$), or current weight on the day the study began ($t=-0.568$, $df=58$, $p=0.572$) and (2) maternal age ($t= 0.68$, $df= 58$, $p= 0.946$) or Baseline Self-Efficacy ($t= 0.235$, $df= 58$, $p= 0.815$) Self-Esteem ($t= 0.886$, $df= 58$, $p= 0.984$), or Attachment scores ($t= 0.021$, $df= 58$, $p= 0.984$); thus the sample was pooled.

Table 6.3 – Mean (s.d.) values for Maternal/Preterm characteristics by Hospital.

	New Cross Hospital (n=30) Mean (s.d.) or frequency	Shrewsbury (n=30) Mean (s.d.) or frequency
Mother-Preterm Characteristics		
Babies' Sex	M=15 / F= 15	M=16 / F= 14
BW (kg)	1.5 (0.39)	1.57 (0.37)
Current Weight at study onset (kg)	1.66 (0.37)	1.7 (0.32)
GA (weeks)	31 (2.5)	31.4 (2.4)
PA (days)	13 (4.1)	12.6 (4.005)
MA (years)	28 (6.07)	28.03 (5.27)
Baseline Maternal Pre- supporting programme/intervention Measurements		
Self-Efficacy	60.23 (9.2)	59.67 (9.4)
Self-Esteem	73.27 (12.16)	70.7 (10.17)
Attachment	81.3 (7.75)	81.26 (7.25)

Key: BW=Birthweight; GA=Gestation Age; PA=Postnatal Age; MA=Maternal Age

Furthermore it was also important to assess whether any differences lay between the developmental support/placebo control groups. Using one-way ANOVA the results indicated that the sample recruited to each of the developmental support/placebo control groups did not differ between; (1) babies' sex ($F=0.849$, $df=57$, $p= 0.433$), birthweight ($F=2.11$, $df=57$, $p= 0.124$), gestation age ($F=2.14$, $df=57$, $p= 0.126$), postnatal age ($F=1.07$, $df=57$, $p= 0.349$), or current weight on the day the study began ($F=2.236$, $df=57$, $p=0.116$), and (2) maternal age ($F=0.141$, $df=57$, $p= 0.0.869$) or Baseline Self-Efficacy ($F=0.689$, $df=57$, $p= 0.506$) Self-Esteem ($F=2.137$, $df=57$, $p= 0.127$), or Attachment scores ($F=0.949$, $df=57$, $p= 0.393$); therefore the data were presumed to be clean for further analysis. Thus, the chapter hypotheses were tested in the following sections.

SECTION 1 – Analysis of the relationships and differences between and within mothers’ pre- and post- supporting programme/intervention measurements

In this section the main hypothesis of this chapter will be dealt with; i.e. H1- It is predicted that the difference between mothers’ post-intervention measurements (Self-Efficacy, Self-Esteem and Attachment) will be significantly explained by the Intervention/Developmental Support group. The mean (s.d.) self-efficacy, self-esteem and attachment score pre- and post- supporting programme/intervention measurement data can be seen below in table 6.3.

Table 6.4 Mean (s.d.) maternal self-efficacy (SE), self –esteem (SES) and Attachment (ATTACH) scores pre- and post- supporting programme/intervention by group

Group	Pre-Intervention Measurements (s.d.) Day 1			Post-Intervention Measurements (s.d.) Day 10		
	SE	SES	ATTACH	SE	SES	ATTACH
Control (n=20)	60.55 (9.5)	83 (5.9)	76 (10.9)	66.55 (8.5)	79.40 (8.07)	85.68 (6.2)
Toy (n=20)	58 (8.9)	69.5 (12.4)	81 (10)	66.85 (4.92)	83.05 (11.48)	84.785 (6.22)
TAC-TIC (n=20)	61.3 (9.4)	70.5 (9.3)	79.8 (5.5)	72 (6.54)	95.10 (5.53)	89.35 (3.72)

Therefore, in order to test H1 a one-way ANCOVA (1x3) was used (mothers pre-intervention scores were used as the covariate) and revealed that there was a significant main effect of Developmental Support Group with all 3 post-intervention measurements; namely Maternal Self-Efficacy ($F=4.590$, $df=2$, $p=0.014$), Maternal Self-Esteem ($F=3.37$, $df=2$, $p=0.001$), and Maternal Postnatal Attachment ($F=4.63$, $df=2$, $p=0.014$). In order to ascertain which Group significantly explained the variance in maternal Self-efficacy, self-esteem and postnatal attachment, and because these differences were anticipated a series of unrelated t-tests were carried out. Post hoc analysis revealed that there were no significant differences with post-intervention maternal self-efficacy, self-esteem, postnatal attachment between the placebo/control and toy group. However, there were significant differences

between (1) post-intervention maternal self-efficacy ($t=2.270$, $df=38$, $p=0.029$), self-esteem ($t=7.173$, $df=38$, $p=0.001$) and postnatal attachment ($t=2.267$, $df=38$, $p=0.03$) and the placebo/control and TAC-TIC group, and (2) significant differences between post-intervention maternal self-efficacy ($t=2.812$, $df=38$, $p=0.008$), self-esteem ($t=4.227$, $df=38$, $p=0.0002$) and postnatal attachment ($t=2.814$, $df=38$, $p=0.008$) and the toy and TAC-TIC group. In both instances, the TAC-TIC group mothers had higher mean self-efficacy, self-esteem and postnatal attachment scores than the other two groups.

Was there a difference between group and post-test measure subscales?

After ascertaining that there were significant differences between groups and the overall questionnaire scores of self-efficacy, self-esteem and attachment an analysis was also carried out between the groups and each subscale of the respective construct. The descriptive data for each construct and subscale is provided in table 6.5 below.

Comparison of Groups on the post-test Self-Efficacy Subscales

Thus, a one-way ANCOVA (1x3) revealed that there were significant differences between mothers' self-efficacy scores and group of subscale 2 only (Evoking changes in their baby's behaviour; $F=4.94$, $df=2$, $p=0.011$). A post hoc Scheffe test was carried out and the differences in scores were between the TAC-TIC and Control Group ($p=0.014$) and the TAC-TIC and Toy Group only ($p=0.01$). In both instances, the TAC-TIC group mothers had higher mean self-efficacy subscale scores than the other two groups.

Comparison of Groups on the post-test Self-Esteem Subscales

A one-way ANCOVA (1x3) revealed that there were significant differences between mothers' self-esteem scores and group on all subscales; subscale 1 (Caretaking ability;

F=6.023, df=2, p=0.004), subscale 2 (General ability and preparedness for mothering role; F=13.42, df=2, p=0.0002), subscale 3 (Acceptance of baby; F=16.13, df=2, p=0.0001), subscale 4 (Expected relationship with the baby; F=11.419, df=2, p=0.0002), and subscale 5 (Feelings concerning pregnancy, labour and delivery; F=13.87, df=2, p=0.0003). A post hoc Scheffe test was carried out and the differences in scores were between the TAC-TIC and Control Group (p=0.007) and the TAC-TIC and Toy Group only (p=0.01) for subscale 1 (Caretaking ability); the TAC-TIC and Control Group (p=0.02) and the TAC-TIC and Toy Group only (p=0.0001) for subscale 2 (General ability and preparedness for mothering role); the Control and Toy Group (p=0.0002) and the Control and TAC-TIC Group only (p=0.0001) for subscale 3 (Acceptance of baby); the TAC-TIC and Control Group (p=0.0002) and the TAC-TIC and Toy Group only (p=0.01) for subscale 4 (Expected relationship with the baby); and the TAC-TIC and Control Group (p=0.0003) and the TAC-TIC and Toy Group only (p=0.003) for subscale 5 (Feelings concerning pregnancy, labour and delivery). In all cases, except subscale 3, the mothers in the TAC-TIC group had a higher mean self-esteem subscale score than the other two groups. On subscale 3, mothers in the control group were lower than the other two groups.

Comparison of Groups on the post-test Postnatal Attachment Subscales

A one-way ANCOVA (1x3) revealed that there were significant differences between mothers' postnatal Attachment scores and group of subscales 1 (Quality of attachment; F=3.881, df=2, p=0.026) and 3 (Pleasure in interaction; F=4.16, df=2, p=0.021) only. A post hoc Scheffe test was carried out and the differences in scores on subscale 1 lay between the Toy and TAC-TIC group (p=0.04) as did subscale 3 (p=0.049). In both instances, the TAC-TIC group mothers had higher mean postnatal attachment subscale scores than the toy group.

Table 6.5 Mean (s.d.) maternal self-efficacy, self –esteem and Attachment post-test subscale scores supporting programme/intervention by group

Group	<i>Self-Efficacy - Mean (s.d.)</i>				
	<i>Subscale 1 – Caretaking procedures</i>	<i>Subscale 2 – Evoking changes in their baby’s behaviour</i>	<i>Subscale 3 – Reading their baby’s behaviour or signalling</i>	<i>Subscale 4 – Situational Issues</i>	
<i>Control</i>	<i>13 (2.87)</i>	<i>23.32 (3.18)</i>	<i>19.6 (2.46)</i>	<i>10.6 (1.18)</i>	
<i>Toy</i>	<i>13.6 (2.21)</i>	<i>23.25 (2.27)</i>	<i>19.1 (2.25)</i>	<i>10.9 (0.96)</i>	
<i>TAC-TIC</i>	<i>13.85 (1.84)</i>	<i>26 (2.75)</i>	<i>20.75 (2.43)</i>	<i>11.4 (0.99)</i>	
	<i>Self-Esteem - Mean (s.d.)</i>				
	<i>Subscale 1 – Caretaking ability</i>	<i>Subscale 2 – General ability and preparedness for mothering role</i>	<i>Subscale 3 – Acceptance of baby</i>	<i>Subscale 4 – Expected relationship with the baby</i>	<i>Subscale 5 – Feelings concerning pregnancy, labour and delivery</i>
<i>Control</i>	<i>18.6 (2.54)</i>	<i>27 (3.03)</i>	<i>7.5 (1.88)</i>	<i>14.75 (1.61)</i>	<i>11.8 (1.28)</i>
<i>Toy</i>	<i>18.75 (3.02)</i>	<i>25.3 (4.04)</i>	<i>9.7 (1.34)</i>	<i>15.85 (2.96)</i>	<i>13.45 (2.95)</i>
<i>TAC-TIC</i>	<i>21.55 (2.86)</i>	<i>29.95 (2.59)</i>	<i>10 (0.56)</i>	<i>17.8 (1.06)</i>	<i>15.8 (1.54)</i>
	<i>Postnatal Attachment - Mean (s.d.)</i>				
	<i>Subscale 1 – Quality of attachment</i>	<i>Subscale 2 – Absence of hostility</i>		<i>Subscale 3 – Pleasure in interaction</i>	
<i>Control</i>	<i>38.77 (3.07)</i>	<i>22.65 (2.32)</i>		<i>23.75 (2.02)</i>	
<i>Toy</i>	<i>37.39 (2.99)</i>	<i>23.15 (2.33)</i>		<i>23.65 (2.2)</i>	
<i>TAC-TIC</i>	<i>39.72 (2.59)</i>	<i>23.75 (2.92)</i>		<i>25 (1.0)</i>	

Was there a difference from pre-test to post test for between and within each group with each construct total score?

Following on from the findings above it was investigated whether mothers' Self-efficacy, self-esteem and attachment scores significantly increased from day 1 (also known as pre-test) to day 10 (post-test) of the study period between/within each group. Between subjects analysis was conducted using a 2 (day of test) x 3 (Intervention group) ANCOVA to examine whether one group showed a particular greater increase than any other, in either, maternal self-efficacy, self-esteem or attachment. The results indicated that there was a significant interaction between the day the test was applied and the group that the mother belonged to for self-efficacy ($F=5.32$, $df=2$, $p=0.03$), self-esteem ($F=11.71$, $df=2$, $p=0.0001$), and attachment ($F=3.166$, $df=2$, $p=0.04$). Post hoc analyses using Scheffe indicated that as regards self-efficacy the significant differences were between the Control and TAC-TIC group ($p=0.03$) and the Toy and TAC-TIC Group ($p=0.02$). With self-esteem the significant differences were between the Control and TAC-TIC group ($p=0.04$) and the Toy and TAC-TIC Group ($p=0.017$). With Attachment the significant differences were between the Control and TAC-TIC group ($p=0.02$) and the Toy and TAC-TIC Group ($p=0.03$). The interaction plots can be seen in figures 6.1, 6.2 and 6.3 (below) and in all instances, the TAC-TIC group showed a greater increase than the other two groups.

Figure 6.1 Interaction plot between day of test and intervention group for maternal self-efficacy.

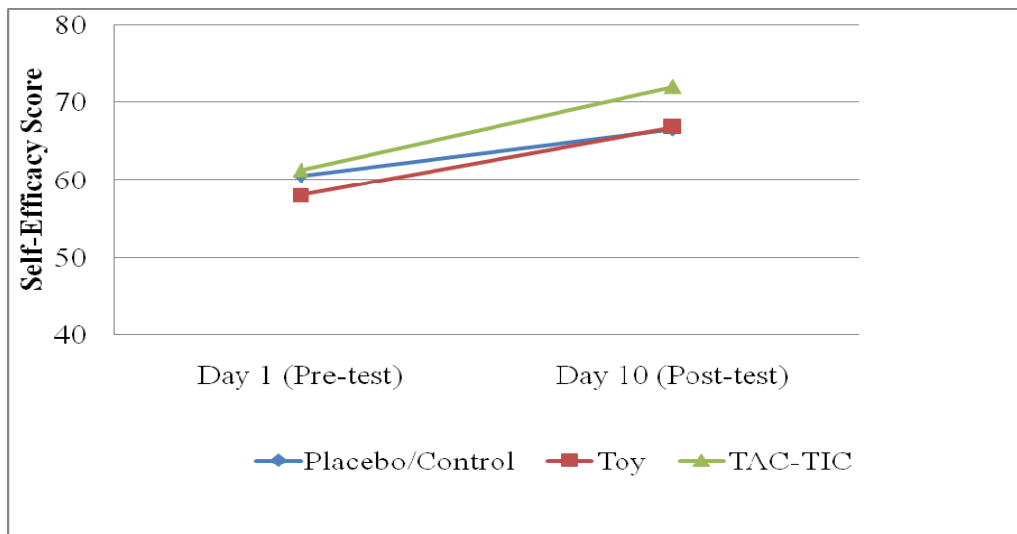


Figure 6.2 Interaction plot between day of test and intervention group for maternal self-esteem.

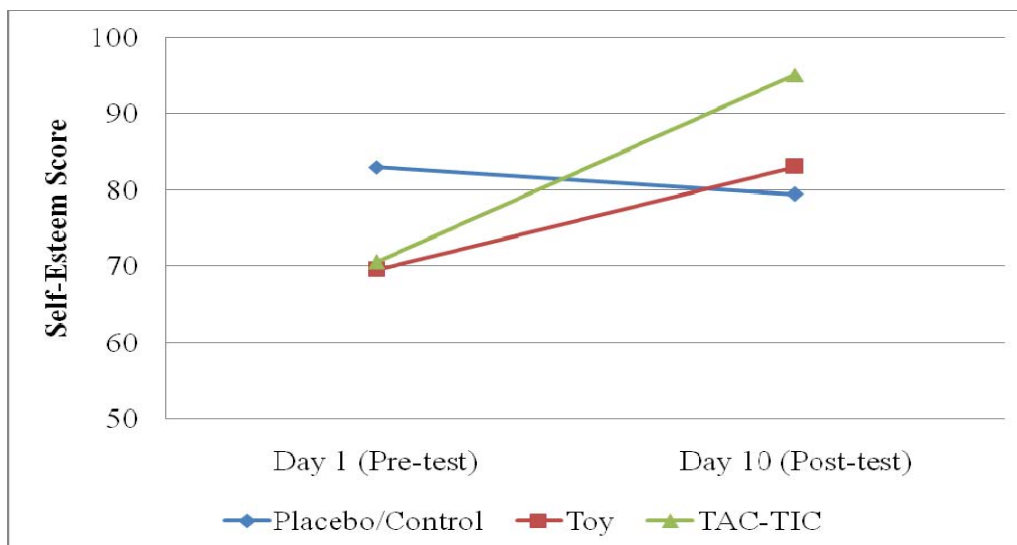
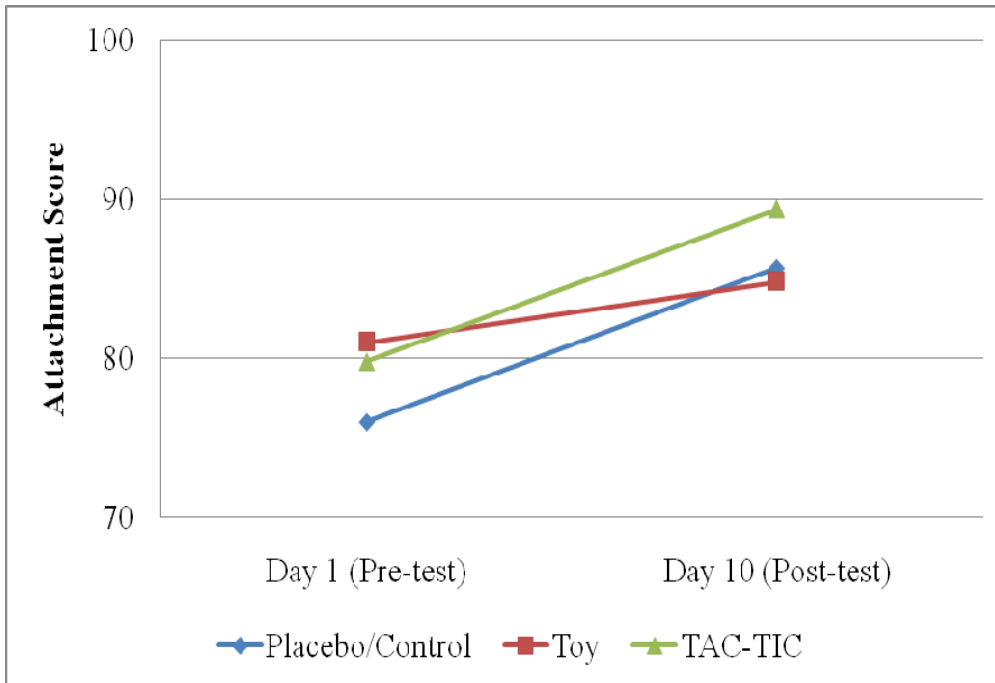


Figure 6.3 Interaction plot between day of test and intervention group for maternal attachment.



Within group analysis was performed using a series of paired sample t-tests. Firstly, analysis of the control group and changes between pre and post test measurements indicated a significant difference in self-efficacy ($t=-2.842$, $df=19$, $p=0.01$) but not self-esteem (n/s) or attachment (n/s). Secondly, analysis of the toy group and changes in pre and post test measurements revealed a significant difference in self-efficacy ($t=-6.692$, $df=19$, $p=0.0002$) and self-esteem ($t=-6.773$, $df=19$, $p=0.0001$) but not attachment (n/s). Finally, analysis of the TAC-TIC group and changes in pre and post test measurements revealed a significant difference in self-efficacy ($t=-6.96$, $df=19$, $p=0.0001$) self-esteem ($t=-13.142$, $df=19$, $p=0.0005$) and attachment ($t=-9.471$, $df=19$, $p=0.0001$). In all cases where there was a significant difference the post-test scores were always higher than the pre-test scores.

Was there a difference from pre-test to post test for each group and each subscale of each construct?

In addition to the findings immediately above it was investigated whether mothers' Self-efficacy, self-esteem and attachment *subscale* scores significantly increased from day 1 (pre-test) to day 10 (post-test) of the study period within each group. Figures 6.2 to 6.13 below show the mean and standard deviation scores for each subscale of each construct measured at day 1 and day 10 of the study period. In addition, in all cases reported below where there was a significant difference, the post-test subscale scores were always higher than the pre-test scores.

Analysis of the control group

Thus, within group analysis was performed using a series of paired sample t-tests. The analysis revealed that Self-efficacy Subscale 1 (Caretaking procedures; $t=-2.364$, $df=19$, $p=0.02$), 2 (Evoking changes in their baby's behaviour; $t=-2.930$, $df=19$, $p=0.009$), and 3 (Reading their baby's behaviour or signalling; $t=-3.169$, $df=19$, $p=0.005$) significantly increased from day 1 to day 10 of the study period, but not subscale 4 (Situational Issues). There were no significant changes in self-esteem or attachment subscale scores for the Control group.

Analysis of the Toy group

A series of paired sample t-tests were also used here. The analysis revealed that Self-efficacy Subscale 1 (Caretaking procedures; $t=-5.005$, $df=19$, $p=0.0002$), 2 (Evoking changes in their baby's behaviour; $t=-5.048$, $df=19$, $p=0.0009$), 3 (Reading their baby's behaviour or signalling; $t=-4.694$, $df=19$, $p=0.0002$) and 4 (Situational Issues; $t=-3.249$, $df=19$, $p=0.004$) significantly increased from day 1 to day 10 of the study period. In

addition, an analysis of Self-Esteem revealed that Subscale 1 (Caretaking ability; $t=-3.866$, $df=19$, $p=0.001$), 3 (Acceptance of baby; $t=-3.392$, $df=19$, $p=0.003$), 4 (Expected relationship with the baby; $t=-4.88$, $df=19$, $p=0.0002$) and 5 (Feelings concerning pregnancy, labour and delivery; $t=-6.47$, $df=19$, $p=0.0001$) significantly increased from day 1 to day 10 of the study period, but not subscale 2. There were no significant changes in attachment subscale scores for the Toy group.

Analysis of the TAC-TIC group

Using a series of paired sample t-tests the analysis revealed that Self-efficacy Subscale 1 (Caretaking procedures; $t=-5.104$, $df=19$, $p=0.0002$), 2 (Evoking changes in their baby's behaviour; $t=-5.715$, $df=19$, $p=0.0002$), 3 (Reading their baby's behaviour or signalling; $t=-5.304$, $df=19$, $p=0.0003$) and 4 (Situational Issues; $t=-4.333$, $df=19$, $p=0.0005$) significantly increased from day 1 to day 10 of the study period. In addition, an analysis of Self-Esteem revealed that Subscale 1 (Caretaking ability; $t=-5.724$, $df=19$, $p=0.0001$), 2 (General ability and preparedness for mothering role; $t=-5.718$, $df=19$, $p=0.0001$), 3 (Acceptance of baby; $t=-4.413$, $df=19$, $p=0.0005$), 4 (Expected relationship with the baby; $t=-5.118$, $df=19$, $p=0.0004$) and 5 (Feelings concerning pregnancy, labour and delivery; $t=-5.621$, $df=19$, $p=0.001$) significantly increased from day 1 to day 10 of the study period, but not subscale 2. Also, analysis of Attachment Subscale 1 (Quality of attachment; $t=-5.861$, $df=19$, $p=0.0001$), 2 (Absence of hostility; $t=-4.585$, $df=19$, $p=0.0005$), and 3 (Pleasure in interaction; $t=-4.243$, $df=19$, $p=0.0007$) significantly increased from day 1 to day 10 of the study period.

Figure 6.4 Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 1 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

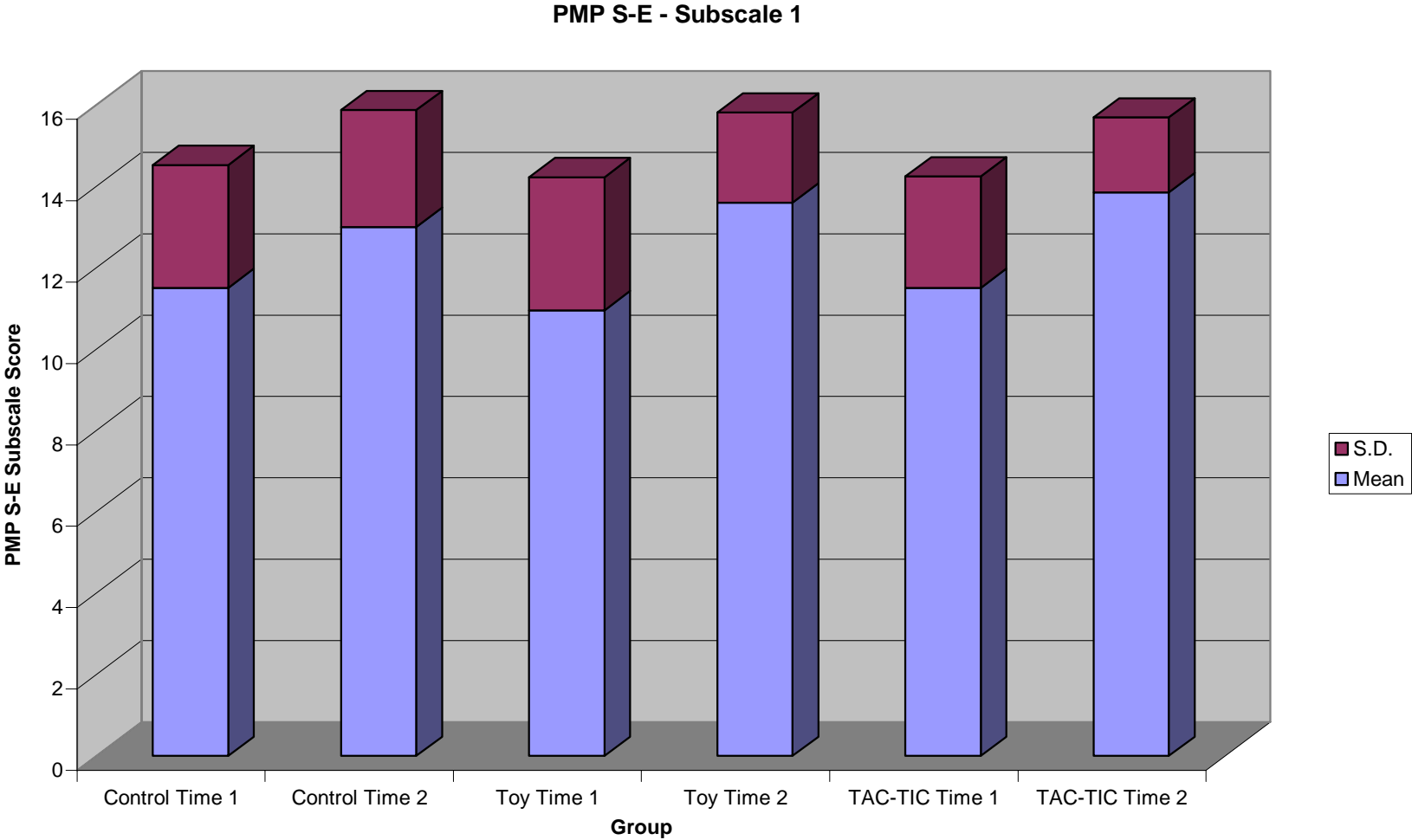


Figure 6.5 Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 2 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

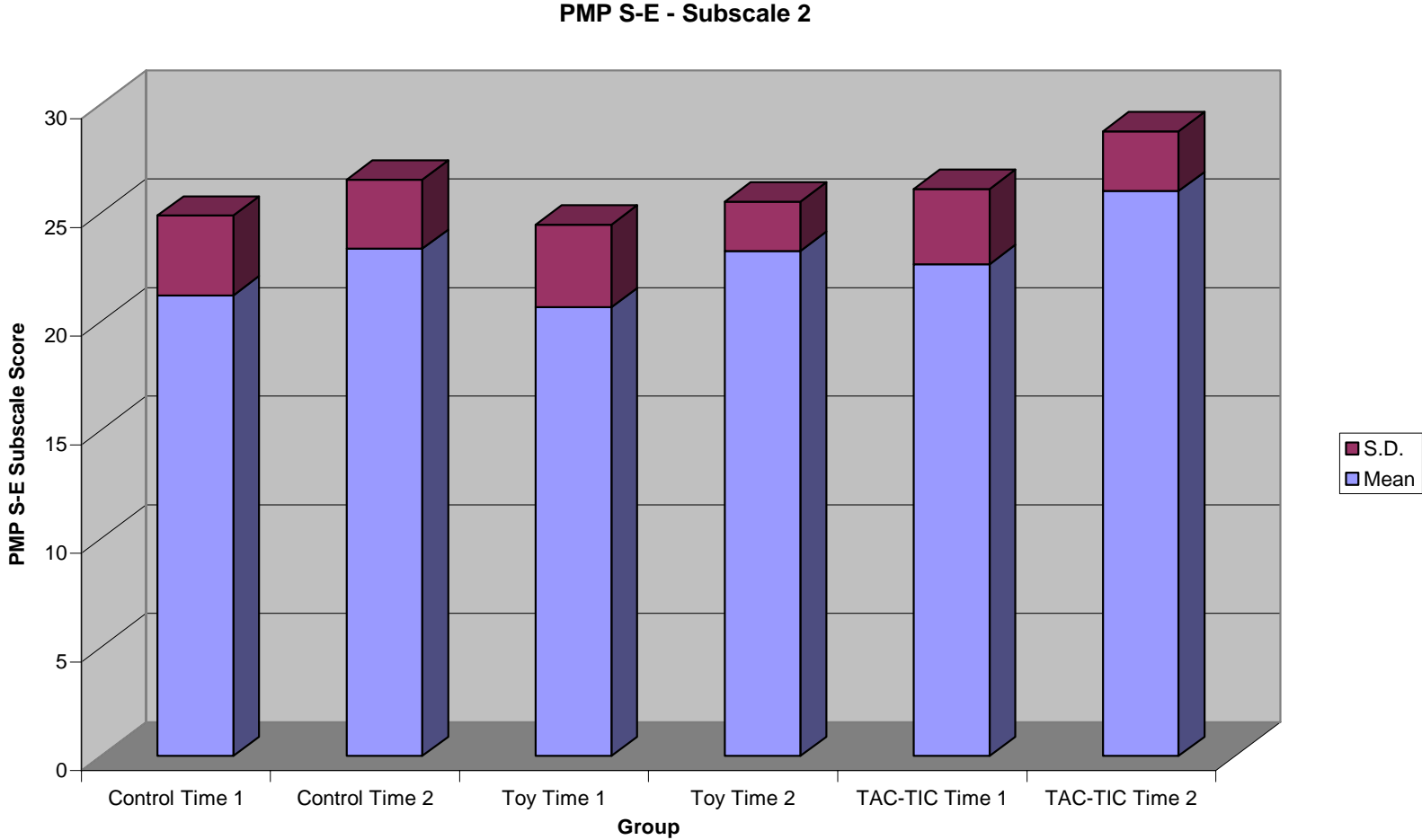


Figure 6.6 Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 3 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

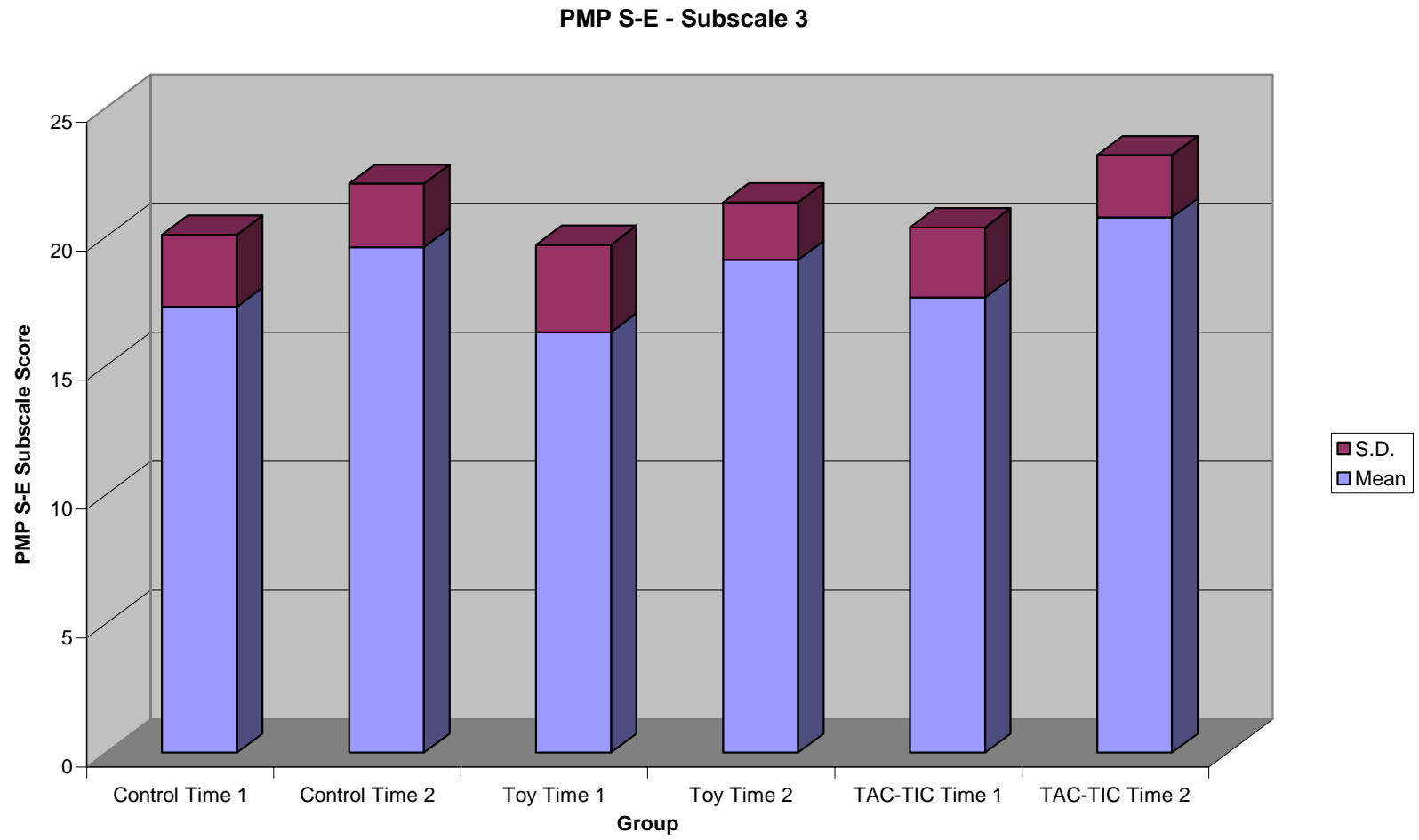


Figure 6.7 Perceived Maternal Parenting Self-Efficacy (PMP S-E) subscale 4 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

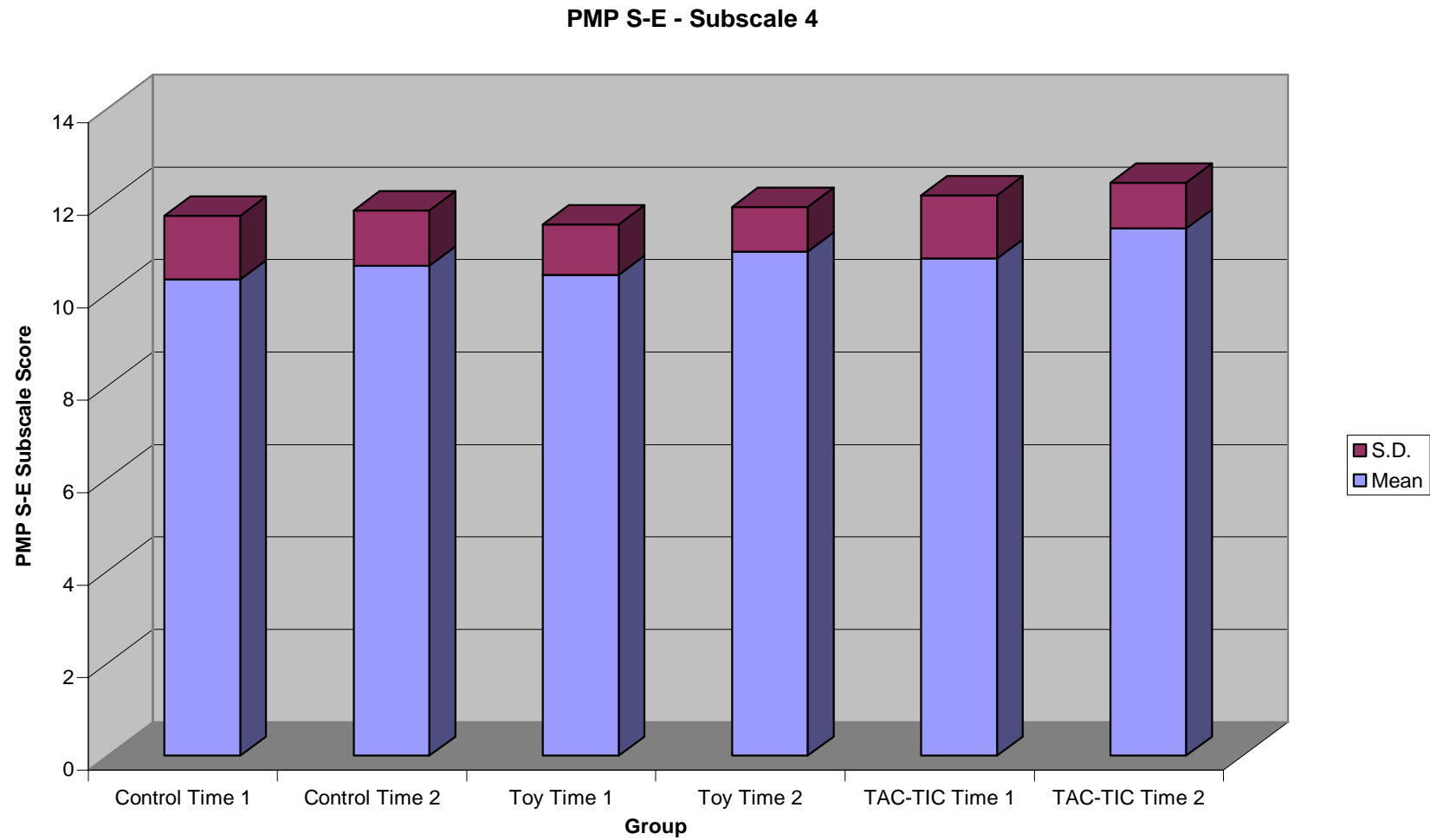


Figure 6.8 Maternal Postnatal Attachment subscale 1 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

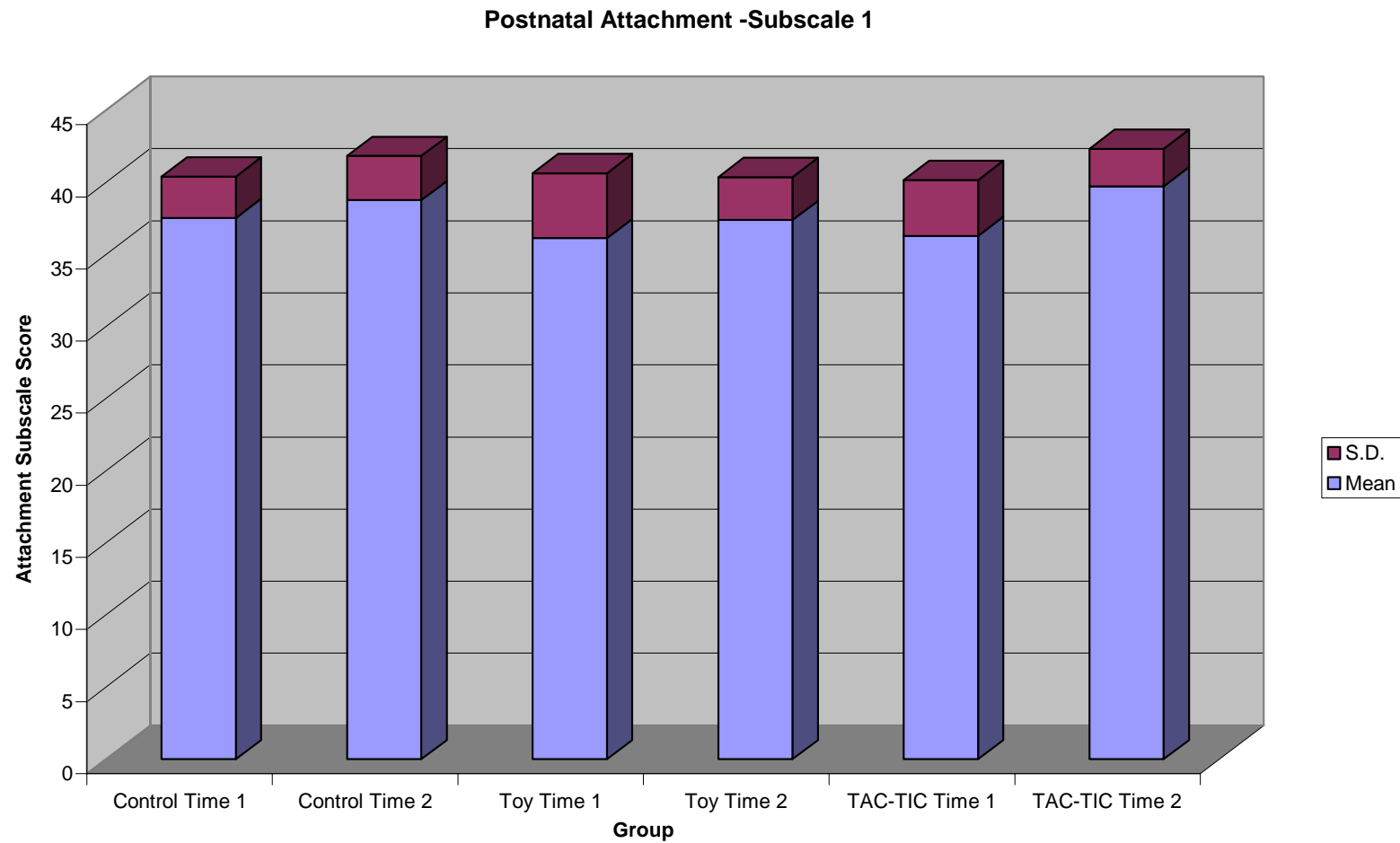


Figure 6.9 Maternal Postnatal Attachment subscale 2 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

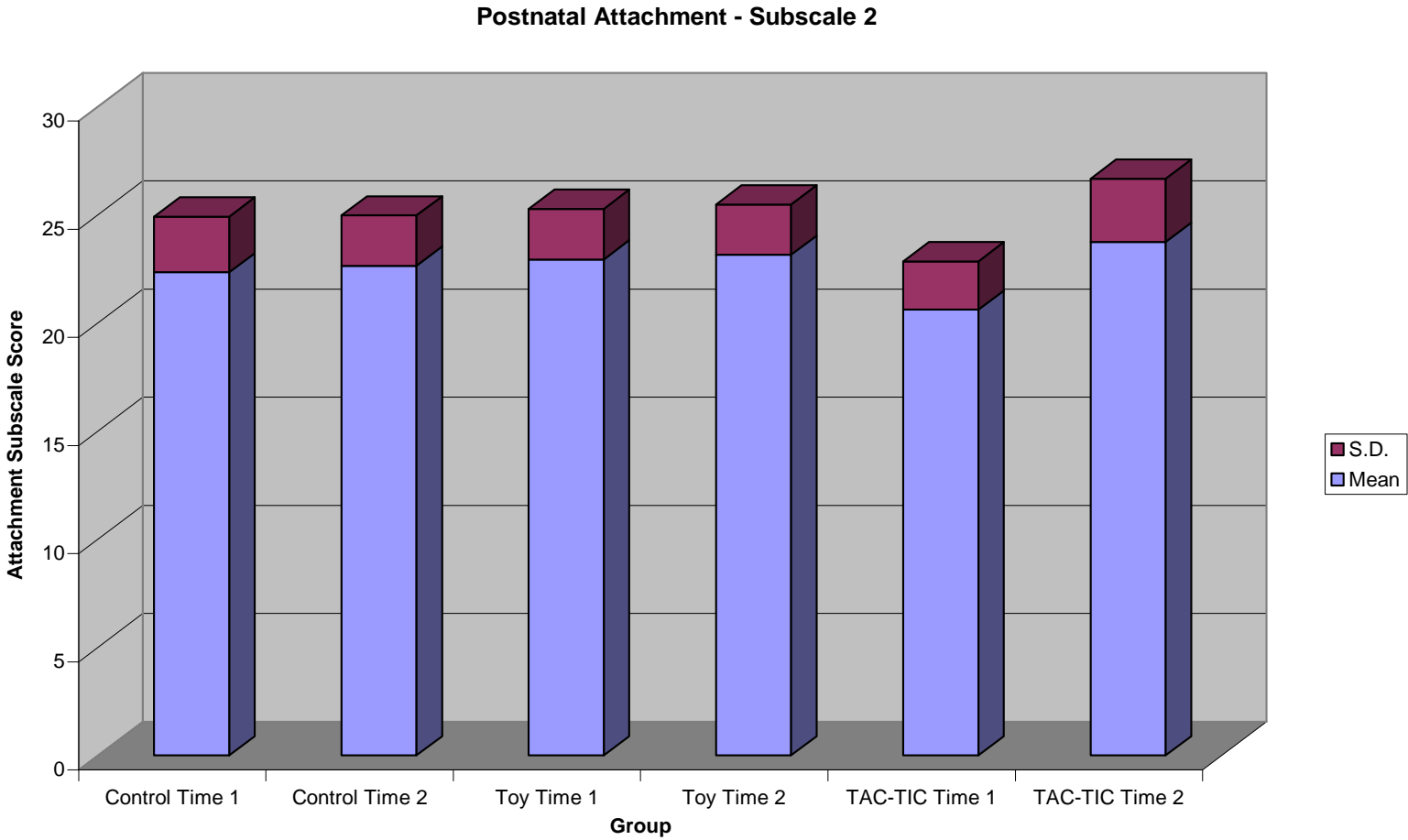


Figure 6.10 Maternal Postnatal Attachment subscale 3 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

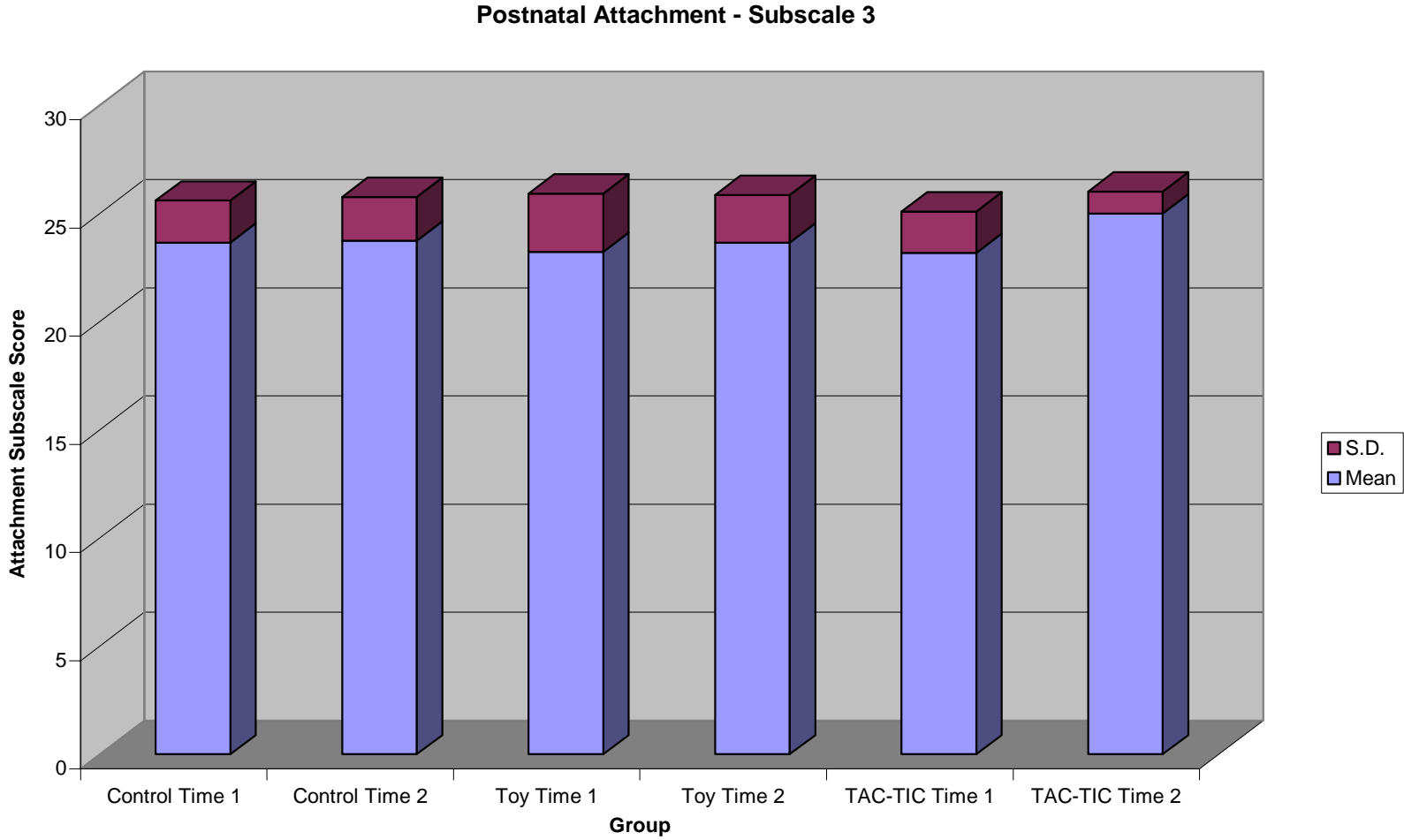


Figure 6.11 Maternal Self-Esteem subscale 1 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

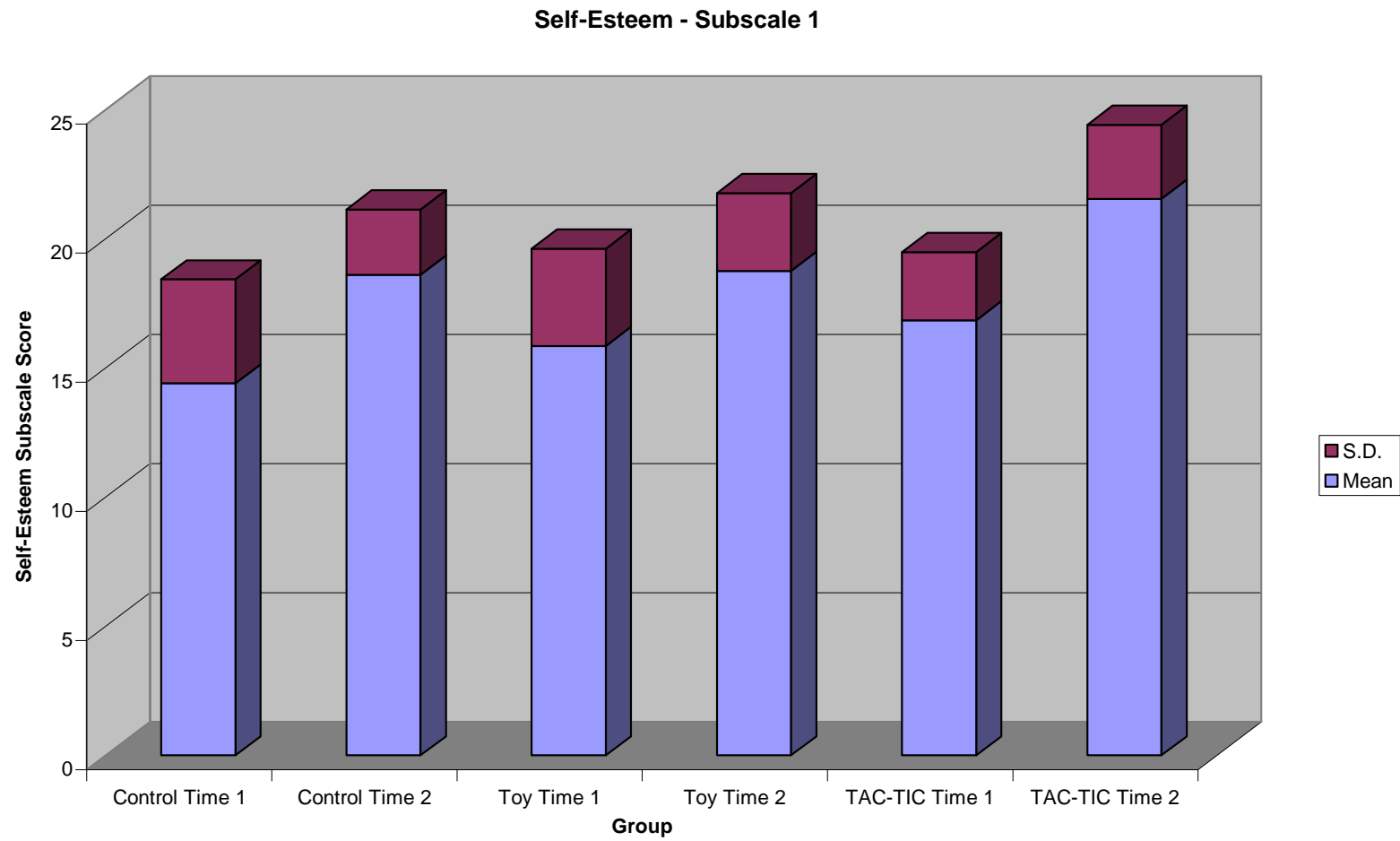


Figure 6.12 Maternal Self-Esteem subscale 2 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

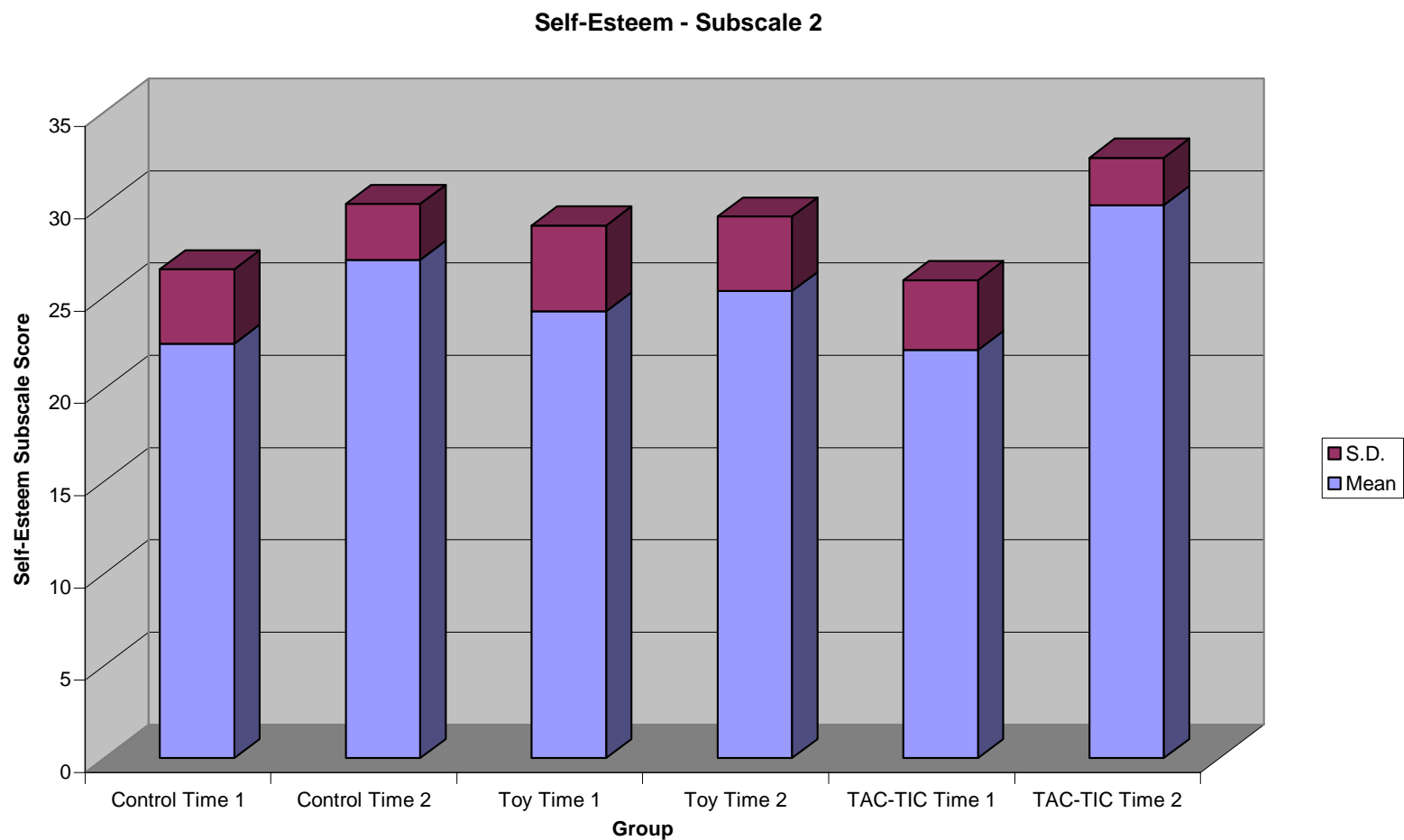


Figure 6.13 Maternal Self-Esteem subscale 3 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

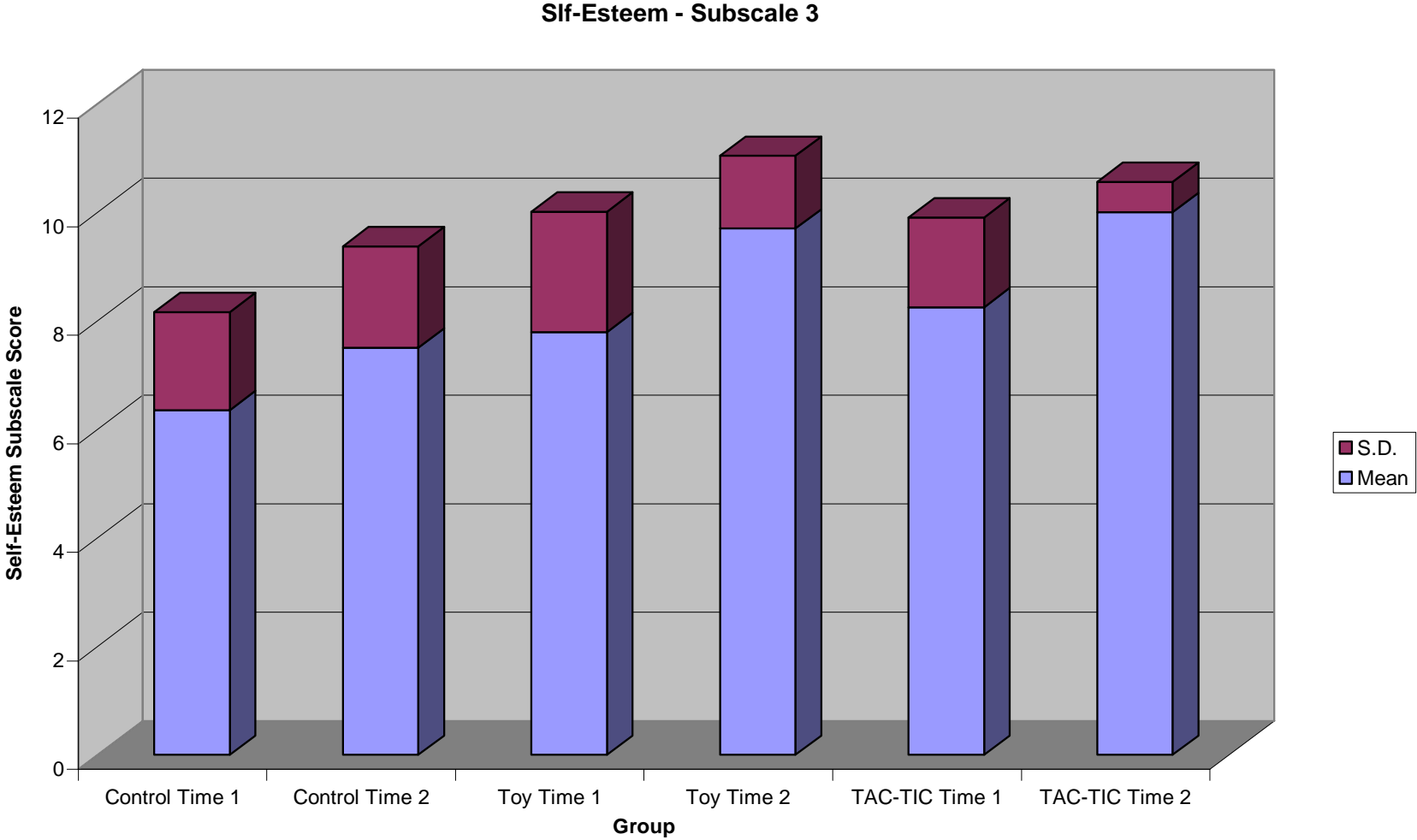


Figure 6.14 Maternal Self-Esteem subscale 4 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention

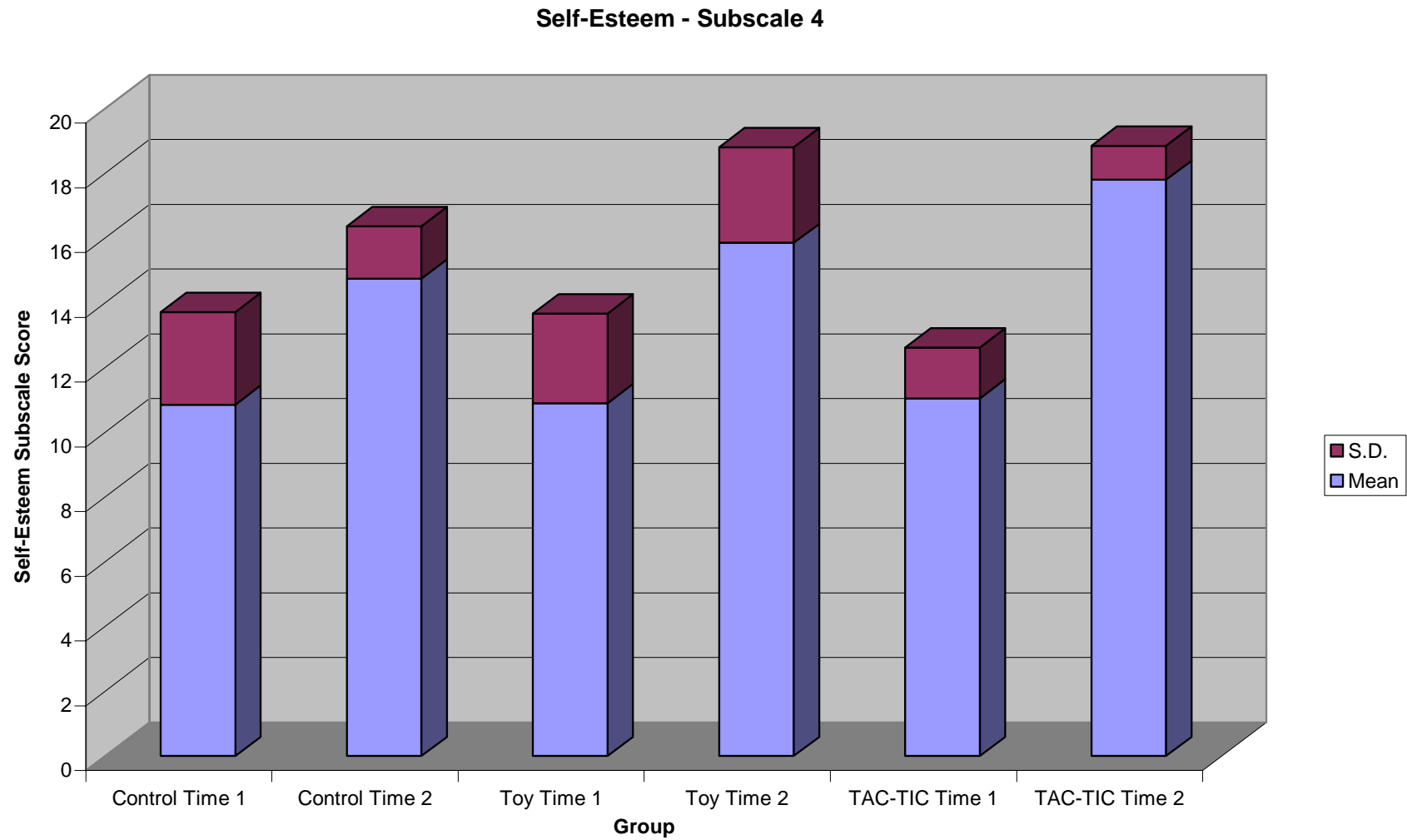
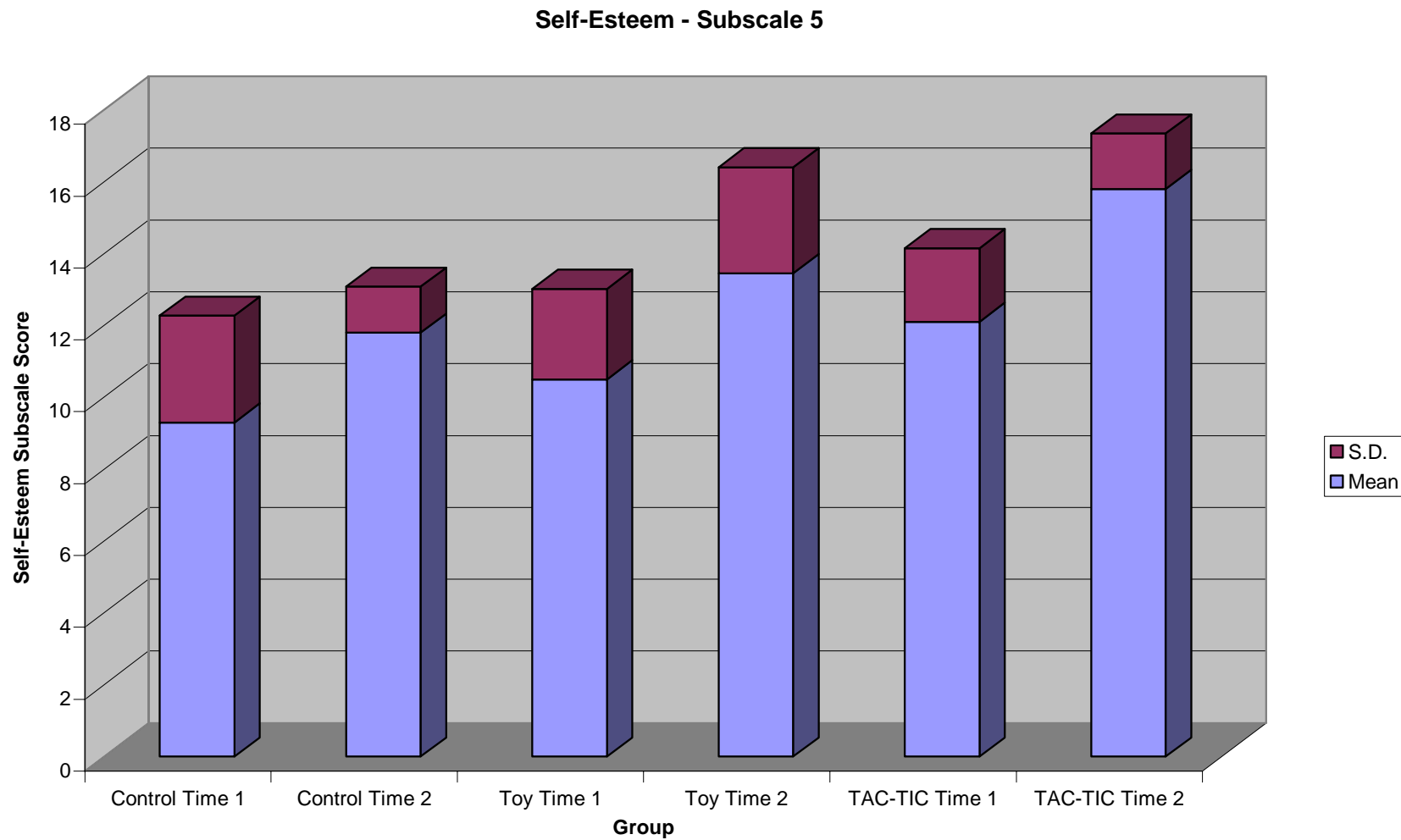


Figure 6.15 Maternal Self-Esteem subscale 5 mean score (s.d.) by group measured at pre- (time 1) and post- (time 2) supporting programme/intervention



SECTION 2.1 – Analysis of the differences between overall preterm state (e.g. Low activity) by cluster group (developmental support or placebo/control), by study period, and also by session phase (e.g. 9 minute period; baseline, supporting programme or after supporting programme/intervention).

In this section only part of subsidiary hypothesis H2 will be dealt with (italiced), i.e. H2- *It is predicted that the differences between the length of time spent in behavioural states (e.g. Low Activity) will be significantly explained by the Developmental Support group.* Please note that this part of section 2 examines (1) the differences between each group and the amount of time spent in that state across each phase (i.e. baseline, supporting programme or after supporting programme/intervention), (2) the differences within each group and the amount of time spent across each phase, and (3) the difference between group and the amount of time spent in each state between the first 5 days of the study period and the last 5 days of the study period. Also, please note that as the time spent in both High activity (HA) and Crying (CR) were negligible these were eliminated from analyses. Please note that graphic examples of the various states can be seen in Appendix 3.

(1) Was there a difference between group and the amount of LA/MA State and by phase?

Therefore, a one-way ANOVA (1x3) revealed that there was not a significant difference between the amount of time that babies spent in the Low activity state (ns) or Medium activity state (ns) during the baseline phase of all groups. However, there was a significant difference between both Low activity (F=8.96, df=57, p=0.0001) and Medium Activity state (F=9.67, df=57, p=0.001) and the supporting programme/intervention phase and the Low activity (F=10.336, df=57, p=0.0001) and Medium Activity state (F=10.831, df=57, p=0.0001) and the after supporting programme/intervention phase.

As these predictions were not made a priori a post hoc Scheffe test was used to find out which of the groups these differences were between. The analyses revealed that in the supporting programme phase there was a significant difference between the Low activity state of the toy group and both the Control (0.024) and TAC-TIC group (0.001) but not between the Control and TAC-TIC (ns). Similarly, analyses of the after supporting programme/intervention phase revealed a significant difference between the Low activity state of the toy group and both the Control (0.005) and TAC-TIC group (0.0001) but not between the Control and TAC-TIC (ns). Furthermore, the analyses revealed that in the supporting programme phase there was a significant difference between the Medium activity state of the toy group and both the Control (0.034) and TAC-TIC group (0.0001) but not between the Control and TAC-TIC (ns). Also, analyses of the after supporting programme/intervention phase revealed a significant difference between the Medium activity state of the toy group and both the Control (0.007) and TAC-TIC group (0.0001) but not between the Control and TAC-TIC (ns). In all the comparisons made above and as can be identified in table 6.7 (below) the babies in the Toy group spent the longest time in a low activity state and the least time in medium activity both during and after supporting programme as compared to the other groups. The descriptive data can be seen in both tables 6.6 and 6.7 below.

Table 6.6 - A table to show the mean time babies spent in each behavioural state

(sec's) per 9 minute daily session by developmental Support / Placebo Control Groups

Developmental Support or Placebo Control Group	Seconds (mean [s.d.])			
	LA	MA	HA	CR
Control	407 (109.3)	127 (100.7)	1 (0) no mean available 1 occurrence	5.25 (0) no mean available 1 occurrence
Toy	479 (62.39)	60 (50.14)	0	0
TAC-TIC	386 (82.49)	153 (85.81)	0	0

Key: LA = Low Activity; MA=Medium Activity; HA=High Activity; CR=Crying

Table 6.7. A table to show the overall mean (s.d.) time babies spent in each behavioural state (seconds) for all sessions by developmental Support / Placebo Control Group and Phase

Developmental Support / Placebo Control Group	Baseline - Phase (A)				Supporting Programme/Intervention Phase (B)				After Supporting Programme Phase (A)			
	LA	MA	HA	CR	LA	MA	HA	CR	LA	MA	HA	CR
	Seconds (mean[s.d.])				Seconds (mean[s.d.])				Seconds (mean[s.d.])			
Control	1371 (342.9)	419 (332.08)	0	1	1367 (395.4)	406 (359.5)	0.1	0.9	1332 (382.7)	440 (352.6)	0.1	1.8
Toy	1508 (225.7)	291 (225.7)	0	0	1640 (234.03)	159 (234.03)	0	0	1649 (212.7)	150 (212.7)	0	0
TAC-TIC	1371 (261.9)	428 (261.9)	0	0	1239 (265.7)	560 (265.7)	0	0	1250 (257.1)	549 (257.1)	0	0
<i>Overall Phase Totals</i>	1417 (283.9)	379 (279.32)	0	1	1415 (345.3)	375 (331.4)	0.1	0.9	1410 (336.4)	380 (323.6)	0.1	0.6

Key: LA = Low Activity; MA=Medium Activity; HA=High Activity; CR=Crying

* (LA/MA/HA/CR) for that particular phase (e.g. supporting programme/intervention)

(2) Was there a difference within group between State (LA and MA) and phase?

Firstly, analyses of the Control group suggests that there was not a significant difference between the phases (baseline, supporting programme or after supporting programme/intervention) and the amount of time that the baby spent in Low Activity state (ns) or Medium Activity State (ns).

Secondly, analyses of the Toy group suggests that there was a significant difference between the phases (baseline, supporting programme or after supporting programme/intervention) and the amount of time that the baby spent in Low Activity state ($F=12.538$, $df=19$, $p=0.002$). A series of paired sample t-tests revealed that these differences lay between only 2 of the phases; that is from baseline to supporting programme ($t=-3.226$, $df=19$, $p=0.004$), from baseline to after supporting programme ($t=-3.541$, $df=19$, $p=0.002$), but not from the supporting programme to after (ns) phase. In this instance, the babies spent less time in Low Activity at 'baseline' but more during the 'supporting programme' and 'after the supporting programme'. Also, analyses of the amount of time that the baby spent in Medium Activity state for the Toy group between the phases (baseline, supporting programme or after supporting programme/intervention) was also significant ($F=12.538$, $df=19$, $p=0.002$). A series of paired sample t-tests revealed that these differences lay between only 2 of the phases; that is from baseline to supporting programme ($t=3.226$, $df=19$, $p=0.004$) and from baseline to after supporting programme ($t=3.541$, $df=19$, $p=0.002$), but not from the supporting programme to after (ns) phase. In this case, the babies spent the most time in medium Activity at 'baseline' and the least during the 'supporting programme' and 'after the supporting programme'.

Finally, analyses of the TAC-TIC group suggests that there was a significant difference between the phases (baseline, supporting programme or after supporting programme/intervention) and the amount of time that the baby spent in Low Activity state ($F=5.971$, $df=19$, $p=0.024$). A series of paired sample t-tests revealed that these differences lay between all three phases; that is from baseline to the supporting programme ($t=2.856$, $df=19$, $p=0.01$), from baseline to after the supporting programme ($t=2.444$, $df=19$, $p=0.024$), and from the supporting programme to after ($t=5.943$, $df=19$, $p=0.0001$) phase. In this instance, the babies spent the most time in Low Activity at baseline, they spent less time during and after the supporting programme, and the least time in Low Activity during the supporting programme. Also, analyses of the amount of time that the baby spent in Medium Activity state for the TAC-TIC group between the phases (baseline, supporting programme or after supporting programme/intervention) was also significant ($F=5.971$, $df=19$, $p=0.024$). A series of paired sample t-tests revealed that these differences lay between only the first 2 phases; that is from baseline to the supporting programme ($t=-2.856$, $df=19$, $p=0.01$) and from baseline to after the supporting programme ($t=2.444$, $df=19$, $p=0.024$), but not from the supporting programme to after (ns) phase. In this case the babies spent the most time in Medium Activity during and after the supporting programme with the least time spent in this state occurring at baseline.

(3) Was there a difference between group and the amount of time spent in each state between the first 5 days of the study period and the last 5 days of the study period?

The descriptive statistics for the amount of time (in seconds) that babies spent in either medium or low activity level by group and by study period are shown below in table 6.7. A one-way ANOVA (1x3) revealed that during the first 5 days of the study

the babies amount of low activity state was significantly different between group ($F=3.73$, $df=57$, $p=0.03$) as was the second 5 days of the study period ($F=7.34$, $df=57$, $p=0.001$). Post hoc analyses using Scheffe revealed that the difference during the first 5 days was only between the control and toy group ($p=0.03$) and during the second 5 day period the difference was only between the toy and TAC-TIC group ($p=0.002$).

In both instances above the Toy group spent the most time in Low Activity than the control and TAC-TIC group in the first and the second 5 day period respectively. In addition, a One-way ANOVA (1x3) revealed that there was only a significant difference between medium activity during the second of the two 5 day periods ($F=8.32$, $df=57$, $p=0.001$). The post hoc analysis using Scheffe revealed that the differences lay between the control and TAC-TIC group ($p=0.018$) and the toy and TAC-TIC group only ($p=0.001$). In this case, the babies in the TAC-TIC Group spent more time in Medium Activity than the other two groups.

Between subjects analysis was also conducted using a 2 (Study period) x 3 (Intervention group) ANCOVA to examine whether one group showed a particular greater increase (or decrease) than any other in either, Low or Medium activity behavioural state. The results indicated that there was a significant interaction between the study period and the group that the baby belonged to for Low activity ($F=3.62$, $df=2$, $p=0.03$), and medium activity ($F=3.48$, $df=2$, $p=0.03$). Post hoc analyses using Scheffe indicated that as regards Low Activity the significant differences were between the Control and TAC-TIC ($p=0.001$), Toy and TAC-TIC group ($p=0.001$) and the Control and Toy Group ($p=0.02$). As concerns Medium activity the significant differences were between the Control and TAC-TIC ($p=0.001$),

Toy and TAC-TIC group ($p=0.0002$) and the Control and Toy Group ($p=0.04$). The interaction plots can be seen in figures 6.16 and 6.17 below.

Table 6.8. Mean (s.d.) time babies spent in low or medium activity by group and study period

Study period	Developmental Support / Placebo Control Group	Low Activity Seconds (mean[s.d.])	Medium Activity Seconds (mean[s.d.])
First 5 days	Control	2052 (745.9)	557 (715.4)
	Toy	2503 (303.2)	176 (301.6)
	TAC-TIC	2260 (411.8)	453 (400.9)
Second 5 days	Control	2035 (663.8)	592 (611.13)
	Toy	2276 (400.3)	423 (400.3)
	TAC-TIC	1601 (596.7)	1098 (596.73)

Figure 6.16 Interaction plot between study period and intervention group for preterm low activity state.

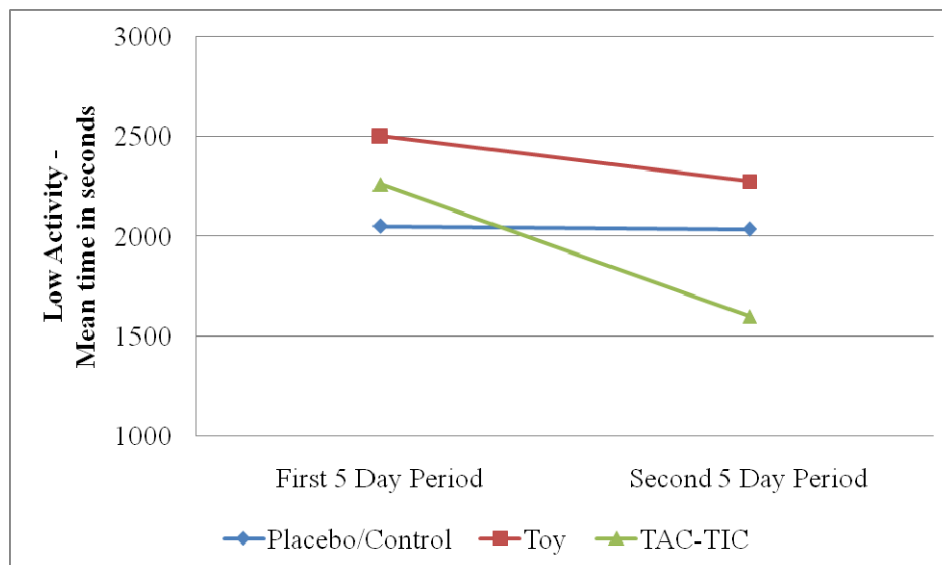
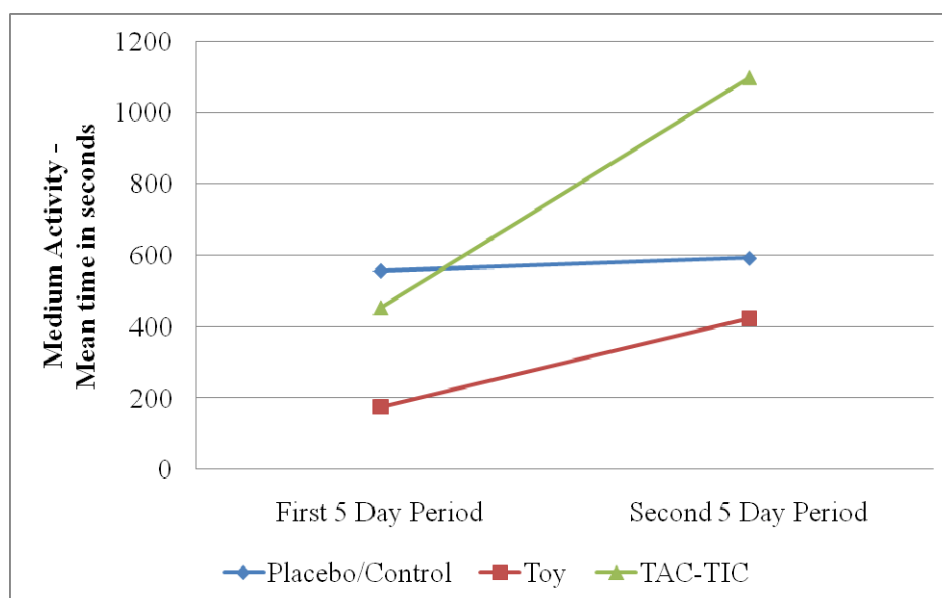


Figure 6.17 Interaction plot between study period and intervention group for preterm medium activity state.



SECTION 2.2 – Analysis of the differences between developmental support group and the Days that the baby spent in Unit (DIU)

In this section the second part of H2 will be dealt with, i.e. H2- It is predicted that the differences between the amount of time the baby spends in the neonatal unit [DIU] will be significantly explained by the Developmental Support group.

Was there a difference between Group and DIU (i.e. Baby outcomes)?

The average length of stay in the neonatal unit for the control group babies was 24.7 days (s.d. = 6.87), 37.05 days (s.d. = 3.74) for the Toy group, and 32.7 days (s.d. = 2.2) for the TAC-TIC group. A one-way ANOVA (1x3) revealed that there was a

significant main effect between group and the number of days the baby spent in the unit ($F=5.558$, $df=57$, $p=0.006$). As this prediction was made a priori a series of post hoc unrelated t-tests were carried out to ascertain between which groups these differences occurred. The analysis revealed that there were significant differences between the (1) control group and the toy group ($t=-3.06$, $df=38$, $p=0.004$) and (2) control group and TAC-TIC group ($t=-2.95$, $df=38$, $p=0.005$), with the control group spending the least time in the neonatal unit as compared to the other two groups.

SECTION 2.3 – Analysis of the differences between developmental support group and the baby’s weight gain (WG)

In this section the second part of H2 will be dealt with, i.e. H2- It is predicted that the differences between the amount of weight gained [WG] during the study period will be significantly explained by the Developmental Support group.

Was there a difference between Group and Weight Gain (i.e. Baby outcomes)?

A one-way ANOVA (1x3) revealed that there was a significant main effect between group and the amount of weight that the infant gained during the course of the study ($F=7.149$, $df=57$, $p=0.002$). As this prediction was made a priori a series of post hoc unrelated t-tests were carried out to ascertain between which groups these differences occurred. The analysis revealed that there were significant differences between the (1) control group and TAC-TIC group ($t=-4.26$, $df=38$, $p=0.0001$), and (2) Toy and TAC-TIC group ($t=-2.96$, $df=38$, $p=0.005$). The descriptive data can be seen in table 6.8 below and shows that the TAC-TIC group put on the most weight during the study period than the other two groups.

Table 6.9 Mean (s.d.) weight at study beginning (time 1 weight) and end (time 2 weight) and mean weight gain between time-1 and -2 (WG)

Group	Time-1 Weight	Time-2 Weight	Mean weight gain change between Time-1 to Time-2
<i>Control</i>	1.79 (0.32)	2.02 (0.32)	0.23 (0.02)
<i>Toy</i>	1.67 (0.42)	1.91 (0.38)	0.24 (0.04)
<i>TAC-TIC</i>	1.57 (0.26)	1.89 (0.31)	0.36 (0.02)

Was there a difference between the amount of weight gained between time point 1 and 2 for each group?

Following the between group analyses of weight gain within group analysis was performed to examine the differences between the amount that babies weighed on the day the study began (day 1) with the day the study ended (day 10) using a series of paired sample t-tests. Please note that it was established earlier in this chapter that there were no significant differences between group and either baby's birthweight or weight on the first day of the study. Thus, analysis of each group suggested that there were significant increases in weight between time-1 and time-2 weights for the control ($t=-9.86$, $df=19$, $p=0.0001$), toy ($t=-6.76$, $df=19$, $p=0.0002$), and TAC-TIC group ($t=-5.22$, $df=19$, $p=0.0001$).

Section 3 – (i) Analysis of the relationship between the constructs; Maternal self-efficacy, self-esteem and attachment and (ii) Analysis of the relationship between each individual construct (Maternal self-efficacy, self-esteem and attachment) and babies (1) behavioural state, (2) weight gain (WG) and (3) Days in Unit.

In section 3 the subsidiary hypotheses H3 will be dealt with i.e. H3- It is predicted that there is a significant relationship between maternal self-efficacy, self-esteem and attachment. A Pearson Product test revealed that there were significant correlations between (1) Self-efficacy and Self-esteem ($r=0.46$, $p=0.0001$), and (2) Self-efficacy and Attachment ($r=0.31$, $p=0.01$) but not between Self-Esteem and Attachment.

In this section the subsidiary hypotheses H4 will also be dealt with i.e.H4- It is predicted that there is a significant relationship between each of the variables tested in H3 (self-efficacy, self-esteem and attachment) and babies behavioural state, Days in Unit (DIU) and weight gain (WG). A Pearson Product moment correlation revealed that there was a significant relationship between Self-efficacy and the babies Medium activity behavioural state ($r=0.29$, $p=0.02$), and attachment and Medium activity behavioural state ($r=0.26$, $p=0.04$) only. No significant correlations were found between any of the constructs and either (1) preterm weight gain or (2) days that they spent in the neonatal unit.

6.4 - DISCUSSION

In the current chapter the main hypotheses investigated the mediatory effects of intervention/developmental support group upon (1) maternal cognitions and emotions, (2) preterm behavioural state, weight gain and Days that the preterm neonates spent in the neonatal unit (see section 6.2).

Thus, one of the first analyses carried out tested the main hypothesis for differences between mothers' post-intervention measurements and significant differences were found between all 3 developmental support groups. The descriptive data of mean maternal self-efficacy, self-esteem and attachment scores seemed to indicate that post-intervention scores were highest for the TAC-TIC group. Post hoc analyses confirmed this and that the TAC-TIC group had significantly higher maternal self-efficacy, self-esteem and postnatal attachment following intervention in contrast to the other two groups. The reasons why the TAC-TIC group have the highest scores are discussed further below in terms of the relevant theory and literature.

Therefore, from a theoretical perspective, the above findings provide evidence for the existence of a vertical coactional link between structured tactile sensory nurturing interventions (Environment) in particular TAC-TIC therapy and the psychological systems of the mother (i.e. Cognitions and emotion). In addition, these findings would seem to suggest that TAC-TIC therapy facilitates a vertical coaction which is beneficial to the mothers' cognitions and emotion, when the therapy has been administered by the mother to her own baby, and which was reflected by significant

increases in their levels of self-efficacy, self-esteem and attachment at post test period.

The justification for a beneficial coaction between TAC-TIC therapy and the psychological systems of the mother may be due to how she perceives her interactions with her baby. In particular, the degree to which mothers may feel that they are contributing to the well being of their baby and the interaction that occurs as a result of them performing TAC-TIC may be of especial importance. For example, it was found in the main study that babies in the TAC-TIC group were significantly more likely to come to an alert and inactive state (medium activity) during and following touch by the mother than the other 2 groups, they also spent less time in presumed sleep (low activity) and gained more weight over the course of the study period. Related studies which have specifically used TAC-TIC have shown that babies display improved and enhanced sucking development (Adamson-Macedo, 1985-6; De Roiste, 1996), whilst others (Hayes, 1996) demonstrate greater state organisation and increased comfort behaviours whilst receiving TAC-TIC. Anecdotally, the author of this thesis also notes that babies in the TAC-TIC group often displayed behaviours relative to the area being stimulated e.g. rooting movements when stroked around the mouth and grasping when the palm was touched. Therefore, it is proposed that these reactions and developments in the baby are cumulatively important occurrences for the mother who may see their baby's response to her strokes as an indication of her ability, self-worth as a mother, and as improvements in both the quality and pleasure of attachment. This line of reasoning may be further validated when considering 2 other important points. Firstly, the findings of this study imply that babies in the control group were less likely to change behavioural state across all phases and they

spent significantly less time awake than other groups. Secondly, in the vast majority of literature preterm babies are described as being low in alertness and wakefulness (Harrison, 1991; Chang et al., 2002), less responsive to social stimulation (Crnic, 1983), give less clear behavioural cues (Eckerman et al. 1994) and consequently they normally have to work much harder to engage their baby (Macey, 1987) which may often be met with unresponsive or unpredictable behaviour (Miles et al. 1991). Therefore, positive outcomes from receiving TAC-TIC, such as those illustrated may provide mothers with identifiable contrasts to the normal demeanour of their baby.

The results for the Toy group on the other hand suggested that there was no significant difference between mothers' post-intervention maternal self-efficacy, self-esteem and attachment. Instead, the differences were between the Toy group and the TAC-TIC group with mothers in the TAC-TIC group scoring significantly higher on all constructs. The reasons why mothers in the Toy group did not show significantly different post-intervention construct scores may in fact be due to the opposite reasons given for the TAC-TIC mothers above i.e. that the babies in the toy group were more likely to be asleep (low activity) in the supporting programme, at baseline and after the supporting programme with the toy, they put on less weight than TAC-TIC babies and on average spent the longest time on the Neonatal ward.

In addition, a Between subjects analysis was conducted using a 2 (day of test) x 3 (Intervention group) ANCOVA to examine whether one group showed a particular greater increase than any other, in either, maternal self-efficacy, self-esteem or attachment from day-1 to -10 of the study period. The results indicated that there was a significant interaction between the day the test was applied and the group that the

mother belonged to for self-efficacy, self-esteem, and attachment. The interaction plots demonstrated that the TAC-TIC group showed a significantly greater increase from day-1 (pre-test) to day-10 (post-test) in all 3 constructs as compared to the other two groups. This interpretation was further corroborated in light of, (1) the group mean scores for the corresponding constructs at the various test periods (as displayed in table 6.4 above), (2) the information gained from the results section which suggested that there were no baseline measures which were significantly different, and (3) the significant day-10 (post-test) ANCOVAs and relevant post hoc tests.

Self-efficacy subscales

Analysis of the self-efficacy subscale scores identified that the groups were only significantly different on subscale 2 (Evoking changes in their baby's behaviour) and that the TAC-TIC group had significantly higher scores on this subscale in comparison to the other groups. This particular finding is interesting because it indicates that it is one particular aspect of maternal parenting self-efficacy which is explaining the variance in self-efficacy scores between the groups. The reason why mothers in the TAC-TIC group may feel more capable to evoke behaviours such as e.g. soothing their baby when he/she becomes restless, fussy or has been crying, may be primarily due to the way the baby responds to them whilst they perform the therapy itself. For example, if the baby becomes more awake during touch and they do not cry, become restless or fussy then the mother may begin to believe that the baby responds well to her and that in turn they can also evoke other behaviours in their baby. The findings from testing hypothesis 4 would certainly seem to validate this claim primarily because significant correlations were found between preterm

behavioural state and maternal self-efficacy and attachment. However, maternal self-esteem was not significantly mediated by preterm behavioural state. It may be that whilst correlations exist between maternal self-efficacy and the other two constructs i.e. that increases in self-efficacy are related to increases in maternal self-esteem and attachment, behavioural state only affects the perceptions in the mothers' perceived ability to successfully perform a parenting activity and attachment than her feelings of self-worth as a mother.

Previous literature with older babies who are non-hospitalised would certainly seem to suggest that mothers who view their baby as less difficult or irritable (Halpern and Maclean, 1997) also have higher self-efficacy as are infants who are easily soothed (Lerkes and Crockenberg, 2002). What these findings may also represent is that the actions of mothers whether it be with the toy or with spontaneous touch (Placebo/Control group) have little effect upon changing the babies behavioural state during the supporting programme phase. This, in combination with other aspects of evoking changes in their baby's behaviour may lead them to lower beliefs in their ability to perform these types of activities with their baby.

Self-esteem subscales

Analysis of the self-esteem subscale scores identified that the groups were significantly different across all 5 of the subscales. The descriptive data appeared to illustrate that the TAC-TIC group have higher scores on all subscales. Post hoc analyses identified that the TAC-TIC group have significantly higher scores on all subscales except for subscale 3 (Acceptance of baby). Subscale 3 demonstrated significant differences only between the control and TAC-TIC/Toy group and not the

TAC-TIC and toy group. As a whole mothers in the TAC-TIC group have higher subscale scores than the other 2 groups which is perhaps because she appraises herself higher and she feels better as a mother (McGrath and Meyer, 1992). At this point it is important to point out that there is some debate surrounding the issue of whether self-esteem is related to how fussy and difficult the baby is. On the one hand there are those that believe that a mothers' self-esteem is largely dependent upon her success with interacting and caring for her baby (McGrath et al., 1993; Shea and Tronick, 1988) and those who do not (Zahr, 1991). The evidence provided from this study suggests that no negative behaviours were observed in the baby at almost any point. However, it is perhaps the outcomes from TAC-TIC therapy as illustrated earlier (e.g. increased awake periods and weight gain) that contribute to higher self-appraisals as mothers.

In relation to the toy group no differences were found between the toy and control on any subscales except 3 (Acceptance of the baby), and that all differences were found to exist between the toy and TAC-TIC group (Higher for the TAC-TIC group) except subscale 3. With sub-scale 3 the finding was reversed in contrast to the other subscales i.e. that the toy group mothers possessed higher self-esteem than the control group and that there was no difference with the TAC-TIC group. What this may represent is, as the subscale name suggests, they can normalise the situation they find themselves in and accept that they can use toys with their baby as may occur if they had given birth to a fullterm newborn.

Attachment subscales

Analysis of the postnatal Attachment subscale scores identified that the groups were significantly different across subscales 1 (Quality of attachment) and 3 (Pleasure in interaction) only. Post hoc analyses identified that the TAC-TIC group have significantly higher scores than the toy group only on subscales 1 and 3. At this point it is important to point out that attachment subscale scores were largely similar for all groups. In general the toy group's overall and subscale scores were lower which would suggest that mothers did not feel that their quality of attachment (subscale 1) or pleasure in interaction (subscale 3) was increased when using the toy with their baby. This is perhaps because those babies were more likely to be asleep (low activity) and therefore less actively engaged in interaction.

Following on from the analysis above it was also investigated whether maternal self-efficacy, self-esteem and attachment scores significantly increased from pre- to post-supporting programme/intervention within each group. The analysis revealed that the TAC-TIC group showed significant increases in all constructs between the two time points. The toy group only demonstrated differences with self-efficacy and self-esteem and the control group only self-efficacy. What is interesting about the findings here is that the control group showed an increase in self-efficacy. It may be that whilst the control group in the main study were not part of a tactile sensory nurturing intervention they were met on a daily basis where themselves and their baby was filmed by the author. Therefore, it may be suggested that the culmination of visiting and filming was enough to sufficiently generate increases in the mothers' perceptions of her ability as a mother. It may be suggested that this was caused as a

result of the mother feeling that what she is doing, albeit a non-structured tactile sensory intervention, is nurturing her beliefs in her ability to parent her baby

In the main study it was also predicted that the differences between the length of time spent in behavioural states (e.g. Low Activity) would be significantly explained by the Developmental Support group. It should be noted that the most ideal behavioural state (e.g. Medium activity) is one in which the baby is in an alert visually attentive state where there is little body movement but which is said to be the most ideal for responsive interaction between mother and baby (Korner et al., 1991 Constantinou, 2002). Also, Whitney and Thoman (1993) note that those babies who spend increased periods in awake states, such as the medium activity state measured in this research, are less likely to experience developmental delay.

State and phase

Thus, firstly the difference between group and the amount of time that the babies spent in either low or medium behavioural state were examined. In addition, it was the differences between the phases of the study that was investigated i.e. baseline, supporting programme or after supporting programme/intervention within each 9 minute session.

The results of this study indicated that there were no significant differences between group and the time spent in low or medium behavioural state and the baseline phase of the design. This is important because it demonstrates that any change in behaviour was most likely due to the type of intervention that followed. However, significant differences were found between groups and the time spent in both behavioural states

and the supporting programme and after supporting programme phases of the design. Post hoc analyses identified that it was the toy group that spent significantly longer in low activity in the supporting programme phase than the other two groups. The latter finding was also replicated in the after supporting programme phase of the design.

In addition, post hoc analyses investigated the difference between group and the amount of time babies spent in Medium activity between the supporting programme and after supporting programme phase of the design. The results indicated a similar pattern to the low activity findings above i.e. that the toy group spent significantly different proportions of time in medium activity to both the control and TAC-TIC group in the supporting programme and after supporting programme phase of the design. However, contrary to the findings for low activity the toy group spent significantly less time in medium activity than the other two groups in both phases. Therefore, it would appear that the use of the toy may be overstimulating the babies making it difficult to bring them to an alert state (Eckerman et al., 1994). The TAC-TIC group spent the most time in Medium activity both the supporting programme and after supporting programme phases in comparison to the other 2 groups. What this may suggest is that the kind of movements used in TAC-TIC are sufficient enough to not over arouse the baby and instead are at the correct level of intensity (Fearon et al., 2002). Much of the current research suggests that preterms often show increases in their level of activity when parents use passive behaviours (e.g. Holding) whereas inactivity was linked to multiple forms of stimulation at the same time (e.g. talking and stimulating) (Wijnroks, 1999). Generally speaking the balance in quantity and quality of touch is the centre of much debate (Wijnroks and Kalverboer, 1997).

However, TAC-TIC (Macedo, 1984; Adamson-Macedo, 1985; 2004) is based upon 4 main principles (outlined in Chapter 3, section 3.3) which include gentleness/lightness, rhythm, equilibrium and continuity (G.R.E.C). Therefore, it is highly likely that the principles of this therapy, which also balance between those movements which are alerting and those which are soothing, are at the right level for the preterm neonate to withstand in contrast to interventions which overstimulate the baby. Some research which has used tactile stimulation has already linked the length of preterms hospitalisation to increased amounts of alert behaviour in these babies (White-Traut et al., 2002). Although this is not the same for all research (Messmer et al., 1997) which has found that touch therapies involving only skin-to-skin contact such as kangaroo care (Ruiz-Pelaez et al., 2004) produce increased sleep as well as stability in physiological parameters.

A further investigation of the amount of time spent in Low and Medium activity state was then conducted within each group to examine any changes across the phases of the design. The findings from the control group indicated that there was no significant difference between the amount of time that the babies spent in low or medium activity across any of the phases. This is important because it means that in comparison to structured tactile sensory nurturing interventions the unstructured placebo/control group generally remained in the same state or showed little variation across the session phases. This would seem to suggest that whatever state the baby was in they remained in it across all phases of the intervention. However, analyses of the toy group did find significant differences between the amount of time the baby spent in low and medium activity across the phases. The analyses suggested that the baby spent significantly different amounts of time in both states from baseline-to-

supporting programme and baseline-to-after the supporting programme. In conjunction with the descriptive data this would seem to suggest that babies in the toy group spend significantly more time in a low activity state and less time in medium activity in the supporting programme and after supporting programme phase. Therefore, this provides further evidence that babies in the toy group are more likely to remain asleep (in low activity) than to come to an alert and inactive state (medium activity) that would be seen in medium activity.

Finally, analyses of the TAC-TIC group revealed that there were significant differences between the amount of time the baby spent in low and medium activity across the phases. Similar to the toy group the TAC-TIC group spent significantly different amounts of time in both states from baseline-to- supporting programme and baseline-to-after the supporting programme. However, the babies in the TAC-TIC group spent significantly more time in Medium activity and less time in the Low activity state whilst the supporting programme was occurring and in the period afterwards. This would seem to suggest that this particular intervention was much more likely to bring the babies to an alert and inactive state (medium activity) thereby making them more receptive to interactions with their mothers. Also, because the differences seen here occurred between the baseline time period and the other 2 phases and not the supporting programme -to-after phase, this would suggest that babies change in their state when they begin to receive the therapy and then are more likely to remain alert and inactive (in medium activity) over the duration of the session. The benefits to the mothers' psychological variables have already been illustrated earlier in this chapter.

Following on from this analysis it was investigated whether there was a temporal affect of developmental support group upon the behavioural state of the baby. Therefore, the difference between group and the amount of time that the baby spent in low and medium activity states was investigated. Thus, the study period was split into 2 equal halves (the first 5 and the second 5 days) to allow sufficient time to pass for any potential effects of the respective group to occur. The findings indicated that there was a significant difference between group and the amount of time that the baby spent in low and medium activity states and the second 5 day period only. Post hoc analyses suggested that the differences in the medium activity state suggested that the TAC-TIC group spent significantly more time in this state during the second 5 days than the other two groups. This is interesting because it suggests that babies in the TAC-TIC group adjusted to receiving the therapy over time

In addition, a Between subjects analysis was also conducted using a 2 (Study period) x 3 (Intervention group) ANCOVA to examine whether one group showed a particular greater increase (or decrease) than any other in either, Low or Medium activity behavioural state across the study period. The results indicated that there was a significant interaction between the study period and the group that the baby belonged to for Low activity and medium activity. The interaction plots demonstrated that the TAC-TIC group showed a significantly greater increase from the first 5-day study period to the second 5-day period in medium activity than either of the other 2 groups, the toy group followed next. This finding was reversed for low activity across the study periods i.e. the TAC-TIC group decreased the most in low activity across the study period, again followed by the toy group. This interpretation was also considered together with (1) the group mean scores for the corresponding behavioural

states at the various test periods (as displayed in table 6.4 above), (2) the information gained from the results section which suggested that there were no baseline measures which were significantly different, and (3) the significant ANOVAs and relevant post hoc tests in section 2.1 above.

Following on from the analysis above it was investigated whether babies within each group differed in the amount of weight gained (WG) in the study period or the time which they spent on the neonatal unit (DIU).

Weight Gain (WG)

Weight gain is important to prematurely born babies perhaps most of all because they need the energy from food mainly for physiological and neurological development (Ludington, 1990; Filchev et al. 1994). Preliminary analyses of weight gain in this study identified that (1) the TAC-TIC group gained significantly more weight than the other 2 groups during the study period and (2) the toy group did not gain more weight than the control group. These findings are important on a number of levels and for the following reasons. Firstly, these findings are important because they provide agreement with previous studies using TAC-TIC which have also found significant increases in weight gain (Macedo, 1984) and also with tactile stimulation studies as a whole; including baby massage (Field et al. 2004; Bond, 2002), kangaroo care (Furman et al., 2002, Ludington-Hoe et al., 2000; Ohgi et al., 2002), and containment holding (Harrison et al., 1996). These findings also provide evidence contrary to the proposals of Vickers et al. (2005) who note that tactile stimulation like TAC-TIC (i.e. gentle touch) is of no benefit to preterm weight gain. However, two important

interlinked questions arise from this finding; (1) why did babies in the TAC-TIC group put on significantly more weight than the other 2 groups, and (2) what are the similarities and differences between the populations used in this thesis and those reported in previous studies using TAC-TIC and measuring weight gain?

In answer to these questions it is important to note that within the literature concerning TAC-TIC several possible reasons have already been given for increased weight gain.

Firstly, the findings from de Roiste (1996) suggested that immediately following the therapy these babies demonstrated increased and enhanced sucking. This evidence was taken to indicate that through a tactile-sucking-feeding mechanism these babies put on more weight. Secondly, and in relation to earlier proposals by Macedo (1984) tactile stimulation may in fact enhance digestion through increased lingual lipase secretion. However, this could not be confirmed but evidence did show that stomach Ph became more acidic (De Roiste, 1995). Other researchers suggest that tactile stimulation programmes such as baby massage enhance weight gain through increase the production of growth hormones and vagal activity which in turn affects the release of food absorption hormones like insulin (Field et al. 2004). Furthermore, there are also differences between (1) the version of TAC-TIC used which has an effect on the number and type of movements that the baby receives and (2) the duration and number of times the therapy is received per day.

Needless to say, the reason why babies in this study increase significantly in weight above the other groups may still be due to the reasons first proposed by Macedo

(1984) i.e that babies are less stressed/in distress which releases growth hormones rather than stress hormones. . However, what is clear is that the duration of the therapy was the shortest from of all versions and also contained the fewest number of movements. Therefore, this implies that (1) the beneficial movements which aid weight gain are still present and (2) even small durations of 3 minutes per day still aid weight gain. The question that arises from this, however, is, if the duration and schedule were the same as other versions of TAC-TIC, whether babies would increase even further in their weight gain.

However, as mentioned above it was also found that the Toy group did not show significant increases in their weight gain as compared to the control group. The reason why babies in the toy group did not have higher weight gain than the control group may be due to the same reason why babies had different state reactions i.e. due to the type of touch which the baby does or does not receive. Therefore, as similar to the explanation given above it is more likely that the way in which a baby is touched and the location of these strokes are extremely important. Thus, patterned sequences of stroking movements may be more beneficial than random touching since they encompass more of the body and are contended to be more therapeutic (Macedo, 1984; Rice, 1977). Hence, it is clear that those movements responsible for weight gain are absent from the kinds of touch used by mothers in the control and toy group.

Days spent in Unit (DIU)

One of the most interesting findings in this section was related to the number of days that babies within each of the developmental support groups spent in the neonatal unit. Length of hospitalisation is of importance to researchers and the Government

primarily because of the cost that the National Health Service (NHS) incurs as a result. As reported earlier in this thesis there are around 70,000 preterm births each year who on average stay for a length of 18-27 days in the neonatal unit (Bhutta et al., 2004). The average cost per cot in the Neonatal Unit is between £340 - £1140 per night (Ashington Audit Group, 2004; Bandolier, 1994; The UK Neonatal Staffing Study Group, 2002) which is an estimated NHS Neonatal services bill of around 4 billion (Action Medical Research, 2006). However, studies that seek to reduce length of hospitalisation through intervention programmes choose the duration of stay not only because of its cost saving potential. Length of hospitalisation is also used as a measure of the general improvement in the health of the baby (Bhutta et al., 2004) i.e. babies that are relatively free from medical problems and showing progressive weight gain are discharged home.

What was interesting in this study was that the placebo/control group spent significantly less time overall on the unit than the other 2 groups. This finding was some what unexpected and is more complex to explain. What is complex about this finding is that babies within the control group did not receive any intervention other than the option to interact with their baby in a comparatively unstructured and non-systematic way when compared to the other 2 intervention groups. Many studies to date which have used stimulation as a form of intervention have found associations between length of stay and various forms of stimulation; be it tactile (Gaebler and Hanzlik, 1996; Als et al., 2004), vestibular (Gatts, 1994), auditory or visual (Mann, et al., 1986) or a combination of all four (White-Traut et al., 2002). Nevertheless, significantly reduced length of hospitalisation was not found with either of the

structured tactile sensory nurturing interventions in this Chapter (i.e. TAC-TIC therapy or using a Toy). Although it is important to note that both the aforementioned groups were still within the average period of hospitalisation for preterm neonates. However, similar to our finding some interventions used have also reported higher durations in hospitalisation compared to controls (Symington and Pinelli, 2006) although no reasons have been given for this by these authors.

In this study it was expected that because both the TAC-TIC and Toy group increased significantly in weight gain above that of the control, that decreased hospitalisation may also have resulted. Although weight gain alone is not the sole reason babies are discharged from the neonatal unit it is related to other improvements in the babies' health. One of the possible reasons the control group spent less time in the unit may have been related to the preterms birth variables in this study (e.g. birthweight). Thus, whilst it is important to note that all groups did not differ significantly in factors such as birthweight and gestation age, the control group did on average weigh more and were born closer to term than the other 2 groups. For example, the toy group was born on average a week earlier than the control group and around a 1/5 of a kilo lighter. Consequently, it may be argued that these slight advantages in factors that matter a great deal in the health and survival of preterms may allow babies in this group to return home faster even though they gain weight less speedily than the other groups. Therefore, it can only be concluded at this stage that structured tactile sensory nurturing interventions such as the ones used in this study have no immediate effect upon length of hospitalisation.

6.5 CHAPTER SUMMARY

The study reported here suggests that tactile sensory nurturing interventions mediate maternal cognitions and emotions, preterm behavioural state, length of hospitalisation and weight gain. In particular it was found that mothers who were taught and provided TAC-TIC therapy to their babies in comparison to those who did not (i.e. the control and toy group) demonstrated significant increases in their levels of Self-efficacy, Self-Esteem and Attachment. This finding was said to be related to the effects that TAC-TIC also had on their babies (e.g. increased periods of awake behaviour and weight gain). In addition, it was found that the mothers and babies in the toy group did not differ significantly either (1) in the effects it produced upon mothers cognitions and emotions or (2) upon infant weight gain or length of hospitalisation. However, the babies in the toy group did spend significantly more time asleep (in low activity) than the other 2 groups. It was suggested that the toy used by mothers was not at the correct level of intensity required for the baby to come to an alert inactive state (medium activity), which is when the baby is said to be in the most ideal state for responsive interaction (Constantinou, 2002). These findings provide several research-based benefits for the use of certain structured tactile sensory nurturing interventions, specifically TAC-TIC, as opposed to (i) structured interventions which are not at the correct level of intensity for preterms to withstand or (ii) unstructured interventions.

CHAPTER 7. – GENERAL DISCUSSION AND MAIN CONCLUSION

7.0 - THEORETICAL BACKGROUND

As stated in Chapter 4 this research searches for evidence-based benefits of environmental support to babies and their mothers during hospital confinement. The possibility that a mother's cognitions and emotions may be affected by environmental mediators in the form of structured or non-structured tactile sensory nurturing interventions has not been hitherto the subject of systematic investigation. Thus, within the scope of Neonatal Health Psychology (NNHP), the empirical work reported in this thesis has investigated for the first time the role of tactile sensory nurturing interventions as mediators of (1) Maternal Parenting Self-Efficacy, Self-Esteem, and Attachment, and (2) of hospitalised preterm neonates' behavioural state, weight gain [WG] and days in unit [DIU]. In addition, the relationship between (i) Self-Esteem, Attachment, and Maternal Parenting Self-Efficacy, and (ii) between 1 and 2 above were also investigated. Accordingly, this thesis is based upon 3 main theoretical assumptions. Firstly, that the preterm neonate is viewed as an emergent, coactional and hierarchical system (Adamson-Macedo, 1997) as proposed in NNHP and which is based on Gottlieb's (1991) theory of experiential canalization. Secondly, that the relationships between the environment, mother and preterm neonate can be explained through the concept of horizontal and vertical coactions. However, before the main results of this thesis are discussed in the empirical work section, a detailed exposition of Gottlieb's experiential canalization theory is provided.

Gottlieb's theory of experiential canalization is one of several theories also known as developmental systems approaches. The various developmental approaches and theories that have been called *ecological* (Bronfenbrenner, 1979), *transactional* (Dewey & Bentley, 1949; Sameroff, 1983), *contextual* (Lerner & Kaufman, 1985), *interactive* (Johnston, 1987; Magnusson, 1988), and *individual-socioecological* (Valsiner, 1987). In this thesis we adopted the theory of *probabilistic epigenesis* (Gottlieb, 1970) which is the favoured systems theory of Neonatal Health Psychology (NNHP) and was chosen on the grounds of comprehensive interdisciplinary plausibility (Adamson-Macedo, 2004).

In essence, from Gottlieb's perspective of development an individual is characterised as an emergent, hierarchical, and coactional system and it is the latter two elements which mainly comprise the key components of the theory. Although there are other important features which will be illustrated later on. In the preceding section the systems view of individual development will be outlined and these core elements expanded upon.

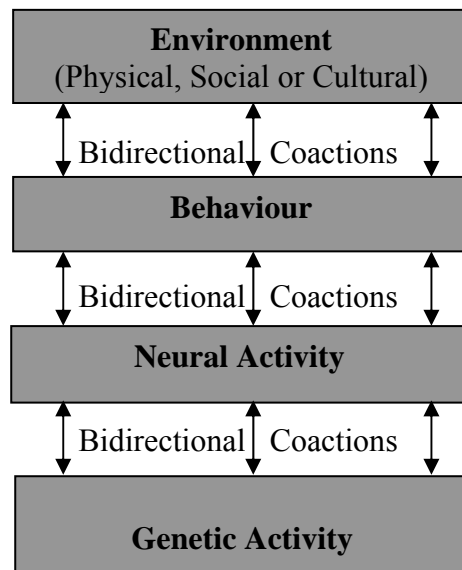
The systems view sees individual development as hierarchically organized into multiple levels (e.g., genes, cytoplasm, cell, organ, organ system, organism, behaviour, environment) that can mutually influence each other. The notion of hierarchy, as it applies to individual development, simply means that coactions occur vertically, as well as horizontally, in all developmental systems. All of the parts of the system are capable of influencing all of the other parts of the system, however indirectly that influence may be. "An Epigenetic viewpoint suggests that

development is not a linear process, but an active system in which both the individual and the environment coact to produce development,” (McGaha, 2002, p.84)

Gottlieb challenges the predetermined view of development (i.e that genes affect development) and instead suggests that whilst genes are recognised as an integral part of the system their activity (i.e., genetic expression) is affected by events at other levels of the system, including the environment of the organism. It is perhaps understandable from current research why development may be conceptualised as predetermined and occurring in a mono-directional way. For example, recent research by Zhi-xang et al. (2007) has found a human specific mutation which results in the splicing and secretion of a specific protein (Neuropilin) associated with the development of learning and memory and which is preferentially expressed in the human brain but which is absent in all other non-human primates.

However, there are other examples from the literature which demonstrate how development is not predetermined. For example, Gorbman et al. (1983) found that hormones circulating in the blood make their way into the cell and into the cell nucleus, where they activate DNA which leads to the production of proteins. Gottlieb (2007) argues that the flow of hormones can be affected by environmental events such as light, day length, nutrition, and behaviour which completes a circle of mutually influential events from genes to environment. Figure 7.1 is a simplified scheme of the developmental systems view, showing a hierarchy of four mutually interacting components/systems in which there are "top-down" as well as "bottom-up" bidirectional influences.

Figure 7.1. A simplified scheme of the developmental systems view.



The principal ideas concerning the epigenetic characterisation of individual development is as an emergent, coactional, hierarchical system. Thus, whilst the concepts of coaction and hierarchy have been introduced the critical feature of Gottlieb's developmental theory is that epigenesis is probabilistically determined. However, it is necessary to first of all explain what epigenesis is? Historically the correct definition of *epigenesis* is the emergence of new structures and functions during the course of individual development (Gottlieb, 1991). Epigenesis is characterised as an emergent, coactional, hierarchical system that results in increasingly complex biological, behavioural, and psychological organization during the course of individual development. Although genes play a part in the developmental system they may also be subject to influences from other levels of the system. Bjorklund (2006) notes that "...genes cannot be viewed as the directors of development, the genome serving as a blueprint for building body and mind. From a probabilistic epigenetic perspective, there should be substantial plasticity in

development, which makes the specific path that ontogeny will take for any individual nearly impossible to predict.”

The essence of Gottlieb’s probabilistic conception of epigenesis is the bidirectionality of structure-function relationships i.e. that any level of the system can affect any other, as depicted in Figure 7.1. Therefore, given that epigenesis is probabilistic Gottlieb (1991) has proposed a new definition of epigenesis which characterises individual development as, “ *an increase of complexity of organization (i.e., the emergence of new structural and functional properties and competencies) at all levels of analysis (molecular, subcellular, cellular, organismic) as a consequence of horizontal and vertical coactions among the organism's parts, including organism-environment coactions.*”

The concept used most frequently to designate coactions at the organismic level of functioning is *experience: which is said to be a relational term*. As Gottlieb (1976) has noted previously experience can play at least three different roles involved in anatomical, physiological, and behavioural development. It can be necessary to sustain already-achieved states of affairs (*maintenance* function), it can temporally regulate when a feature appears during development (*facilitative* function), and it can be necessary to bring about a state of affairs that would not appear unless the experience occurred (*inductive* function). Furthermore, Gottlieb (2002) proposes that behavioral (or organic or neural) outcomes of development are a consequence of at least two specific components of coaction (e.g., person-person, organism-organism, organism-environment, cell-cell, nucleus-cytoplasm, sensory stimulation-sensory system, activity-motor behaviour). Thus, it is said that what makes development

occur, is the relationship of two components, and not just the components themselves. Furthermore, within this framework, Adamson-Macedo (1998) suggests that preterm neonates may experience positive coactions which she defines as appropriate experiences crucial to the further development of the mind and body of the preterm neonate. Therefore, by the same token the opposite may also be true, i.e. that inappropriate experiences may result in negative coactions thereby inhibiting development.

Moreover, McGaha (2002) suggests that parenting skills are the result of the transaction between the biology of the individual and the environment in which that individual lives. Therefore, the development or outcomes in newborn babies maybe the result of the combination of the characteristic of the parent, the history of that parent and the subsequent experience and relationship that exists between the parent and their baby/child. However, in certain circumstances it may be beneficial to provide interventions which have a positive effect on the mother-infant relationship (please see Chapter 2). Therefore, it is said that by making changes in components of the individual or the environment then the whole system, can be changed and canalized in a positive way (Phillips, 1976). However, some studies have focused upon issues similar to the hypotheses tested in this thesis. For example, Strunk (2001) has identified that modification of features of the environment (light and noise) have significant coactional effects upon the behavioural systems of the preterm neonate (e.g. behavioural state organisation). In their study they found that by regulating the amounts of light and noise that the preterm received they were able to modify and stabilise their behavioural state to somewhat normal levels. Hayes (1996) and Hayes et al. (1999), on the other hand, demonstrated the existence of vertical coactions

between the administration of a sensory nurturing intervention (Environment) and the secretory immune system (Immune System) of the preterm neonate. The latter authors explain that coactions between the sensory system and the immune system led to the preterm newborns, who received a type of therapeutic touch, having higher concentrations of specific immunoglobulins in their saliva versus preterms who did not receive a sensory nurturing intervention. Also, authors such as Tymchuk (1999) have suggested that interventions and training provided to parents with intellectual impairments have positive coactions upon babies' weight gain.

However, in this thesis 2 main sets of coactions were examined; (1) the vertical coactions which occur between the environment (in the form of tactile sensory nurturing interventions; i.e. TAC-TIC therapy) and the systems of the preterm neonate (i.e. changes in behavioural state or weight gain), and (2) horizontal coactions which may occur between the mother and her preterm baby (i.e. person-person) resulting in behavioural outcomes of development.

7.1 – EMPIRICAL WORK

In Chapter 2 it was illustrated how the use of tactile sensory nurturing interventions, one of the research avenues of Neonatal Health Psychology (NNHP), have been used in neonatal units to facilitate the development of preterm neonates (Oehler 1996; Harrison et al., 1991; Harrison et al., 1996, Field, 2004). However, studies using this type of intervention have almost exclusively focused upon their impact on the baby. Hitherto, no systematic evidence has been forthcoming in the literature that

investigates when the mother, as opposed to an investigator, performs the sensory nurturing intervention and in what way this may affect her cognitions and emotions.

Nevertheless, it is important at this point to note that the work reported in this thesis has for the first time investigated simultaneously 2 of the proposed avenues of research within the scope of NNHP (i.e. Sensory Nurturing Interventions and Assessment Procedures and Diagnostic Methods) and that this work has been specifically carried out within the neonatal period. However, as noted in Chapter 1 the current definition of NNHP does not include the mother or family, thus in section 7.4 a new definition of NNHP is proposed. Therefore, this thesis examines coactions between environmental mediators (e.g. TAC-TIC), the mothers' Cognitions and Emotions (Self-efficacy, Self-Esteem, Attachment) and the preterm neonates' behavioural state, weight gain, and days in unit.

The empirical work reported in this thesis has investigated for the first time the main hypothesis that a mother's cognitions and emotions may be affected by environmental mediators in the form of structured or non-structured tactile sensory nurturing interventions. However, prior to discussing the empirical work reported in this thesis it is necessary to give a very brief overview of the prerequisites to carrying out this work. In Chapter 5 it was identified that there was no appropriate measure of perceived maternal parenting self-efficacy in the literature which could be used with mothers of hospitalised preterm neonates. Accordingly, Chapter 5 reports on the development and testing of the Perceived Maternal Parenting Self-Efficacy questionnaire. In order to gain a greater understanding of Maternal Parenting Self-Efficacy in mothers of hospitalised preterm neonates, an analysis was carried out to

examine which of the sources of self-efficacy information (which make up a person's self-efficacy beliefs about a particular activity), as specified by self-efficacy theory (Bandura, 1977, 1997), were the strongest mediators of a mother's self-efficacy level. Subsequently, Phase 2 of chapter 5 (Perceived Maternal Parenting Self-Efficacy (PMPS-E) of Mothers who are Breastfeeding Hospitalised Preterm Neonates) investigated whether factors such as the way in which mothers chose to feed their baby (breastfeeding Vs non-breastfeeding), would affect mothers' self-efficacy beliefs independent of the sources of self-efficacy beliefs outlined by Bandura (1977, 1997). Thus, following the above phases (1 and 2) the main and sub-hypotheses as set out in section 7.0 were tested and are reported in full in Chapter 6 (Phase-3). It is important at this point to note, as illustrated in Chapters 3 and 4, there is a distinct lack of literature studying the impact of structured or non-structured tactile sensory nurturing interventions upon the cognitions and emotions of the mother and specific behavioural variables of the hospitalised preterm newborn, particularly during the neonatal period i.e. first 28 days of postnatal life. Therefore, whilst the findings reported in this thesis will be related to empirical studies, it is in their absence that the findings will be discussed in relation to relevant psychological theory and current knowledge about hospitalised preterm neonates.

The following section is now divided into 3 parts based upon the empirical work carried out in Phases-1 to -3 (Phase-1; Development of the Perceived Maternal Parenting Self-Efficacy questionnaire, Phase-2; Perceived Maternal Parenting Self-Efficacy (PMPS-E) of Mothers who are Breastfeeding Hospitalised Preterm Neonates, and Phase-3; Cognitive, emotional and environmental mediators of early parenting) and will discuss some of the main findings including their practical and theoretical

implications. During the course of this section the main results will be discussed within the context of Neonatal Health Psychology but in particular from the perspectives of Gottlieb's theory and Bandura's Self-efficacy theory. However, the interactions and bidirectional influences between the baby, the mother and the environment will be explained through the concept of coactions rather than transactions which have been utilised in Bandura's Social Cognitive theory.

(i) Phase 1- Development of a tool to measure Perceived maternal Parenting Self-Efficacy (Chapter 5)

A questionnaire to measure Perceived Maternal Parenting Self-Efficacy (PMP S-E) was developed and then tested with an overall population of 160 mothers of hospitalised preterm neonates⁵. The results indicated that the PMP S-E scale had good preliminary psychometric properties and had strong reliability and validity for its use with its target population group. Therefore, it was suggested that our scale will provide health care professionals, in conjunction with their own clinical observations, with a reliable method for screening and identifying mothers who may need additional parenting support. We recommend that the PMP S-E total score should be used as a general indicator of self-efficacy level but that the subscales/items should also be used to understand what support each individual mother may require. A single cut-off or threshold score is not recommended as a method to determine risk of a lower maternal self-efficacy. However, there maybe some scoring scenarios where it is much clearer to establish whether a mother will be considered at a greater risk for a low self-

⁵ Whilst the total number of participants used to test the reliability and validity was 160 the same total was not used for all statistical tests (see Chapter 4, Figure 4.2)

efficacy. In particular, as our questionnaire is on a 4 point Likert scale, mothers scoring 1s or 2s indicate that they either 'strongly disagreed' or 'disagreed' that they can do a particular parenting task, successfully. Mothers scoring 3s and 4s indicate that they either 'agree' or 'strongly agree' that they can do a particular parenting task, successfully. Therefore, mothers scoring 20-40 on the PMPS-E questionnaire will be at the highest 'risk' of possessing a low maternal self-efficacy because they have said they do not believe they can do any of the parenting tasks, successfully. At the opposite end of the scoring spectrum, mothers scoring between 60-80 will more likely be at the lowest 'risk' and possess a relatively high self-efficacy because they have said they can do all parenting tasks, successfully. However, those mothers scoring between 41-59 will be in a middle zone where 'risk' may range from moderately high to moderately low. Mothers within this middle zone will need a more thorough examination of their scoring profile to examine where they feel less efficacious.

Furthermore, it was established in section 2 of Phase-1 that of the sources of information which contribute and make up a person's self-efficacy beliefs, it was previous birth experience (i.e. enactive mastery experience) that was correlated and have the strongest link with mothers overall PMP S-E score. At this point this finding appeared to be congruent with Bandura's formulation that previous experience with a particular task or activity has the strongest effect upon overall efficacy beliefs. However, a question arose from this finding whether situational factors, such as how the mother was feeding her baby, would also be affected predominantly by a persons enactive mastery experience i.e. previous experience with childbirth

(ii) Phase 2- The perceived Self-Efficacy of Breastfeeding and Non-Breastfeeding mothers (Chapter 5)

Therefore, leading on from Phase 1 it was investigated whether (1) the type of feeding a mother gives to her preterm neonate is a mediator of her Perceived Parenting Self-Efficacy (PMP S-E) and (2) whether the mothers type of feeding is independent of or multiply caused by factors previously established to mediate maternal self-efficacy during hospitalisation and during the neonatal period (i.e. previous experience with childbirth, Study 1). Thus, the results from this phase, using a sub sample of 50 (25 breastfeeding and 25 non-breastfeeding [randomly selected]) mothers of hospitalised preterm neonates from Phase 1, found that mothers' perceptions of their parenting self-efficacy, whilst in hospital, was mediated by the task of breastfeeding. In fact, findings indicated that breastfeeding mothers had significantly lower overall Perceived Maternal Parenting Self-Efficacy (PMP S-E) scores a finding that was replicated across all self-efficacy subscales. This finding suggests that breastfeeding a preterm neonate during hospital confinement may adversely affect mothers' perceptions of their efficacy in all aspects of parenting. Further analysis indicated that none of the principle sources of information could significantly explain the variance in breastfeeding mothers' PMP S-E scores and that the relationship between a mothers' type of feeding and her PMP S-E were independently explained by type of feeding when controlling for previous birth experience.

Thus, it may be suggested that whether a mother has had (i.e. feeding her baby) previous experience with childbirth may no longer be of importance and instead it is the practicalities of the task of feeding their baby (i.e. breastfeeding) that is causing the variance in mothers' self-efficacy beliefs. Previous studies such as those carried

out by Dennis and Faux (1999), the only study to date which has developed a measure of breastfeeding self-efficacy, whilst important were limited to measuring breastfeeding self-efficacy only and did not examine for example non-breastfeeding self-efficacy e.g. mothers' perceived ability to feed their baby with a bottle. The authors of this measure used a mixed design to examine the breastfeeding self-efficacy beliefs of 130 hospitalised mothers of fullterm born babies. However, they did not state the types of mothers who were more vulnerable to a low breastfeeding self-efficacy and consequently did not explain how the sources of self-efficacy information might affect efficacy beliefs. Hitherto, no study to date has examined the impact of feeding and overall perceived maternal parenting self-efficacy of mothers of hospitalised preterm neonates (as stated in Chapter 5, section 5.8 [ii]), which makes the understanding of the findings solely reliant upon self-efficacy theory for an explanation.

Moreover, in Chapter 5 it was proposed that the reason why mothers obtained lower PMP S-E scores may rest with the fourth principle source of self-efficacy information (i.e. physiological feedback and affective states) which was not measured or tested in this study. Although this source of efficacy information was not tested there may be significant cause to assume that it is the critical variable affecting mothers' efficacy beliefs. Bandura (1997, p106) proposes that factors influencing a persons' physiological and affective state, which in turn may affect their self-efficacy beliefs, include fatigue, aches, and pains. Although, Bandura acknowledges that physiological indicators are not the only factors which may affect a person's efficacy beliefs. Thus, for mothers of hospitalised preterm neonates it may be suggested that factors and problems encountered during breastfeeding, such as fixing and feeding her

baby at the breast (Fisher and Baum, 1983) and whether a mother produces enough milk (Lang, 2002) that may in turn affect her efficacy beliefs.

In addition, the literature suggests that mothers must often deal with the environment of the neonatal unit where they must attempt breastfeeding in a room where there may be other babies, nursing staff and families all trying to complete tasks of their own making this a less than conducive environment to feed their baby. Lang (2003) suggests that the task of breastfeeding also becomes difficult due to the very nature of breastfeeding, for example; it is not possible to know how much milk the baby takes from the breast, mothers must be present every 3-4 hours to feed their baby which makes the management of other children, travelling to-and-from the hospital, and home life much more complex and difficult. In comparison, mothers who choose to bottle feed may decide not to visit at every feeding time and leave these tasks to the neonatal staff. Thus, a conglomerate number of factors may ultimately make breastfeeding not only a more complex choice but one where they must overcome many obstacles in order to successfully achieve the task. This is perhaps why mothers who do breastfeed are more susceptible of perceiving themselves poorer in their ability to parent across all tasks and perhaps why many mothers either do not initiate or maintain breastfeeding. However, whilst previous experience with childbirth was measured, previous experience with breastfeeding or bottle feeding was not.

(iii) Phase 3- Main Study (Chapter 6)

In the main study of this thesis a total of 60 mothers and their hospitalised preterm neonates were recruited and tested the main hypotheses as set out in the beginning of

section 7.1. Thus, the first analyses carried out tested the main hypothesis that tactile sensory nurturing interventions are mediators of maternal self-efficacy, self-esteem and attachment which was subsequently confirmed. However the data revealed that not only were there differences between the groups it also indicated that the TAC-TIC group was significantly higher in all constructs than either of the other two groups. The reasons why the TAC-TIC group may have had higher self-efficacy were suggested in Chapter 6 to be related to how a mother perceived her interactions with her baby. In particular, it was proposed that mothers may feel that they are contributing to the well being of their baby as a result of performing TAC-TIC.

The finding that mothers increased across all 3 constructs was an important one not least of all because it implied that psychological states could be beneficially altered, in a short period of time. In particular, the degree to which mothers may feel that they are contributing to the well being of their baby and the interaction that occurs as a result of them performing TAC-TIC may be of especial importance. For example, it was found in the main study that babies in the TAC-TIC group were significantly more likely to come to an alert and inactive state (medium activity) during and following touch by the mother than the other 2 groups, they also spent less time in presumed sleep (low activity) and gained more weight over the course of the study period. Although, preterm state will be dealt with later in this chapter it is important at this point to note that those babies who spend increased periods in awake states are less likely to experience developmental delay (Whitney and Thoman, 1993) and are also much more likely to be responsive to interactions with their mother (Constantinou, 2002). Related studies which have specifically used TAC-TIC have shown that babies display improved and enhanced sucking development (Adamson-

Macedo, 1985-6; De Roiste, 1996), whilst others (Hayes, 1996) demonstrate greater state organisation and increased comfort behaviours whilst receiving TAC-TIC. Anecdotally, the author of this thesis also notes that babies in the TAC-TIC group often displayed behaviours relative to the area being stimulated e.g. rooting movements when stroked around the mouth and grasping when the palm was touched.

In comparison, babies in both the toy and control group tended to be much less responsive to the touch given by their mothers. Therefore, it is proposed that the reactions and developments of the babies receiving TAC-TIC are cumulatively important occurrences for the mother who may see their baby's response to her strokes as an indication of her ability, self-worth as a mother, and as improvements in both the quality and pleasure of attachment. This line of reasoning may be further validated when considering 2 other important points. Firstly, the findings of this study imply that babies in the control group were less likely to change behavioural state across all phases and they spent significantly less time awake than other groups. Secondly, in the vast majority of literature preterm babies are described as being low in alertness and wakefulness (Harrison, 1991; Chang et al., 2002), less responsive to social stimulation (Crnic, 1983), give less clear behavioural cues (Eckerman et al. 1994) and consequently they normally have to work much harder to engage their baby (Macey, 1987) which may often be met with unresponsive or unpredictable behaviour (Miles et al. 1991). Therefore, positive outcomes from receiving TAC-TIC, such as those illustrated may provide mothers with identifiable contrasts to the normal demeanour of their baby.

Thus, two important issues arose from this. Firstly, it adds a further dimension to research which utilises TAC-TIC therapy and makes TAC-TIC the first structured systematic tactile sensory nurturing intervention with known benefits to the mothers' self-efficacy, self-esteem and attachment. Secondly, this finding may also suggest that TAC-TIC may be acting as a facilitator of parenting ability, feelings of self-worth as a mother and increase the quality and pleasure during interaction with their baby.

However, it is important at this point in the discussion to address what these findings mean in terms of (1) the potential benefits to both the mother and infant of increasing scores for perceived maternal parenting self-efficacy, self-esteem and attachment, and (2) how the findings from this study relate to Gottlieb's (1991) theory of experiential canalization. Please note that as preterm behavioural state and weight gain are considered part of the explanation for increases in maternal cognitions and emotions, their discussion in terms of Gottlieb will also be addressed here. The discussion of the main findings of the thesis will then recommence on page 222.

Potential benefits to the mother and infant of increasing maternal self-efficacy, self-esteem and attachment scores.

The possible benefits to both mothers and their children from increases in maternal self-efficacy, self-esteem and attachment may be wide ranging and explained in terms of the physical benefits and theoretical ones. The current research in the area suggests that there are several benefits of increased maternal self-efficacy to both mother and child. In fact, mothers who do have higher maternal self-efficacy are more likely to display more sensitive behaviour towards their baby (Lerkes and Cockenber, 2002), more likely to develop positive and successful discipline practices (Sanders and

Woolley, 2005), have children who go on to have lower numbers of child conduct problems, and have children with higher school achievement (Jones and Prinz, 2005). From a theoretical perspective Self-Efficacy beliefs are important because they influence how people think, feel and act (Schwarzer, 1992). and are considered to be a major determinant of human motivation (Koul & Rubba, 1999). Therefore, from a Bandurian (1977, 1997) point of view, people who benefit from a higher maternal self-efficacy are more likely believe in their ability to carry out parenting tasks and once they believe in their ability they become more inclined to act and feel more committed to its completion.

Moreover, if people believe that they can cause an event they become more inclined to act and feel more committed to this decision (Bandura, 1986). A person with a high self-efficacy will also choose to partake in more challenging parenting activities and will be more likely to persevere when confronting obstacles or adverse situations (Pajares, 2002). Individuals with high self-efficacy are also more likely to form beliefs about what they can do in certain situations, they may be able to anticipate positive or negative outcomes and consequently are more likely to plan courses of action necessary to avoid aversive situations and realise ones which are valued (Bandura, 1997, p.122). Therefore, the immediate term effects for mothers parenting in the Neonatal Unit may include; an enhanced ability to deal with various kinds of parenting tasks, higher likelihood of attempting more difficult parenting tasks and greater perseverance when confronting obstacles such as changes in infant health.

In addition, research into self-esteem suggests that those mothers who have increased levels of self-esteem of preterms are more likely to maximize developmental

outcomes in the infants and contribute to successful parenting behaviours (Mercer, 1990). Mothers who have a high self-esteem will also develop more positive parenting styles (Farrow and Blisset, 2005) and benefit from lower levels of parenting stress (Chang, et al., 2004), anxiety and depression (Clark and Graham, 2006). In addition, benefits to maternal self-efficacy may also have knock-on benefits to maternal self-esteem. For example, the emerging mother-infant relationship, particularly the mother's ability to interact and care for her preterm infant, is viewed as central to the mother's development of maternal self-esteem (Als, 1986; Shea, 1984). In fact, the research reported in this thesis suggests that TAC-TIC may increase the number of occasions when babies are in an alert visually attentive state which is ideal for interaction between mother and baby. Indeed, research suggests infants who spend more time in these kinds of behavioural states are more likely to communicate their needs effectively (Scanlon et al., 1983). This in turn facilitates caretaking which in the long run enhances mother's self-esteem (McGrath and Meyer, 1992).

On the other hand, research concerning attachment suggests that the mothers who have increased levels of attachment are much more likely to form secure lifelong relationships (Raval et al., 2001), that these attachments are likely to remain stable across several generations (Benoit and Parker, 1994), that these mothers will avoid situations where preterm babies develop less clear relationships (Crawford, 1982), that their children will more likely adapt to varying social situations with greater ease (Egeland and Heister, 1995) and that the child's development will most likely result in their healthy growth (Koniak-Griffin, 1993).

How the findings from this study relate to Gottlieb's (1991) theory of experiential canalization?

In the findings discussed so far it was highlighted that mothers who provided TACTIC therapy to their babies, in comparison to those who did not (i.e. the control and toy group), demonstrated significant increases in their levels of Self-efficacy, Self-Esteem and Attachment. This finding was said to be related to the effects that TACTIC also had on their babies (i.e. increased periods spent in an alert visually attentive state and also more weight gain in the study period). What is more, it is proposed here that these significant findings provide evidence for the existence of positive coactions between (1) features of the environment (i.e. a tactile sensory nurturing intervention) and the systems of the preterm neonate (i.e. changes in behavioural state and weight gain), and (2) the mother and her preterm baby (i.e. person-person); resulting in behavioural outcomes of development.

The possibility that sensory nurturing interventions may coact with preterm newborn systems is not a new thing. In fact, authors such as Hayes's (1996) and Hayes et al. (1999) demonstrated the existence of vertical coactions between the administration of a sensory nurturing intervention (Environment) and the secretory immune system (Immune System) of the preterm neonate (outlined above). Therefore, the same may also be said of the findings in this thesis, however in this case the sensory nurturing intervention was having a positive coaction with the systems of the preterm neonate leading to the development of enhanced behavioural state and weight gain. A finding which has also been illustrated in other studies such as Strunk (2001) who suggested that modification of features of the environment (light and noise in their study) have

significant coactional effects upon the behavioural systems of the preterm neonate (e.g. behavioural state organisation).

It is also asserted here that horizontal coactions may exist between the mother and the baby themselves (i.e. person-to-person). For example, as already illustrated in the previous paragraph, positive coactions existed between features of the environment and the systems of the preterm newborn. These benefits to preterm weight gain and behavioural state were suggested to be cumulatively important occurrences for the mother who saw her implementation of the sensory nurturing intervention as of benefit to the development of her baby, as demonstrated by increases in the levels of maternal self-esteem, attachment but especially self-efficacy. Thus, it may be argued that by increasing mothers' perceptions in their ability to carry out parenting tasks, changing the way mothers dealt with their baby on a daily basis. In particular, when mothers possess high self efficacy they are more likely to attempt the more difficult parenting tasks and persistent when confronting obstacles (Teti and Gelfand, 1991; Hess et al., 2004). Therefore, the behavioural outcomes of development observed in the babies who received TAC-TIC may not solely be due to the coactions between the sensory nurturing intervention and the baby's systems. In fact, they may also be the result of the changes in parental cognitions leading to changes in mother-baby interaction and thereby suggesting the existence of positive horizontal coactions from person-to-person.

In addition, knowing that a therapy may affect mothers' cognitions and emotions is vital as a tool which could be used with those mothers who are identified as particularly low in perceived maternal self-efficacy, self-esteem or attachment.

Evidence of this was further identified in an analysis of the subscales within each measure of each construct.

Moreover, in terms of the self-efficacy subscales it was identified that the TAC-TIC group had significantly higher scores in relation to their ability to evoke changes in their babies' behaviour e.g. soothing the baby following crying. In addition, as a whole, mothers in the TAC-TIC group also had higher self-esteem subscale scores on all scales than the other 2 groups. Finally, analysis of attachment demonstrated that it was the toy group that had the lowest subscale scores. These findings all appeared to indicate that when mothers' babies spend more time awake and demonstrate increases in their weight that mothers accept these changes to be a result of their own doing, something they have been able to do for their baby. Anecdotally, the author of this thesis notes that the babies' weight gain is a factor which is regularly monitored by the mother and of primary importance to them. More often than not mothers in all of the developmental support groups including the placebo/control would enter the neonatal unit and then proceed immediately to check their babies monitoring information particularly weight gain. Mothers would also comment upon the smallest of weight increases with great pleasure. This may help reconcile the crisis that many mothers are acknowledge to be in (Caplan and Mason, 2000)

Following on from this analysis it was examined whether the mothers' constructs significantly increased from pre- to post-intervention within each group. The analysis revealed some surprising results. Specifically that the control group increased in their self-efficacy across the study period. This finding was not only surprising, however, it was more what it implied. Thus, in Chapter 6 it was suggested that the culmination

of visiting and filming was enough to sufficiently generate increases in the mothers' perceptions of her ability as a mother. Thus, as a result the mother felt that what she was doing, albeit a non-structured tactile sensory intervention, was nurturing her beliefs in her ability to parent her baby. Therefore the implication of this on a general level and would seem to suggest that in the process of meeting up with a mother once a day and ensuring that she interacts with her baby is enough to affect her overall beliefs about her parenting ability. In addition, McGaha (2002) says "Not only does training lead to improvement of parenting skills, but it also increases positive interactions between mother and child, which has been associated with an increase in cognitive skills in children."

Furthermore, as noted earlier investigation into behavioural state was also conducted. The babies' behavioural state is important because it is primarily used to evaluate their short-term developmental outcomes (Brandon et al., 2005). It is said that because the preterm has a limited behavioural repertoire one of the most reliable early neurobehavioural evaluations is state (Gertner et al., 2002). Measuring the state of preterms has been indicated as reliable measures which aid in identifying individual differences in patterns of development for the baby (Holditch-Davis, 1990). Essentially, sleep wake states identify central nervous system maturation and organisation (Scher et al., 2003) and may predict later problems (Freudigman and Thoman, 1993). Preterms that spend increased amounts of time in sleep amongst other factors have been associated with lower developmental scores (Freudigman and Thoman, 1993) with those in awake states associated without delay (Whitney and Thoman, 1993) and are also much more likely to be responsive to interactions with their mother (Constantinou, 2002). Generally the findings in Chapter 6 suggested that

the TAC-TIC group spent the most time in Medium activity both during and after the supporting programme/intervention in comparison to the other 2 groups.

By contrast, analyses also identified that the toy group spent significantly longer in low activity in the supporting programme phase than the other two groups. It is important to note that the state of the babies in the toy group was the only significant difference found between this group and the control group. Mothers within the toy group did not differ significantly in terms of their cognitions and emotions and the babies did not differ in the amount of weight gained across the study period. Therefore, in Chapter 6 it was proposed that it was the type of touch that was the deciding factor in the amounts of time that the babies spent in the corresponding behavioural states. In particular it was suggested that because of the principles employed within TAC-TIC therapy (Gentleness, Rhythm, Equilibrium and Continuity) these balanced between alerting and soothing movements for the baby (Adamson-Macedo, 1985; 2004). In addition, this suggests that therapies like TAC-TIC are able to bring preterms to alert receptive states allowing a greater range of interaction between parents and child.

What is more, these findings also imply something quite important for the Toy group. What it suggests is two important factors. Firstly, that the way in which mothers used the toy was not sensitive to the baby or the intensity of stimulation that they could withstand. Consequently, these babies did not come to a bright eyed and alert inactive state (medium activity) receptive to their mothers touch. Instead they shut themselves off from external stimulation. Therefore, it would appear that the specific toy used in this thesis is not appropriate to the level of intensity that the baby can withstand (Field

et al., 1981) making it difficult to bring these babies to an alert state (Eckerman et al., 1994). The TAC-TIC group spent the most time in Medium activity both during and after the supporting programme in comparison to the other 2 groups. What this may suggest is that the kind of movements used in TAC-TIC are sufficient enough to not over arouse the baby and instead are at the correct level of intensity (Fearon et al., 2002).

Secondly, it may also be suggested that the type of toy used may not have been appropriate to the needs of the baby perhaps most of all because mothers and their babies do not react in the same way or use the toy as fullterm newborns and their parents would. In fact, the author notes that mothers in the toy group did mainly one of two things. They either used the surface of the toy to stroke their babies head or attempted to place the toy into the baby's hand. Most babies did not respond at all when the mother used the toy and consequently mothers touched their babies less frequently as the each individual filming session progressed. Therefore, this means that more developmentally appropriate toys should be provided for these babies and developed in accordance with benefits to their development.

Following on from the analysis above it was also investigated whether babies within each developmental support group differed in the amount of weight gained (WG) and in the time which they spent on the neonatal unit (DIU).

Weight gain is important to prematurely born babies perhaps most of all because they need the energy from food mainly for physiological and neurological development (Ludington, 1990; Filchev et al. 1994). A preliminary analyses identified that the

TAC-TIC group gained significantly more weight than the other 2 groups during the study period. Firstly, these findings are important because they provide agreement with previous studies using TAC-TIC which have also found significant increases in weight gain (Macedo, 1985) and also with tactile stimulation studies as a whole; including baby massage (Field et al. 2004; Bond, 2002), kangaroo care (Furman et al., 2002, Ludington-Hoe et al., 2000; Ohgi et al., 2002), and containment holding (Harrison et al., 1996). These findings also provide evidence contrary to the proposals of Vickers et al. (2007) who note that the type of tactile stimulation used in TAC-TIC (i.e. gentle touch) is of no benefit to preterm weight gain. However, whilst the proposals of Vickers and colleagues were based upon a systematic review of the literature there were aspects of this review that were flawed. For example, the types of studies which they included in their review were based upon either studies which used either massage, gentle touch and routine care. The fundamental flaw lay with the type of studies which they had included under the title of massage. Moreover, these authors included TAC-TIC therapy which is by its very definition a light and gentle touch therapy and strongly differentiates itself from baby massage. Hence, this review casts doubt over the methods of selection incorporated in this work.

Furthermore, there were several other implications of these findings. Firstly, it meant that as mothers performed the therapy they too were capable of producing the same effects on weight gain on their baby in comparison to other studies which had not used the parents. This is important because it is not merely the experience that an investigator has from performing the therapy on many babies that is the crucial factor. Secondly, given that TAC-TIC has such benefits to babies weight gain, it may be beneficial to introduce TAC-TIC into neonatal units nation or world wide providing

steps are taken to teach parents and family members in the correct way. The benefits may be far wider reaching than the benefits to the baby and may also extend to the mothers (as demonstrated in this research), other caregivers and the government. Cumulative research from the last 3 decades, including this research, has provided several research-based benefits to both mother (e.g. increased maternal self-efficacy, self-esteem and attachment) and baby (e.g. weight gain, enhanced sucking, immune system and behavioural state). However, caution is advised on such a step that the scientific aims and sensitiveness to the health of the preterm are not compromised.

In Chapter 6 it was highlighted that the length of hospitalisation is of importance to researchers and the Government primarily because of the cost that the National Health Service (NHS) incurs as a result (Ashington Audit Group, 2004; Bandolier, 1994; The UKNSS Group 2002). In this thesis the placebo/control group spent significantly less time overall on the unit than the other 2 groups. This was an interesting finding because babies within the control group did not receive any intervention. Mothers in this group were only asked to interact with their baby however they chose as long as it did not encompass moving of the baby. Moreover, several studies have found associations between sensory stimulation programmes and length of hospital stay for preterm newborns whether it be tactile (Gaebler, 1996; Als et al., 2004), vestibular (Gatts, 1994), auditory or visual (Mann, 1996) or a combination of all four types of stimulation (White-Traut, 2002). Nevertheless, this was not the finding of this research. Although it is important to note that both the afore mentioned groups were still within the average period of hospitalisation for preterm neonates. However, similar to our finding some sensory nurturing interventions used have also reported higher durations in hospitalisation compared to their controls (Symington and Pinelli,

2006) although no reasons have been given for this by these authors.

In this study it was expected that because the TAC-TIC group increased significantly in weight gain above that of the control, that decreased hospitalisation may also have resulted. Although weight gain alone is not the sole reason babies are discharged from the neonatal unit it is related to other improvements in the babies' health. One of the possible reasons the control group spent less time in the unit may have been related to the preterms birth variables in this study (e.g. birthweight). Thus, whilst it is important to note that all groups did not differ significantly in factors such as birthweight and gestation age, the control group did on average weigh more and were born closer to term than the other 2 groups. For example, the toy group was born on average a week earlier than the control group and around a 1/5 of a kilo lighter. Consequently, it may be argued that these slight advantages in factors that matter a great deal in the health and survival of preterms may allow babies in this group to return home faster even though they gain weight less speedily than the other groups. Therefore, it can only be concluded at this stage that structured tactile sensory nurturing interventions such as the ones used in this study have no immediate affect upon length of hospitalisation.

7.2 – LIMITATIONS

There are some limitations to the empirical work carried out in this thesis. Firstly, as identified in Chapter 5 there is debate about the number of participants that a factor analysis requires when validating a measure of a particular construct. Indeed, Froman (2001) suggests that the minimum number of participants should not go below 5 per

item in the measure and ideally around 10. Thus, whilst the measure developed in this thesis met the lower range of participants required for a meaningful analysis it did not quite meet the higher end of this range. Therefore, it is recommended that any future validity testing with this measure should aim to use at least 10 participants per item to avoid potential confounding factors.

Secondly, one of the other limitations identified in this thesis relates to the breastfeeding study carried out in Phase-2. Moreover, in this phase the sources of self-efficacy information were examined in an effort to understand the variance in mothers' self-efficacy scores between breastfeeding and non-breastfeeding women. However, whilst previous experience with childbirth was measured, previous experience with breastfeeding or bottle feeding was not. Knowing whether mothers had previously attempted to breastfeed or bottle feed with another child and how long they breast fed for may have led to a greater understanding of these results. It is recommended that future studies should ask mothers about their previous experiences with feeding other siblings including other peoples' children in the case of bottle feeding.

7.3– DIRECTIONS FOR FURTHER RESEARCH

In Chapter 5 (p115) it was reported that factor analyses was conducted with 100 participants, as part of validating the Perceived maternal Parenting Self-Efficacy (PMP S-E) questionnaire. However, some authors suggest that this is the minimum number of participants that should be used and that 200 participants (Froman, 2001) should be used with a questionnaire like the PMP S-E. Therefore, it is recommended

that any future validity testing of The Perceived Maternal Parenting Self-Efficacy (PMP S-E) tool should be carried out testing the factor structure with at least 200 participants to avoid any potential confounding factors. Re-evaluation of a questionnaires psychometric properties over time allows people who use it to be confident that the tool has contemporary continuity with the next generation of mothers.

In addition, further investigation may also be required to examine the use of The Perceived Maternal Parenting Self-Efficacy (PMP S-E) tool cross culturally. The benefit of developing the PMPS-E tool into other languages allows the examination of ethnic differences (Reijneveld, 2000) and in this case whether a measure is understood and interpreted in the same way by different populations (Scott et al., 2000).

In phase 2 of Chapter 5 it was investigated whether the way in which mothers fed their baby (breast or bottle) mediated their parenting self-efficacy beliefs. The findings suggested that in this study's population, breastfeeding mothers perceived themselves as poorer in parenting ability, and were influenced more by their somatic indicators than bottle feeding mothers. It is unclear whether there is a particular aspect of breastfeeding, or breastfeeding in general, which is having an affect upon mothers perceptions in their overall ability to parent. Therefore, it may be important to examine whether previously feeding other peoples' babies has any effect upon mothers' efficacy beliefs when feeding their own baby. In particular, this may be important when considered in terms of the sources of information from which self-

efficacy beliefs are said to be derived i.e. Enactive mastery experience and Vicarious experience (Bandura, 1997).

It may also be important to investigate how difficult or easy mothers find the task of bottle and breastfeeding and how this relates to mothers parenting self-efficacy beliefs. Examining how mothers perceive their ability at breastfeeding has already been spearheaded by the work of Dennis and Faux (1999) who developed a breastfeeding self-efficacy scale. However, the author is not aware of any scale which measures mother's perceived ability at bottle feeding. Therefore, future testing should also combine scales measuring breastfeeding self-efficacy (or bottle feeding should one become available) in addition to those measuring maternal parenting self-efficacy.

In light of the findings from Chapter 6, more work is now needed to understand, (1) precisely how TAC-TIC affects weight gain, (2) whether TAC-TIC may be of use within the home environment, (3) to study the longitudinal impact of TAC-TIC, (4) to compare the relative impact of different tactile therapies (e.g. kangaroo care and TAC-TIC), (5) to use more developmentally appropriate toys as tactile interventions, (6) to investigate why the unstructured interventions still affected maternal self-efficacy. These points are elaborated upon below and explain why they merit further research..

The findings from this thesis suggest that babies who received TAC-TIC therapy put on around a third more weight in the study period than the other two groups. This finding is similar to other tactile intervention studies with newborns who have also

found significant benefits to infant weight gain (Field et al. 2004; Bond, 2002, Furman et al., 2002). However, in this context the mechanisms behind preterm weight gain are still relatively unknown. In particular, studies using TAC-TIC have not investigated the specific features of a tactile therapy which cause the preterm newborn to gain weight faster. However, whilst various mechanisms have been put forward (e.g. Macedo, 1984; de Roiste and Bushnell, 1995) to explain the biological process of weight gain from receiving tactile therapy, the minimum amounts of touch required (e.g. duration of the therapy) necessary to produce benefits, remain relatively unknown. Therefore, it is also important to understand whether it is the frequency of touch, the duration of touch, the period after birth when the tactile therapy is begun, the location (on the baby's body) of touch or a culmination of all four factors which lead to enhanced weight gain.

In addition, future studies should also aim to examine the benefits of using TAC-TIC in the home environment as so far to-date it has been exclusively used in the Neonatal Unit. Currently, other tactile interventions such as baby massage are used in the home environment (Field, 2004) and in mother and baby clinics/classes (Glover et al., 2002). For example, many researchers using massage believe that it helps mother-infant interaction (Onozawa et al., 2000). Knowing whether TAC-TIC has similar effects to baby massage in the home environment would be important and allow health care professionals to choose tactile therapies which are best suited to the needs of the baby.

Furthermore, whilst Adamson-Macedo et al. (1993) and De Roiste and Bushnell (1996) have done some longitudinal follow up work, many more studies maybe

required to investigate the longer term effects of TAC-TIC therapy and its different versions. Both of the previously mentioned authors found that premature babies who received TAC-TIC had a significant benefit to the child's mental development as measured by the Bayley test at age 15 months or intelligence at age 7 (a full description of the studies is available in Chapter 2, p.44-46). Future studies may also, for example, consider examining children's academic achievements in addition to standardised measures of development or intelligence.

In addition, some studies have compared unimodal versus multimodal sensory stimulation interventions such as White-Traut et al. (1997). White-Traut and colleagues investigated the responses (e.g. Pulse rate and Respiratory rate) of preterm infants to these types of intervention. They found that unimodal interventions elicited a heightened state of arousal compared with multimodal ones. Therefore, it is recommended that larger scale studies should also be designed which directly compare interventions such as Kangaroo care, containment holding and TAC-TIC or a combination of them. This would allow researchers to examine the different effects produced by each intervention whilst also investigating their compatibility.

In Chapter 6 (p.214-5) it was suggested that the type of toy used in this research may not have been sensitive to the needs of hospitalised preterm babies and that more developmentally appropriate toys should be provided and developed in accordance with benefits to preterm development. However, recent work by Adamson-Macedo and Barnes (2004, 2008) has involved the development of a new type of size appropriate toy specifically for newborn babies within the first weeks and months of life. This toy was especially designed for the size of the newborns hand and 3

different texture properties were created. Their findings from this study with fullterm newborns suggested that babies used different types of touch (grasping or fingering) according to the texture of the toy being touched. The latest results (Adamson-Macedo and Barnes, 2008, submitted) even suggest that babies who received this particular toy twice weekly for the first 3 months of life demonstrated benefits to their cognitive, communication and motor development. Therefore, future research may be necessary to examine the use of this toy within the neonatal unit; its benefit to the development of the preterm neonate, its benefits compared to TAC-TIC or other tactile interventions, and its psychological benefit to the caregivers (e.g. mothers, fathers, or grandparents).

In addition, it was also found that mothers in the placebo/control group still increased in their self-efficacy beliefs across the study period. Therefore, further investigation is required to understand how unstructured tactile sensory nurturing interventions produce benefits to mothers' efficacy beliefs. In this case, it may have been that simply asking mothers to touch their baby and video recording it, was sufficient enough to increase their beliefs in their parenting ability. However, the only way to measure this would be to include a fourth group; only measuring maternal constructs at the beginning and the end of the study period, not requesting any additional touch, not video recording the baby or visiting the mother each day.

7.4 – FINAL CONCLUSIONS

In summary, the main conclusions drawn from the empirical studies are:-

- 1) This is the first Randomised Cluster Control Trial (RCCT) in the West Midlands and Shropshire designed to support mothers and babies during hospitalisation.
- 2) The Perceived Maternal Parenting Self-Efficacy tool is the first valid and reliable tool for use with mothers of hospitalised preterm neonates. It adds to the existing number of assessments within the scope of Neonatal Health Psychology (NNHP) and provides a new way for allied health professional to support mothers during hospital confinement.
- 3) There is evidence that the cognitions of mothers' of hospitalised preterm neonates are mediated by the type of feeding a mother gives her baby.
- 4) Tactile sensory nurturing interventions mediate
 - a. maternal cognitions and emotions
 - b. Preterm behavioural state, length of hospitalisation and weight gain
- 5) Mothers who are taught and provide TAC-TIC therapy in comparison to those who did not showed significant increases in;
 - a. Their levels of Self-efficacy, Self-Esteem and Attachment
 - i. thereby suggesting that psychological states can be changed in a short period of time.

- b. The amount of time spent in medium activity and weight gain during the study period

- 6) This research contributes new knowledge within the scope of Neonatal Health Psychology (NNHP) and provides further evidence of the applicability of NNHP as a theoretical framework, using Gottlieb's theory of experiential canalization and Bandura's Self-Efficacy theory for studying the hospitalised preterm neonate and their family.

- 7) Within its current definition NNHP does not include the potential influence upon and of caregivers such as the family; including the parents, grandparents and neonatal staff, within this context. The original contributions of this research listed within this thesis add to the growing body of research-based literature that can be studied from a Neonatal Health Psychology (NNHP) perspective. Hence, a new addendum to the current definition of NNHP is proposed to include the family and other caregivers of hospitalised preterm neonates, which marks a new advent within this line of research.
 - a. Thus, it is proposed that Neonatal Health Psychology should be redefined as, 'the scientific study of biopsychosocial and behavioural processes in health, illness and health care of the preterm (and fullterm) neonate *and their caregivers* during his/her first 28 days of life, and the relationship of such processes with later outcome.'

REFERENCE

- Abidin, R.R. (1983) *Parenting Stress Index*. Charlottesville, VA: Pediatric Psychology Press
- Action Medical Research (2006) Premature birth: Is inflammation to blame? [online] Action Medical Research [cited 30th August 2006] <http://www.action.org.uk/medical_research/prematurity_inflammation.php>
- Adamson-Macedo, E.N. (1985-6) Effects of tactile stimulation on low and very low birthweight infants during the first week of life. *Current Psychological Research and Reviews*, **6**, pp.305-308
- Adamson-Macedo, E.N. (1990) The effects of touch on preterm and fullterm neonates and young children. *Journal of Reproductive and Infant Psychology*, **8**, pp.267-273.
- Adamson Macedo, E.N. (1997) Neonatal Psychoneuroimmunology: Emergence, scope and perspectives. *International Journal of Prenatal and Perinatal Psychology and Medicine*, **9**(4), pp.421-440.
- Adamson-Macedo, E.N. (1998) The mind and body of the preterm neonate. *International Journal of Prenatal and Perinatal Psychology and Medicine*, **10**(4), pp.439 – 456.
- Adamson-Macedo, E.N. (2000). Pathways in the emergence of neonatal health psychology (NNHP), and its scope. *International Journal of Prenatal and Perinatal Psychology and Medicine*, **12**(1), pp.15-39.
- Adamson-Macedo (2004) Neonatal Health Psychology (NNHP): Theories and Practice. In E.N. Adamson-Macedo (Ed.), *Expanding Frontiers of Neonatology. Special Issue of Neuroendocrinology Letters*, **25**(1), pp. 9-34.
- Adamson-Macedo, E.N. and Attree, J.L. (1994) TAC-TIC therapy: the importance of systematic stroking. *British Journal of Midwifery*, **2**(6), pp.264-269
- Adamson-Macedo, E.N., and Barnes, C.R. (2008, submitted) Neo-Hapy: neohaptic touch in 0-3 month olds.
- Adamson-Macedo, E. N., Dattani, I., Wilson, A., and De Carvalho, F. A. (1993) A small sample follow-up study. *Journal of Reproductive and Infant Psychology*, **11**(3), pp. 165.
- Adamson-Macedo, E.N., de Roiste, A., Wilson, A., de Carvalho, F., and Dattani, I. (1994) TAC-TIC therapy with high-risk, ventilated preterms. *Journal of Reproductive and Infant Psychology*, **12**(2), pp. 249-252.
- Adamson-Macedo, E.N., de Roiste, A., Wilson, A., Hayes, J.A., Eaton, B., and de Carvalho, F. (1997) systematic gentle/light stroking and maternal random touching of ventilated preterms: A preliminary study. *International Journal of Prenatal and Perinatal Psychology and Medicine*, **9**(1), pp.17-31.

- Ader, R., Cohen, N., and Felten, D. (1995) Psychoneuroimmunology: interactions between the nervous system and the immune system. *Lancet*, **345**, pp.99-103.
- Ainsworth, M.D.S. (1969) Object relations, dependency and attachment: a theoretical review of the infant-mother relationship. *Child Development*, **40**, pp.969-1025.
- Akamatsu, T.J., Stephens, M.A.P., Hobfoll, S.E., and Crowther, J.H. (1991) *Family health psychology*. New York: Hemisphere Publishing Corporation.
- Als, H. (1986) A synactive model of neonatal behavioural organisation: framework for the assessment and support of the neurobehavioural development of the premature infant and his parents in the environment of the neonatal intensive care unit. in Sweeney, J.K. (ed.) *The high-risk neonate: Developmental therapy perspectives*. New York: Harworth Press limited.
- Als, H. (1997) Earliest intervention for preterm infants in the newborn intensive care unit. in Guralnick, M.J. (ed.) *Effectiveness of Early Intervention*, Baltimore: Paul H. Brookes.
- Als, H., Duffy, F.H., McAnulty, G.B., Rivkin, M.J., Vajapeyam, S., Mulkern, R.V., Warfield, S.K., Huppi, P.S., Butler, S.C., Conneman, N., Fischer, C., and Eichenwald, E.C. (2004) Early experience alters brain function and structure. *Pediatrics*, **113**(4), pp.846-857.
- Anderson, G.C., Chiu, S-H., Dombrowski, M.A., Swinth, J.Y., Albert, J.M., and Wada, N. (2003) Mother-newborn contact in a randomized trial of kangaroo (skin-to-skin) care. *Journal of Obstetric, Gynecological, and Neonatal Nursing*, **32**(5), pp.604-611.
- Appleton, S. (1997) 'Handle with care': An investigation of the handling received by preterm infants in intensive care. *Journal of Neonatal Nursing*, **3**(3), pp.23-27.
- The Ashington Audit group (2004) Evaluating a nurse-led model for providing neonatal care. *Journal of Advanced Nursing*, **47**(1), pp.39-48.
- Aunola, K., Nurmi, J., Onatsu-Arvilommi, T., and Pulkkinen, L. (1999) The role of parents' self-esteem, mastery-orientation and social background in their parenting styles. *Scandinavian Journal of Psychology*, **40**, pp.307-317.
- Barlow, J., Powell, L., and Gilchrist, M. (2006) The influence of the training and support programme on the self-efficacy and psychological well-being of parents of children with disabilities: A controlled trial. *Complementary Therapies in Clinical Practice*, **12**, pp.55-63.
- Barnes, C.R. & Adamson-Macedo, E. N. (2004) Perceived Parenting Self-Efficacy (PMP S-E) of mothers who are breastfeeding hospitalised preterm neonates. in E.N. Adamson-Macedo (Ed.), *Expanding Frontiers of Neonatology. Special Issue of Neuroendocrinology Letters*, **25**(1), pp. 95-102.
- Barr, R.G. (1998) Crying in the first year of life: good news in the midst of distress. *Child: Care, Health and Development*, **24**(5), pp.425-439.

- Bandolier (1994) Steroids in preterm delivery **2**(2), pp.1-5.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review*, **84**, pp.191-215
- Bandura, A. (1982) Self-efficacy: Mechanism in human agency. *American Psychologist*, **37**, pp.122-147.
- Bandura, A. (1986). *Social foundations of thought and action: A social-cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1989) Regulation of cognitive processes through perceived self-efficacy. *Developmental Psychology*, **25**, pp.729-735.
- Bandura, A. (1997) Self-efficacy: The exercise of control. USA: Freeman and Co.
- Bates, J.E., and Bayles, K. (1988) Attachment and the development of behaviour problems. in Belsky, J., and Nezworski, T. (Eds.) *Clinical Implications of Attachment*, Hillsdale, NJ: Lawrence Erlbaum Associates.
- Benoit, D., and Parker, K.C.H. (1994) Stability and transmission of attachment across three generations. *Child Development*, **65**, pp.1444-1456.
- Bhutta, Z.A., Khan, I., Salat, S., Farukh, R., and Ara, H. (2004) Reducing length of stay in hospital for very low birthweight infants by involving mothers in a stepdown unit: An experience from Karachi (Pakistan). *The British Medical Journal*, **329**, pp.1151-1155.
- Biancuzzu, M. (2003) Breastfeeding the newborn: *Clinical strategies for nurses (2nd Edition)*. St Louis, Missouri: Mosby Inc.
- Bidmead, C., and Farnes, J. (2004) Enhancing early parent-infant interaction. Part two: Positive touch. *Community Practitioner*, **77**(11), pp.434-436.
- Black, K.A., and Hylander, M.A. (2000) breastfeeding the high risk infant: Implications for midwifery management. *Journal of Midwifery and Women's Health*, **45**(3), pp.238-245.
- Bland, J.M., and Altman, D.G. (1997) Statistics notes: Cronbach's alpha. *British Medical Journal*, **314**, pp.1-5.
- BLISS (2005) *Newborn News*. London: Design Group International.
- BLISS (2007) http://www.bliss.org.uk/pagebuild.php?texttype=howbliss_info_causesprem
- Blyth, R., Creedy, D.K., Dennis, C.L, Moyle, W., Pratt, J., and De-Vries, S.M. (2002) Effect of maternal confidence on breastfeeding duration: An application of breastfeeding self-efficacy theory. *Birth: Issues in Perinatal Care*, **29**(4), pp. 278-284.
- Bockhorst, C.L., Backermans-Kranenburg, M.J., Fearon, R.M., van Ijzendoorn, H., Fonagy, P., and Schuengel, C. (2003) The importance of shared environment in mother-infant

- attachment security: a behavioural genetic study. *Child Development*, **74**(6), pp.1769-1782.
- Bond, C. (2002) Positive touch and massage in the neonatal unit: A means of reducing stress level. *Journal of Neonatal Nursing*, **5**(5), pp.16-20.
- Bowlby, J. (1969) *Attachment and Loss*. Vol. 1, *Attachment*. Basic Books: New York.
- Bowlby, J. (1973) *Attachment and Loss*, vol. 2: *Separation: Anxiety and anger*, London: Hogarth and New York: Basic Books.
- Bowlby, J. (1980) *Attachment and Loss*, vol. 3: *Loss: Sadness and Depression*, London: Hogarth and New York: Basic Books.
- Bowlby, J. (1982) *Attachment and Loss*, vol. 1: *Attachment*; London: Hogarth and New York: Basic Books.
- Bowlby, J. (1988) *A Secure Base: Clinical Applications of Attachment Theory*. Tavistock/Routledge: London.
- Brandon, D.H., Holditch-Davis, D., and Winchester, D.M. (2005) Factors affecting early neurobehavioural and sleep outcomes in preterm infants. *Infant Behaviour and Development*, **28**, pp.206-219.
- Brofenbrenner, U. (1979) *The ecology of human development*. Cambridge, MA, Harvard University Press.
- Bromberger, P. (2004) Care of the very small premature infant. *Pediatric Advisor*, McKensson Health Solutions LLC.
- Brown, P., Rustia, J., and Schappert, P. (1991) A comparison of fathers of high-risk newborns and fathers of healthy newborns. *Journal of Pediatric Nursing*, **6**, pp.269-273.
- Caplan, G., Mason, E.A., and Kaplan, D.M. (2000) Four studies of crisis in parents of prematures. *Community Mental Health Journal*, **36**(1), pp.25-45.
- Carson, R. (1997) The problem of prematurity: Premature labour. *Modern Midwife*, **7**(10), pp.8-11.
- Carson, R.J. (2004) Detection and prevention of premature labour. in E.N. Adamson-Macedo (Ed.), *Expanding Frontiers of Neonatology. Special Issue of Neuroendocrinology Letters*, **25**(1), pp. 35-41.
- Carson, K., and Virden, S. (1984) Can prenatal teaching promote maternal attachment? *Health Care for Women International*, **5**(5/6), pp. 355-369.
- Chamberlain, D.B. (1994) The sentient pre-nate: What every parent should know. *Pre- and Perinatal Psychology Journal*, **9**(1), pp.9-31.

- Chang, Y.-J., Anderson, G.C., and Lin, C.-H. (2002) Effects of prone and supine positions on sleep state and stress responses in mechanically ventilated preterm infants during the first postnatal week. *Issues and Innovations in Nursing Practice*, **40**(2), pp.161-169.
- Chang, Y.J., Fine, M.A., Ispa, J., Thornburg, K.R., Sharp, E., and Wolfenstein, M. (2004) Understanding parenting stress among young, low income, african-american, first-time mothers. *Early Education and Development*, **15**(3), pp.265-282.
- Chen, C.W., and Conrad, B. (2001) The relationship between maternal self-esteem and maternal attachment in mothers of hospitalized premature infants. *The journal of nursing research*, **9**(4), pp. 69-82.
- Chen, C-H., and Wang, S-Y. (2002) Psychological outcomes of vaginal births in Taiwanese Primiparas. *Research in Nursing and Health*, **25**, pp.452-458.
- Chwo, M.J., Anderson, G.C., Good, M., Dowling, D.A., Shiau, S.H.H., and Chu, D.M. (2002) A randomized control trial of early kangaroo care for preterm infants: effects on temperature, weight, behaviour, and acuity. *Journal of Nursing Research*, **10**, pp.129-141.
- Clark-Carter, D. (1997) *Doing quantitative psychological research: from design to report*. UK: Psychology Press Ltd.
- Cohen, S.E., and Beckwith, L. (1977) Caregiving behaviours and early cognitive development as related to ordinal position in preterm infants. *Child Development*, **48**, pp.152-157.
- Coleman, P.K., and Karraker, K.H. (1997) Self-efficacy and parenting quality: Findings and future applications. *Developmental Review*, **18**, pp.47-85.
- Coleman, P.K., and Karraker, K.H. (2000) Parenting self-efficacy among mothers of school-age children: conceptualization, measurement, and correlates. *Family Relations*, **49**(1), pp13-24.
- Colin, W.B. and Scott, J.A. (2002) Breastfeeding: reasons for starting, reasons for stopping and problems along the way. *Breastfeeding Review*, **10**(2), pp.13-19.
- Condon, J.T., and Corkindale, C.J. (1998) The assessment of parent-to-infant attachment: development of a self-report questionnaire instrument. *Journal of Reproductive and Infant Psychology*, **16**, pp. 57-76.
- Constantinou, J. (2002) Predictive value of Neonatal Neurobehavioural and Neuroimaging assessments for detecting cerebral palsy in preterms, Unpublished Doctoral Thesis, University of Wolverhampton, Wolverhampton.
- Cornell, E.H., and Gottfried, A.W. (1976) Intervention with premature human infants. *Child Development*, **47**(1), pp. 32-39.
- Cox, C.L., and Bialoskurski, M. (2001) Neonatal intensive care: Communication and attachment. *British Journal of Nursing*, **10**(10), pp.668-676.

- Crawford, J.W. (1982) Mother-infant interaction in premature and fullterm infants. *Child Development*, **53**, pp.957-962.
- Crnic, K.A., Ragozin, A.S., Greenberg, M.T., Robinson, N.M., and Basham, R.B. (1983) Social interaction and developmental competence of preterm and full-term infants during the first year of life. *Child Development*, **54**, pp.119-1210.
- Davis, M.S., and Akridge, K.M. The effect of promoting intrauterine attachment in primiparas on postdelivery attachment. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, **16**(6), pp. 430-437.
- De Roiste, A. (1991) Aspects of tactile stimulation with infants in intensive and special care baby units. *Unpublished Doctoral Thesis*. University of Glasgow, Scotland.
- De Roiste, A., and Bushnell, I.W.R. (1993) Tactile stimulation and preterm infant performance on an instrumental conditioning task. *Journal of Reproductive and Infant Psychology*, **11**, pp.155-163.
- De Roiste, A., and Bushnell, I.W.R. (1995) The immediate gastric effects of a tactile stimulation programme on premature infants. *Journal of Reproductive and Infant Psychology*, **13**, pp.57-62.
- De Roiste, A., Bushnell, I.W.R., Burns, J. (1995) TAC-TIC: How do special care baby unit babies react to it? *British Journal of Midwifery*, **3**, pp.8-15
- De Roiste, A., and Bushnell, I.W.R. (1996) Tactile stimulation: Short and long term benefits for premature infants. *Journal of Reproductive and Infant Psychology*, **11**, pp.155-163.
- Dennis, C.L., and Faux, S. (1999). Development and psychometric testing of the breastfeeding self-efficacy scale. *Research in Nursing and Health*, **22**, pp.399-409.
- Diamond, M.E., Armstrong-James, M., Ebner, F.F. (1993) *Experience-dependent plasticity in adult rat barrel cortex*. *Proceedings National Academy of Science USA*. **90**, pp.2082-2086.
- Dieter, J.N.I., Field, T., Hernandez, R.M., Emory, E.K., and Redzepi, M. (2003) Stable preterm infants gain more weight, and sleep less after 5 days of massage therapy. *Journal of Pediatric Psychology*, **28**(6), pp.403-411.
- DiMatteo, M.R., Morton, S.C., Lepper, H.S., Damush, T.M., Carney, M.F., Pearson, M., and Kahn, K.L. (1996) Cesarean childbirth and psychosocial outcomes: A meta-analysis. *Health Psychology*, **15**(4), pp.303-314.
- De Montigny, F., and Lacharite, C. (2005) Perceived parental efficacy: concept analysis. *Journal of Advanced Nursing*, **49**(4), pp.387-396.
- Eckerman, C.O., Oehler, J.M., Medvin, M.B., and Hannan, T. (1994) Premature newborns as social partners before term age. *Infant Behaviour and Development*, **17**, pp.55-70.

- Eckerman, C.O., and Oehler, J.M. (1992) Very-low birthweight newborns and parents as early social partners. *in* Friedman, S.L., and Sigman, M.D. (Eds.) *The Psychological Development of Low Birthweight Children*, USA: Ablex Publishin Company.
- Egeland, B., and Hiester, M. (1995) The long-term consequences of infant day-care and mother-infant attachment. *Child Development*, **66**, pp.474-485.
- Eyler, F.D., Marylou, B., Conlon, M., Woods, N.S. and Frentzen, B. (1994) prenatal cocaine use: A comparison of neonates matched on maternal risk factors. *Neurotoxicology and Teratology*, **16**(1), pp.81-87.
- Farrow, C., and Blisset, J. (2005) Maternal cognitions, psychopathologic symptoms, and infant temperament as predictors of early infant feeing problems: A longitudinal study. *International Journal of Eating Disorders*, **39**(2), pp.128-134.
- Fearon, I., hains, S.M.J., Muir, D.W., and Kisilevsky, B.S. (2002) Development of tactile responses in human preterm and fullterm infants from 30 to 40 weeks postconceptional age. *Infancy*, **3**(1), pp.31-51.
- Field, T. (1977). Effects of early separation interactive deficits and experimental manipulation on infant– mother face-to-face interaction. *Child Development*, **48**, pp.763–771.
- Field, T.M. (1980) Interactions of high risk infants: Quantitative and qualitative differences. *in* Sawin, D.B., Hawkins, R.C., Walker, L.P., and Penticuff, J.H. (Eds.) *Exceptional infant (Vol. 4): Psychological risks in infant-environment transactions*. New York: Brunner/Mazel.
- Field, T.M., Dempsey, J.R., and Shuman, H.H. (1981) Developmental follow-up of preterm and post-term infants. *in* Friedman, S.L., and sigman, M. (Eds.) *Preterm Birth and Psychological Development*. New York: Academic Press.
- Field, T.M. (1992) Interventions in early infancy. *Infant Mental Health Journal*, **13**(4), pp. 329-336.
- Field, T.M. (1998) Massage therapy effects. *American Psychologist*, **53**(12), pp.1270-1281.
- Field, T.M., Hernandez-Reif, M., and Freedman, J. (2004) Stimulation programmes for preterm infants. *Research in Child Development*, **18**(1), pp.3-19.
- Field, T., Hernandez-Reif, M. Diego, M., Feijo, L., Vera, Y., and Gil, K. (2004) Massage therapy by parents improves early growth and development. *Infant Beahvior and Development*, **27**, pp.435-442.
- Field, T., Hernandez-Reif, M., Feijo, L., and Freedman, J. (2006) Prenatal, Perinatal and neonatal stimulation: A survey of neonatal nurseries. *Infant Behavior and Development*, **29**, pp.24-31.

- Filtchev, S.I., Curzi, D.L., Spassov, L., Kauffmann, F., Trang, H.T.T, and Gaultier, C. (1994) Heart rate variability during sleep in infants with bronchopulmonary dysplasia: Effects of mild decrease in oxygen saturation. *Chest*, **106**(6), pp.1711-1716.
- Fish, M., Stifter, C.A., and Belsky, J. (1991) Conditions of continuity and discontinuity in infant negative emotionality: Newborn to five months. *Child Development*, **62**, pp.1525-1537.
- Fish, M., and Stifter, C.A. (1993) Mother parity as a main and moderating influence on early mother-infant interaction. *Journal of Applied Developmental Psychology*, **14**, pp.557-572.
- Fisher, C., And Baum, J.D. (1983) Breast feeding for very low birthweight babies. in Davis, J.A., Richards, M.P.M., And Robertson, N.R.C. (eds.) *Parent baby attachment in premature infants*. Great Britain: St. Martin's Press, Inc, 177-188.
- Fisher, J., Astbury, J., and Smith, A. (1997) Adverse psychological impact of operative obstetric interventions: A prospective longitudinal study. *Australian and New Zealand Journal of Psychiatry*, **31**, pp.728-738.
- Forrest, G.C. (1993) Preterm labour and delivery: Psychological sequelae. *Ballieres Clinical Observations and Gynaecology*, **7**(3), pp.653-669.
- Freudigman, K.A., and Thoman, E.B. (1993) Infant sleep during the first postnatal day: An opportunity for assessment of vulnerability. *Pediatrics*, **92**, pp.373-379.
- Froman, R.D. (2001) Elements to consider in planning the use of factor analysis. *Southern Online Journal of Nursing Research*, **5**(2), pp.1-22.
- Froman, R.D., and Owen, S.V. (1989) Infant care self-efficacy. *Scholarly Inquiry for Nursing Practice: An International Journal*, **3**(3), pp.199-211.
- Fuller, J.R. (1990) Early patterns of maternal attachment. *Health Care for Women International*, **11**(4), pp.433-446.
- Furman, L., Minich, N., and Hack, M. (2002) Correlates of lactation in mothers of very low birth weight infants. *Pediatrics*, **109**(4), p.7.
- Gandy, G.M., and Robertson, N.R.C. (1987). Lecture notes on neonatology. Blackwell Scientific Publications, Oxford.
- Gerhardt, J.K. & Abrams, R.M. (2000). Fetal exposure to sounds and vibroacoustic stimulation. *Journal of Perinatology*, **20**(2), pp.21-30.
- Gertner, S., Greenbaum, C.W., Sadeh, A., Dolfin, Z., Sirota, L., and Ben-Nun, Y. (2002) Sleep-wake patterns in preterm infants and 6 months home environment: Implications for early cognitive development. *Early Human Development*, **68**, pp.93-102.
- Giacoia, G.P., Rutledge, D., and West, K. (1985) Factors affecting visitation of sick newborns. *Clinical Pediatrics*, **24**(5), pp.259-262.

- Gaebler, C.P., and Hanzlik, J.R. (1996) The effects of a prefeeding stimulation program on preterm infants. *American Journal of Occupational Therapy*, **50**, pp.184-192.
- Gatts, J.D., Wallace, D.H., Glasscock, G.H., McKee, E., and Cohen, R.S. (1994) A modified newborn intensive care unit environment may shorten hospital stay. *Journal of Perinatology*, **14**, pp.422-427.
- Gibaud-Wallaston, J., and Wandersman, L.P. (1978) *Development and utility of the parenting sense of competence scale*. Paper presented at the meeting of the American Psychological Association, Toronto, Canada.
- Goldberg, S., and DiVitto, B. Parenting children born preterm. in M. H. Bornstein, (Ed). (2002). *Handbook of parenting: Vol. 1: Children and parenting (2nd ed.)*. Mahwah, NJ, US: Lawrence Erlbaum Associates, Publishers.
- Gondoli, D.M., and Silverberg, S.B. (1997) Maternal emotional distress and diminished responsiveness: the mediating role of parenting efficacy and parental perspective taking. *Developmental Psychology*, **33**(5), pp.861-868.
- Gottfried, A.W., and Gaiter, Y.L. (1985) *Infant stress under intensive care: Environmental Neonatology*. Baltimore: university press.
- Gottlieb, G. (1983) Development of species identification in ducklings: Perceptual specificity in the wood duck embryo requires sib stimulation for maintenance. *Developmental Psychobiology*, **16**(4), pp. 323-333.
- Gottlieb, G. (1976) Conceptions of prenatal development: Behavioural embryology. *Psychological Review*, **83**, pp.215-234.
- Gottlieb, G. (1991) Experiential canalization of behavioural development: Results. *Developmental Psychology*, **27**, pp.35-39.
- Graham, S. (1995) Psychological needs of families with babies in the neonatal unit: The role of the neonatal nurse. *Journal of Neonatal Nursing*, **1**(4), pp.15-18.
- Gray, B.A. (2001) Women's subjective appraisal of pregnancy risk and the effects of uncertainty, perceived control, coping and emotions on maternal attachment. *Unpublished Doctoral thesis*, Case Western Reserve University.
- Gross, D., and Rocissano, L. (1988) Maternal confidence in toddlerhood: Its measurement for clinical practice and research. *Nurse Practitioner*, **13**, pp.19-29.
- Gross, D., Rocissano, L., and Roncoli, M. (1989) Maternal confidence during toddlerhood: Comparing preterm and fullterm group. *Research in Nursing and Health*, **12**, pp.1-9.
- Gross, D., Conrad, B., Fogg, L., and Wothke, W. (1994) A longitudinal model of maternal self-efficacy, depression, and difficult temperament during toddlerhood. *Research in Nursing and Health*, **17**, pp.207-215.

- Halpern, L.F., and McLean, W.R. (1997) Hey mom look at me. *Infant Behaviour and Development*, **20**(4), pp.515-529.
- Harlow, H.F., and Harlow, M. (1965) Learning to love. *American Scientist*, **54**, pp.171-182.
- Harrison, L.L. (1992) Effects of tactile stimulation programmes for premature infants: review of the literature. *Maternal Child Nursing Journal*, **14**, pp.69-90.
- Harrison, L., Sherrod, R.A., Dunn, L., Olivet, L., and Jeong, J. (1991) Effects of hospital-based instruction on interactions between parents and preterm infants. *Neonatal Network*, **9**(7), pp.27-32.
- Harrison, L.L., and Woods, S. (1991) Early parental touch and preterm infants. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, **20**(4), pp.299-306.
- Harrison, L., Olivet, L., Cunningham, K., Bodin, M.B., and Hicks, C. (1996) Effects of gentle human touch on preterm infants: pilot study results. *Neonatal Network*, **15**(2) pp.35-42.
- Hart, J., Davidson, A., Clark, C., and Gibb, C. (2003) Health visitor run baby massage classes: investigating the effects. *Community Practitioner*, **76**(4), pp.138-142.
- Harter, S. (1993) Causes, correlates, and the functional role of global self-worth: A life-span perspective. in Baumeister, B.R. (Ed.) *Self-Esteem: The Puzzle of Low Self Regard*. New York: Plenum.
- Hayes, J.A. (1996) TAC-TIC: A non pharmacological approach to the elliviation of neonatal pain. *Unpublished doctoral dissertation*, University of Wolverhampton, Wolverhampton: UK
- Hayes, J.A., and Adamson-Macedo, E.N. (1998) Tactile stimulation in the ventilated preterm: A single case study. *British Journal of Midwifery*, **6**(11), pp.720-724.
- Hayes, J.A., Adamson-Macedo, E.N., Perera, S., Anderson, J. (1999) Detection of secretory immunoglobulin A (SIgA) in saliva of ventilated and non-ventilated preterm neonates. *Neuroendocrinology letters*, **20**(1), pp.109-113.
- Hayes, J.A., Adamson-Macedo, E.N., and Perera, S. (2000) The mediating role of cutaneous sensitivity within neonatal Psychoneuroimmunology. *Neuroendocrinology Letter*, **21**, pp.187-193.
- Hess, C.R., Teti, D.M., and Hussey-Gardner, B. (2004) Self-efficacy and parenting of high-risk infants: The moderating role of parent knowledge of infant development. *Applied Developmental Psychology*, **25**, pp.423-437.
- Holditch-Davis, D. (1990) The development of sleeping and waking states in high-risk preterm infants. *Infant Behaviour and Development*, **13**, pp.513-531.

- Horton, J., Waldenstrom, U., and Bowman, E. (1998) Touch of low birthweight babies in neonatal intensive care: Observations over a 24 hour period. *Journal of Neonatal Nursing*, **4**(2), pp. 24-28.
- Howitt, D., and Cramer, D. (2000) *An introduction to statistics in psychology: A complete guide for students*. Pearson Education Limited: Edinburgh
- Hunt, J.M. (1979) Psychological development: early experience. *Annual Review of Psychology*, **30**, pp.102-144.
- Iams, J.D. (2003) Prediction and early detection of preterm labor. *Obstetric Gynaecology*, **101**, pp.402-412.
- Jacobs, B.S., and Moss, H.A. (1976) Birth order and sex of sibling as determinants of mother-infant interaction. *Child Development*, **47**, pp.315-322.
- Jackson, A., Gorman, W.A. (1988) Maternal attitudes to preterm birth. *Journal of psychosomatic obstetrics and gynaecology*, **8**(2), pp.119-126.
- James, S.R., and Mott, S.R. (1988) *Child Health Nursing*. New York: Addison-Wesley
- Jay, S.S. (1982) The effects of gentle human touch on mechanically ventilated very-short-gestation infants. *Maternal-Child Nursing journal*, **11**(4), pp.199-256.
- Jewell V.C., Northrop-Clewes, C.A., Tubman, R., and Thurnham, D.I. (2001) Nutritional factors and visual function in premature infants. *The Proceedings of the Nutritional Society*, **60**(2), pp.171-178.
- Johnston, C., and Mash, E.J. (1989) A measure of parenting satisfaction and efficacy. *Journal of Clinical Child Psychology*, **18**, pp.167-175.
- Jones, T.L. and Prinz, R.J. (2005) Potential roles of parental self-efficacy in parent and child adjustment: A review. *Clinical Psychology Review*, **25**, pp.341-363.
- Kaplan, D., and Mason, E.A. (1960) Maternal reactions to premature birth viewed as an acute emotional disorder. *American Journal of Orthopsychiatry*, **30**, pp.539-547.
- Kaufman, K., and Hall, L.A. (1989) Influences of the social network on choice and duration of breastfeeding in mothers of preterm infants. *Research in Nursing and Health*, **12**(3), pp.149-159.
- Kaufman, A.S., and Kaufman, N.L. (1983) K-ANC Kaufman Assessment Battery for Children. American Guidance Service, Circle Pines, MN.
- Kendall, S., and Bloomfield, L. (2005) Developing and validating a tool to measure parenting self-efficacy. *Journal of Advanced Nursing*, **51**(2), pp.174-181.
- Kenyon, S., Boulvain, M., and Neilson, J. (2003) Antibiotics for premature rupture of membranes. *Chochrane Database of Systematic Reviews*, **2**, CD001058.

- Kessler, L.A., Gielen, A.C., Diener-West, M., and Paige, D.M. (1995) The effect of a woman's significant other on her breastfeeding decision. *Journal of Human Lactation*, **11**(2), pp.103-109.
- Klaus, M.H., and Kennel, J. (1976) *Maternal-infant bonding*. St. Louis: Mosby.
- Klaus, M.H., and Kennel, J. (1982) *Parent-infant bonding*. St. Louis: Mosby.
- Knepfer, G., and Johns, C. (1989) *Nursing for Life*. Australia: Pan Books
- Koniak-Griffin, D. (1993) Maternal role Attainment. Image. *Journal of Nursing Scholarship*, **25**, pp.257-262.
- Korner, A.F., Constantinou, J., and Dimiceli, S. (1991) Establishing the reliability and developmental validity of a neurobehavioural assessment for preterm infants: A methodological process. *Child Development*, **62**, pp.1200-1208.
- Koul, R., and Rubba, P. (1999) An Analysis of the Reliability and Validity of Personal Internet Teaching Efficacy Beliefs Scale, *Electronic Journal of Science Education*, **4**(1).
- Krebs, T.L. (1998) Clinical pathway for enhanced parent and preterm infant interaction through parent education. *Journal of Perinatal and neonatal Nursing*, **12**(2), pp.38-49.
- Labbok, M.H. (1999) Health sequelae of breastfeeding for the mother. *Clinics in Perinatology*, **26**(2), pp.491-503.
- Lang, S. (2002) *Breastfeeding special care babies (2nd Edition)*. UK: Harcourt Publishers Limited
- Lau, R., and Morse, C. (1998) Experiences of parents with premature infants hospitalised in neonatal intensive care units: A literature review. *Journal of Neonatal Nursing*, **4**(6), pp.23-29.
- Lerkes, E.M., and Crockenberg, S.C. (2002) The development of maternal self-efficacy and its impact on maternal behaviour. *Infancy*, **3**(2), pp.227-247.
- Leung, C. (2004) Born too soon. in E.N. Adamson-Macedo (Ed.), *Expanding Frontiers of Neonatology. Special Issue of Neuroendocrinology Letters*, **25**(1), pp. 133-136.
- Levy-Shiff, R., Sharir, H., and Mogliner, M.B. (1989) Mother- and father-preterm infant relationship in the hospital preterm nursery. *Child Development*, **60**, pp.93-102.
- Lewis, M., and Kreitzberg, V.S. (1979) Effects of birth order and spacing on mother-infant interactions. *Developmental Psychology*, **15**, pp.617-625.
- Lickliter, R., Dyer, A.B., and McBride, T. (1993) Perceptual consequences of early social experience. *Behavioural Processes*, **30**, pp.185-200.

- Long, J.G., Philip, A.G.S., and Lucey, J.F. (1980) Excessive handling as a cause of hypoxemia. *Pediatrics*, **65**(2), pp.203-207.
- Lowe, N. (1993) Maternal confidence for labor: development of the Childbirth Self-Efficacy Inventory, *Research in Nursing and Health*, **16**(2), pp.141-149.
- Ludington, S.M. (1990) Energy conservation during skin-to-skin contact between premature infants and their mothers. *Heart and Lung*, **19**(5), pp.445-451.
- Ludington-Hoe, S.M., Hoseini, R., and Torowicz, D.L. (2005) Skin-to-skin contact (kangaroo care) analgesia for preterm infant heel stick. *AACN Clinical Issues: Advanced Practice in Acute and Critical Care*, **16**(3), pp.373-387.
- Ludington-Hoe, S.M., Nguyen, N., Swinth, J.Y., and Satyshur, R.D. (2000) Kangaroo care compared to incubators in maintaining body warmth in preterm infants. *Biological Research for Nursing*, **2**(1), pp.60-73.
- Macedo, E.N. (1984) The effects of early tactile stimulation on low birth weight infants a 2year follow-up. Unpublished Doctoral Thesis, Bedford College, London.
- Macey, T.J., Harmon, R.J., and Easterbrooks, M.A. (1987) Impact of premature birth on the development of the infant in the family. *Journal of Consultation and Clinical Psychology*, **55**, pp.846-852.
- Maclean, L.I., McDermott, M.R., and May, C.P. (2000) Method of delivery and subjective distress: women's emotional responses to childbirth practices. *Journal of Reproductive and Infant Psychology*, **18**(2), pp. 153-162.
- Malatesta, C.Z., Grigoryev, P., Lamb, C., Albin, M., and Culver, C. (1986) Emotion Socialization and Expressive Development in Preterm and Full-Term Infants. *Child Development*, **57**(2), pp.316-330.
- Mann, N.P., Haddow, R., Stokes, L., Goodley, S., and Rutter, N. (1986) Effect of night and day on preterm infants in a newborn nursery: randomised trial. *British Medical Journal*, **293**, pp.1265-1267.
- Manns, S.V. (2004) Life after the NNU: The long term effects on mothers' lives, managing a child at home with bronchopulmonary dysplasia and on home oxygen. in E.N. Adamson-Macedo (Ed.), *Expanding Frontiers of Neonatology. Special Issue of Neuroendocrinology Letters*, **25**(1), pp. 127-132.
- Marinho, H., and Werner, J. (1985) Individual Card of Child's Development. Instituto de Pesquisas Heloisa Marinho. IPHEM Publications, Rio de Janeiro.
- Martin, R.J., Herrell, N., Rubin, D., and Fanaroff, A. (1979) Effect of Supine and Prone Positions on Arterial Oxygen Tension in the Preterm Infant. *Pediatrics*, **63**(4), pp. 528-531.

- Masterson, J., Zucker, C., and Schulze, K. (1987) Prone and Supine Positioning Effects on Energy Expenditure and Behavior of Low Birth Weight Neonates. *Pediatrics*, **80**(5), pp.689-692.
- McCarter-Spaulding, D., and Kearney, M. (2001) Parenting self-efficacy and perception of insufficient breast milk. *Journal of Obstetric Gynecologic and Neonatal Nursing*, **30**(5), pp. 515-522.
- McCarter-Spaulding, D.E., and Kearney, M.H.. Parenting self-efficacy and perception of insufficient breast milk. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, **30**(5), pp. 515-522.
- McGaha, C.G. (2002) Developing of parenting skills in individuals with an intellectual impairment: an epigenetic explanation. *Disability and Society*, **17**(1), pp.81-91.
- McGrath, M.M., and Meyer, E.C. (1992) Maternal self-esteem: From theory to clinical practice in a special care nursery. *Child Health Care*, **21**(4), pp.199-205.
- McGrath, M., and Boukydis, C.F.Z. (1993) Determinants of maternal self-esteem in the neonatal period. *Infant Mental Health Journal*, **14**(1), pp.35-48.
- McIldruff, A. (1998) Parental touch of the preterm neonate: Encourage or Condemn? Australian College of Midwives Incorporated, March, pp.11-22.
- Mercer, R.T. (1985) The process of maternal role attainment over the first year. *Nursing Research*, **34**, pp.198-204.
- Mercer, R.T. (1990) Parents at Risk. New York: Springer Publishing Co.
- Mercer, R.T., and Ferketich, S.L. (1990) Predictors of parental attachment during early parenthood. *Journal of Advanced Nursing*, **15**, pp.268-280.
- Mercer, R.T., and Ferketich, S.L. (1994) Maternal-Infant attachment of experienced and inexperienced mothers during infancy. *Nursing Research*, **43**(6), pp.344-351.
- Messmer, P.R., Rodriguez, S., Adams, J., Wells, G.J., Washburn, K., Zabaleta, I., and Abreu, S. (1997) Effect of kangaroo care on sleep time for neonates. *Pediatric Nursing*, **23**(4), pp. 408-414.
- Miles, M.S. (1989) Parents of critically ill premature infants: Sources of stress. *Critical Care Quarterly*, **12**(3), pp.69-74.
- Miles, M.S., Funk, S.G., and Kasper, M.A. (1991) The neonatal intensive care unit environment: Sources of stress for parents. *AACN Clinical Issues in Critical Care Nursing*, **2**(2), pp.347-354.
- Miles, M.S., Holditch-Davis, D., and Shepherd, H. (1998) Maternal concerns about parenting prematurely born children. *The American Journal of Maternal Child Nursing*, **23**(2), pp. 70-75.

- Miles, M.S., and Frauman, A.C. (1993) Nurses' and parents' negotiation of caregiving roles for medically fragile infants: Barriers and bridges. *in* Funk, S.G., tornquist, E.M., Champagne, M.T., and Weiss, R.A. (Eds.) *Key aspects of caring for the chronically ill: Hospital and Home*. New York: Springer Publishing Co.
- Miles, M.S., and Holditch-Davis, D. (1997) Parenting the prematurely born child: Pathways of influence. *Seminars in Perinatology*, **21**(3), pp.254-266.
- Minde, K. (1992) The social and emotional development of low-birthweight infants and their families up to age 4. *in* Friedman, S.L., and Sigman, M.D. *The Psychological Development of Low Birthweight Children*, New Jersey: Ablex Publishing Corporation.
- Mitra, A.K., Khoury, A.J., Hinton, A.W., and Carothers, C. (2004) Predictors of breastfeeding intention among low-income women. *Maternal and child health journal*, **8**, (2), pp. 65-70.
- Montigny, F., and and Lacharite, C. (2005) Perceived parental self-efficacy: concept analysis. *Nursing Theory and Concept Development or Analysis*, **49**(4), pp.387-396.
- Muller, M.E. (1994) A questionnaire to measure mother-to-infant attachment. *Journal of Nursing Measurement*, **2**(2), pp.129-141.
- Nelson, M.N., White-Traut, R.C., Vasan, U., Silvestri, J.M., Comiskey, E., and Meeledy-Rey, P. (2001) One-year outcome of auditory-tactile-visual-vestibular intervention in the neonatal intensive care unit: Effects of severe prematurity and central nervous system injury. *Journal of Child Neurology*, **16**(7), pp.493-498.
- Nevill, A.M., Lane, A.M., Kilgour, L.J., Bowes, N., and Whyte, G.P. (2001). Stability of psychometric questionnaires. *Journal of Sports Sciences*, **19**(4), pp.273-278.
- Niven, C., Wiszniewski, C., AlRoomi, L. (1993) Attachment (bonding) in mothers of pre-term babies. *Journal of Reproductive and Infant Psychology*, **11**(3), pp.175-185.
- Nunnally, J.C., and Bernstein, I.H. (1994). *Psychometric theory (3rd Ed.)* New York: McGaw-Hill.
- Oehler, J.M., Hannan, T., and Catlett, A. (1993) Maternal views of preterm infants' responsiveness to social interaction. *Neonatal Network*, **12**(6), pp.67-74.
- Oehler, J.M. (1996) Research utilization: The NICU environment. *Neonatal Network*, **15**(3), pp.85-86.
- Ohan, J.L., Leung, D.W., Johnston, C. (2000) The parenting sense of competence scale: Evidence of a stable factor structure and validity. *Canadian Journal of Behavioural Science*, **32**(4), pp.251-261.
- Ohgi, S., Fukunda, M., Morruchi, H., Kusumoto, T., Akiyama, T., and Nugent, J.K. (2002) Comparison of kangaroo care and standard care: Behavioural organization,

development, and temperament in healthy low-birth-weight infants through 1 year. *Journal of Perinatology*, **22**, pp.374-379.

Padden, T., and Glenn, S. (1997) Maternal experiences of preterm birth and neonatal intensive care. *Journal of Reproductive and Infant Psychology*, **15**, pp.121-139.

Pajares, F. (2002) Overview of social cognitive theory and of self-efficacy. Retrieved 10/04/2006, from <http://www.emory.edu/EDUCATION/mfp/eff.html>.

Papousek, M., and von Hofacker, N. (1998) Persistent crying in early infancy: A non-trivial condition of risk for the developing mother-infant relationship. *Child: Care, Health & Development*, **24**(5), pp.395-424.

Parker, S., and Zahr, L.K. (1985). The Maternal Confidence questionnaire. Boston, MA: Boston City Hospital.

Pederson, D.R., Bento, S., Chance, G.W., Evans, B., and Fox, A.M. (1987) Maternal emotional responses to preterm birth. *American Journal of Orthopsychiatry*, **57**(1), pp.15-21.

Piontelli, A. (1987) Infant observation from before birth. *International Journal of Psycho-Analysis*, **68**(4), pp.453-463.

Phillips, D.C. (1976) Holistic thought in social science. Stanford: Stanford University press.

Porter, C., and Hsu, H. (2003) First-time mothers' perceptions of efficacy during the transition to motherhood: Links to infant temperament. *Journal of Family Psychology*, **17**(1), pp.54-64.

Protheroe, L., Dyson, L., Renfrew, M.J., Bull, J., and Mulvihill, C. (2003) The effectiveness of public health interventions to promote initiation of breastfeeding. Health Development Agency.

Raikes, H.A., and Thompson, R.A. Efficacy and Social Support as Predictors of Parenting Stress Among Families in Poverty. *Infant Mental Health Journal*, **26**(3), pp.177-190.

Raval, V., Goldberg, S., Atkinson, L., Benoit, D., Myhal, N., Poulton, L., and Zwiers, M. (2001) Maternal attachment, maternal responsiveness and infant attachment. *Infant Behaviour and Development*, **24**, pp.281-301.

Redshaw, M., and Harris, A. (1995) Maternal perceptions of neonatal care. *Acta Paediatrica*, **84**, pp.593-598.

Redshaw, M.E., Harris, A., Ingram, J.C. (1996) *Delivering Neonatal Care. The Neonatal Unit as a Working Environment: A Survey of Neonatal Unit Nursing*. London: HMSO.

Reece, S.M. (1992) The parent expectations survey. *Clinical Nursing Research*, **1**(4), pp.336-346.

- Reich, S., Bickman, L., and Heflinger, C.A. (2004) Covariates of self efficacy: caregiver characteristics related to mental health services self-efficacy. *Journal of Emotional and Behavioral Disorders*, **12**(2), pp. 99-108.
- Rice, R.D. (1977) Neurophysiological development in premature infants following stimulation, *Developmental Psychology*, **13**(1), pp.69-76.
- Rosenblatt, D. (1997) Premature babies. In Baum, A., Newman, S., Weinman, J., West, R., and McManus, C. *Cambridge Handbook of Psychology, Health and Medicine*, London: Cambridge University Press.
- Rosenblatt, D.B., and Redshaw, M.E. (1984) Factors influencing the psychological adjustment of mothers to the birth of a preterm infant. in Call, J.D., Galenson, E., and Tyson, R. (Eds.) *Frontiers of Infant Psychiatry (Vol. 2)*. New York: Basic Books.
- Ruiz-Pelaez, G., Charpak, N., and Cuervo, L. (2004) Kangaroo Mother Care: an example to follow from developing countries. *British Medical Journal*, **329**, pp1179-1182.
- Sanders, M.R., Turner, K.M.T., Wall, C.R., Waugh, L.M., and Tully, L.A. (1997) Mealtime behaviour and parent-child interaction: A comparison of children with cystic fibrosis, children with feeding problems, and nonclinic controls. *Journal of pediatric Psychology*, **22**(6), pp.881-900.
- Sanders, M.R., and Woolley, M.L. (2005) The relationship between maternal self-efficacy and parenting practices: Implications for parenting training. *Child: Care, Health and Development*, **31**(1), pp.65-73.
- Scharffe, E. and Bartholemew, K. (1994) Reliability and stability of adult attachment patterns. *Personal Relationships*, **1**, pp.23-43
- Schwarzer, R. (1992) *Self-Efficacy: Thought Control of Action*. USA: Taylor and Francis.
- Shea, E.M. (1984) Maternal self-esteem as affected by infant health, infant behaviour and family support (Doctoral dissertation, University of Massachusetts). *Dissertation abstracts International*, **45**, 379B.
- Shea, E., and Tronick, E. (1988) The Maternal self-report inventory: A research and clinical instrument for assessing maternal self-esteem. In H.E. Fitzgerald, B. Lester, and M.W. Yogman (Eds.), *Theory and Research in Behavioural Pediatrics*. New York: Plenum.
- Scher, M.S., Jones, B.L., Steppe, D.A., Cork, D.L., Seltman, H.J., and Banks, D.L. (2003) Functional brain maturation in neonates as measured by EEG-sleep analyses. *Clinical Neurophysiology*, **114**(5), pp.875-882.
- Shiau, S.H. (1999) The effects of kangaroo care on sleep and crying of healthy full-term newborns. *Nursing Research*, **7**(3), pp. 198-208.

- Silvestre, M.A., Morbach, C.A., and Brans, Y.W. (1996) A prospective randomised trial comparing continuous versus intermittent feeding methods in very low birth weight neonates. *Journal of Pediatrics*, **128**, pp.748-752.
- Soet, J.E., Brack, G.A., and Dilorio, C. (2003) Prevalence and predictors of women's experience of psychological trauma during childbirth. *Birth*, **30**(1), pp.36-46.
- Spencer, N., Wallace, A., Sundrum, R., Bacchus, C. And Logan, S. (2006) Child abuse registration, fetal growth, and preterm birth: a population based study. *Journal of Epidemiology and Community Health*, **60**, pp.337-340
- Spiedel, B.D. (1978) Advers effects of routine procedures on preterm infants. *Lancet*, **i**, pp.864-865.
- Stevenson, M.B., Roach, M.A., and Leavitt, L.A. (1992) Early channels of mother-infant communication: Preterm and term infants. *Journal of Child Psychology and Psychiatry*, **33**(7), pp.1193-1204.
- Stifter, C.A., and Bono, M.A. (1998) The effect of infant colic on maternal self perceptions and mother-infant attachment. *Child: Care, Health and Development*, **24**(5), pp.339-351.
- Strunk, P.C. (2001) Dissertation - Effects of Auditory Stimulation in Low and High Light Conditions on Behavioral and State Organization in Preterm Infants. Digital Library and Archives.
- Symington, A., and Pinelli, J. (2006) Developmental care for promoting development and preventing morbidity in preterm infants. *The Cochrane Collaboration*, **4**, pp.1-43.
- Teti, D. M., Gelfand, D. M., and Pompa, J. (1990) Depressed mothers' behavioral competence with their infants: Demographic and psychosocial correlates. *Development and Psychopathology*, **2**(3), pp. 259-270
- Teti, D.M., and Gelfand, D.M. (1991). Behavioral competence among mothers of infants in the first year: The mediational role of maternal self-efficacy. *Child Development*, **62**, pp.918-929.
- The National Assembly for Wales (2003) *Investing in a better start: Promoting breastfeeding in Wales*. Cardiff: Crown
- Tribotti, S.J. (1990) Effects of gentle touch on the premature infant. in Gunzenhauser, N. (Ed.) , New Jersey: Johnson and Johnson.
- Tymchuck, A.J. (1999) Moving towards integration of services for parents with intellectual disabilities. *Journal of Intellectual and Developmental Disability*, **24**, pp.59-74.
- UK Neonatal Staffing Study Group (2002) Patient volume, staffing, and workload in relation to risk-adjusted outcome in a random stratified sample of UK neonatal intensive care units: A prospective evaluation. *Lancet*, **359**, pp.99-107.

- Tulman, L.J. (1985) Mothers' and unrelated persons' initial handling of newborn infants. *Nursing Research*, **34**, pp.205-210.
- Vickers, A., Ohlsson, A., Lacy, J.B., and Horsley, A. (2005) Massage for promoting growth and development of preterm and/or low birth-weight infants (Review). *The Cochrane Collaboration*, **(3)**, pp.1-42.
- WellBeing (2006) WOW: Wellbeing of Women [online] Wellbeing [cited 29th August 2006]. <<http://www.wellbeing.org.uk/>>.
- Wells, L. and Marwell, G. (1976) *Self-esteem: its conceptualization and measurement*. Beverly Hills, Sage.
- Wells-Parker, E., Miller, D.I., and Topping, J.S. (1990) Development of control-of outcome scales and self-efficacy scales for women in four life roles. *Journal of Personality Assessment*, **54**(3&4), pp.564-57
- Whitney, M.P., and Thoman, E.B. (1993) early sleep patterns of premature infants are differentially related to later developmental disabilities. *Journal of Developmental and Behavioural Pediatrics*, **14**(2), pp.71-80.
- White-Traut, R.C., Nelson, M.N., Silvestri, J.M., Cunnigham, N., and Patel, M. (1997) Responses of preterm infants to unimodal and multimodal sensory intervention. *Pediatric Nursing*, **23**(2), pp.169-193.
- White-Traut, R., Nelson, M.N., Silvestri, J., Vasan, U., Littau, S., and Meeledy-Rey, P. (2002) Effect of auditory, tactile, visual, and vestibular intervention on length of stay, alertness, and feeding progression in preterm infants. *Developmental Medicine and Child Neurology*, **44**(2), pp.91-97.
- White-Traut, R.C., Nelson, M.N., Silvestri, J.M., Patel, M., Berbaum, M., Gu, G., and Rey, P.M. (2004) Developmental patterns of physiological response to a multisensory intervention in extremely premature and high-risk infants. *Journal of Obstetric, Gynecological, and Neonatal Nursing*, **33**(2), pp.266-275.
- Wijnroks, L. (1999) Maternal recollected anxiety and mother-infant interaction in preterm infants. *Infant Mental Health Journal*, **20**(4), pp.393-409.
- Wijnroks, L., and Kalverboer, A.F. (1997) Early mother-child interaction and quality of attachment in preterm infants. in Koops, W., Hoeksma, J.B., and van den Boom, D. (Eds.) *Development of interaction and attachment: Traditional and non-traditional approaches*. Amsterdam: North Holland Publishers
- Wolke, D. (1987) Environmental Neonatology. *Archives of Disease in Children*, **62**, pp.987-988
- Yellot, G. (2001) The loving touch: more than just a therapy. *Journal of Neonatal Nursing*, **7**(6), pp.207-208.

- Younger, J. B., Kendell, M. J., and Pickler, R. H. (1997) Mastery of stress in mothers of preterm infants. *Journal of the Society of Pediatric Nurses*, **2**(1), pp.29-35.
- Zahr, L.K., Parker, S. and Cole, J. (1991) Comparing the effects of neonatal intensive care unit intervention on premature infants at different weights. *Developmental and Behavioral Pediatrics*, **13**(3), pp.165-172.
- Zichella, L. (1992) Preterm labor: Disruption of a biological agreement. *International Journal of Prenatal and Perinatal Studies*, 4, 1/2, 53-59.

APPENDIX I. BEHAVIOURAL ETHOGRAM

Item	Code	Behaviour	Definition
BABY			
<i>Behavioural State</i>	LA	Low Activity	Presumed Sleep eyes closed or semi closed or eyes open with rapid eye movement (indicative of sleep)
	MA	Medium Activity	Little or no body movement in an alert visually attentive state
	HA	High Activity	Little eye opening, much or moderate body movement
	CR	Crying	

*All Definitions are taken from Eckerman and Oehler's (1992) behavioural coding scheme.

APPENDIX II – TAC-TIC (PARENTS VERSION) PROTOCOL

- 1) At the beginning of each session all mothers warmed their hands before touching the baby.
- 2) The very first touch presented to the baby was then a hold whereby both hands cupped the infants head from the front of the baby's head to the posterior of the baby's head. The hands were placed so that the palms of each hand were in line with the baby's forehead and base of the rear skull (fingers of each hand touching in the middle). This is known as the 'comfort position' and was held for 5 seconds.
- 3) Next the fingers of each hand stroked simultaneously from the midline of the head down to the babies forehead temple and the nape of the neck
- 4) The fingers which stroked to the nape of the baby's neck were then brought back up to their original position and this particular hand was left holding the baby's head for continuity between the various touch.
- 5) The fingers on the other hand were now at the baby's forehead temple and one finger was used to do a small circular stroke.
- 6) Still maintaining the hand on the back of the baby's head the other hand was now moved to the temples on the sides of the baby's head and the same circular touch was performed on each side.
- 7) Following the final motion on the baby's side temple the same finger was used to trace around the outside of the baby's lips; once in a clockwise direction and once in an anticlockwise motion.
- 8) The hand used for touching the baby's face was then moved from the lips to grasp the baby's wrist, the hand which cupped the baby's head was now moved to the baby's hand and the mother's fingers were used to stroke from the bottom of the baby's palm up to all of the baby's fingers. Finally, the centre of the baby's palm was then grasped pressing gently.
- 9) The hand not grasping the baby's wrist was then moved across to the other wrist of the baby and the same procedure as in 8 above was repeated.
- 10) Following completion of stroking the baby's hands the mothers' free hand was then used to grasp gently the baby's ankle after which her free hand repeated a similar procedure to the hands. Moreover, the feet were stroked in one uniform direction from the heel of the baby up to the tops of their toes.
- 11) The free hand of the mother was then moved across to grasp the other ankle of the baby and the free hand repeated the procedure outlined in 10 above.
- 12) Once the final stroke of the baby's foot had occurred the hands of the mother were brought back up into the comfort position (as outlined in point 1) one at a time and then the procedure from point 1-12 was repeated for a total of 3 consecutive occasions.

APPENDIX III –GRAPHIC EXAMPLES OF BEHAVIOURAL STATES

Behavioural State

Low Activity (LA)

Baby 005 TOY session 5, 3:24min – LA



Medium Activity (MA)

Baby 10 – Control session 6, 0:06 seconds, MA



Baby 008 TAC-TIC session 10, 8:30 min, MA



Crying (CR)

Baby 012 Control Session 4, 6:15 min, CR



APPENDIX IV – The Perceived Maternal Parenting Self-Efficacy Questionnaire

Study Number:

Patient No.

Date of

Questionnaire:

Instructions to mothers

Below are questions that relate to how you and your baby interact. When answering a question please circle the response you feel best describes your perception of the situation. i.e. Strongly Disagree; Disagree; Agree or Strongly Agree.

1. I believe that I can tell when my baby is tired and needs to sleep.

Strongly Disagree Disagree Agree Strongly Agree

2. I believe that I have control over my baby's care.

Strongly Disagree Disagree Agree Strongly Agree

3. I can tell when my baby is sick.

Strongly Disagree Disagree Agree Strongly Agree

4. I can read my baby's cues.

Strongly Disagree Disagree Agree Strongly Agree

5. I can make my baby happy.

Strongly Disagree Disagree Agree Strongly Agree

6. I believe that my baby responds well to me.

Strongly Disagree Disagree Agree Strongly Agree

7. I believe that my baby and I have a good interaction with each other.

Strongly Disagree Disagree Agree Strongly Agree

8. I can make my baby calm when he / she has been crying.

Strongly Disagree Disagree Agree Strongly Agree

9. I am good at soothing my baby when he / she becomes upset.

Strongly Disagree Disagree Agree Strongly Agree

APPENDIX IV – continued

10.I am good at soothing my baby when he / she becomes fussy.

Strongly Disagree Disagree Agree Strongly Agree

11.I am good at soothing my baby when he / she continually cries.

Strongly Disagree Disagree Agree Strongly Agree

12.I am good at soothing my baby when he / she becomes more restless.

Strongly Disagree Disagree Agree Strongly Agree

13.I am good at understanding what my baby wants.

Strongly Disagree Disagree Agree Strongly Agree

14.I am good at getting my babies attention.

Strongly Disagree Disagree Agree Strongly Agree

15.I am good at knowing what activities my baby does not enjoy.

Strongly Disagree Disagree Agree Strongly Agree

16.I am good at keeping my baby occupied.

Strongly Disagree Disagree Agree Strongly Agree

17.I am good at feeding my baby.

Strongly Disagree Disagree Agree Strongly Agree

18.I am good at changing my baby.

Strongly Disagree Disagree Agree Strongly Agree

19.I am good at bathing my baby.

Strongly Disagree Disagree Agree Strongly Agree

20.I can show affection to my baby.

Strongly Disagree Disagree Agree Strongly Agree

APPENDIX V – Contributions to Conference Proceedings and Published Work

Conference Proceedings

Barnes, C.R., and Adamson-Macedo, E.N. (2000) Correlates of self-efficacy of mothers of preterm babies during their first 28 days of postnatal life in hospital confinement. Paper *Symposium “Nurturing and Caring for Preterm babies and their Mothers”*. International Conference for Infant Studies (ICIS), 18th July 2000

Barnes, C.R., and Adamson-Macedo, E.N. (2001) Perceived maternal parenting self-efficacy (PMP-SE) of mothers of hospitalised preterm neonates. *Poster: “Women and Reproductive Health.”* The British Psychological Society - Health Psychology Conference, 7th September 2001.

Barnes, C.R., and Adamson-Macedo, E.N. (2003) Perceived parenting self-efficacy [PMPS-E] and mothers' decisions to visit their hospitalised preterm neonate. *Paper Symposium PsyPAG (Psychology Postgraduate Affairs Group) annual conference*, 29th July 2003.

Barnes, C.R., and Adamson-Macedo, E.N. (2003) Perceived parenting self-efficacy [PMPS-E] of mothers' who are breastfeeding hospitalised preterm neonates: Implications to health care. *Poster Symposium “Motivation and Risk Perception”*. *BPS Health Psychology conference 2003; There’s nothing so practical as a good theory*, 4th September 2003.

Barnes, C.R., and Adamson-Macedo, E.N. (2004) Perceived parenting self-efficacy [PMPS-E] of mothers' who are breastfeeding hospitalised preterm neonates. *Paper: Neonatal Nurses Association (NNA) annual conference 2004, Working in Partnership*, 27th September 2004.

Published Work

Barnes, C.R. & Adamson-Macedo, E. N. (2004) Perceived Parenting Self-Efficacy (PMP S-E) of mothers who are breastfeeding hospitalised preterm neonates. *in Adamson-Macedo, E.N. (Ed.), Expanding Frontiers of Neonatology. Special Issue of Neuroendocrinology Letters*, **25**(1), pp.95-102.

Adamson-Macedo, E.N. and **Barnes, C.R.** (2004) Grasping and Fingering (active and haptic touch) in healthy newborns. *in Adamson-Macedo, E.N. (Ed.), Expanding Frontiers of Neonatology. Special Issue of Neuroendocrinology Letters*, **25**(1), pp.157-168.

Barnes, C.R. & Adamson-Macedo, E.N. (2007) The Perceived Maternal Parenting Self-Efficacy (PMP S-E) tool: Development and Validation with Mothers of Hospitalised Preterm Neonates. *Journal of Advanced Nursing*, **60**(5), pp.550-560