

**STRESS EXPERIENCED
BY PARENTS
FROM THE
NEONATAL
INTENSIVE CARE UNIT**

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Wendy Kate Steedman

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LIST OF ABBREVIATIONS

DAS	Dyadic Adjustment Scale
FOOTPRINT	Follow-up study of Neonatal Intensive Care Unit admissions
HADS-A	Hospital Anxiety and Depression Scale – Anxiety subscale
NICU	Neonatal Intensive Care Unit
PARENTS	Canterbury Psychological Adjustment Related to Newborn Trauma or Stress
PBI	Parental Bonding Instrument
PSS:NICU	Parental Stressor Scale: Neonatal Intensive Care Unit
STAI-T	State Trait Anxiety Inventory – Trait subscale

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ABSTRACT

The psychometric properties of this Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU) were assessed, before using the scale to describe stress experienced by parents in a Neonatal Intensive Care Unit (NICU). The extent to which parental stress from the parent-infant relationship in the unit was linked to parenting they received as a child, and adjustment to their couple relationship, was also examined. The sample consisted of 182 mothers and 183 fathers, who were in a cohabitating relationship, of infants from the NICU at Christchurch Women's Hospital. The self-report questionnaires included the PSS:NICU, Parental Bonding Instrument, and the Dyadic Adjustment Scale, and were administered to parents within 2-3 weeks of their infant's birth. This study extends the finding of satisfactory psychometric properties of the PSS:NICU (Franck, Cox, Allen & Winter, 2005; Miles, Funk & Carlson, 1993; Reid & Bramwell, 2003) to this New Zealand sample. Mothers experienced significantly higher stress from the unit compared to fathers ($p < .01$). A previous finding, for mothers, of the parent-infant relationship being the most stressful aspect of the unit (Franck et al., 2005; Reid & Bramwell, 2003; Shields-Poe & Pinelli, 1997) extends to the New Zealand sample. The most stressful aspect of the unit for fathers was sights and sounds. Lack of evidence was found for associations between parental stress from the parent-infant relationship in the unit and parenting received as a child, or adjustment to their couple relationship. A weak but significant negative correlation was, however, found between stress from the mother-infant relationship and maternal care received in childhood. It is unnecessary to provide all parents with intervention further to what is already being practiced in the unit, as overall low levels of stress were reported. Some parents, however, did find the unit more stressful, and they may benefit from increased intervention.

PREFACE

The current study is based on data from a longitudinal study of parents of infants admitted to a Neonatal Intensive Care Unit (NICU), and a comparison group of parents of full term infants. This longitudinal study is known as the Canterbury Psychosocial Adjustment Related to Newborn Trauma or Stress (PARENTS) study, and took place at Christchurch Women's Hospital, Canterbury, New Zealand. The PARENTS study was designed to examine predictors of stress levels for mothers and fathers of NICU infants. The participants were 447 parents (242 mothers and 205 fathers) of NICU infants, and 189 parents (100 mothers and 89 fathers) of full term comparison infants. The PARENTS study was conducted between 2001 and 2003, with measures taken at baseline, 3 months, 9 months, and 2 years. The investigators are Dr Janet Carter, Associate Professor Roger Mulder, and Professor Brian Darlow, of the Christchurch School of Medicine and Health Sciences. Only baseline data from parents of infants admitted to the NICU were used in the present study. The PARENTS study database has also been utilised in the following studies: Carter, Mulder, Bartram and Darlow (2005); Carter, Mulder and Darlow (2007); and Carter, Mulder, Darlow, Frampton and Darlow (2007).

The PARENTS study database included a small amount of data relating to the clinical characteristics of the NICU infants, which were also used in the current study. These data were obtained from a follow up study of NICU admissions, called the FOOTPRINT study, which was conducted in conjunction with the PARENTS study. There were 266 NICU infants who participated in the FOOTPRINT study. The investigators for this study are Professor Brian Darlow, and Mr John Horwood, of the Christchurch School of Medicine and Health Sciences.

In the current study, I was responsible for summarising theoretical work on parental stress, and reviewing empirical research that utilised the Parental Stressor Scale: NICU (PSS:NICU). I contributed to the design of the study, developing the aims and hypotheses to address gaps in the literature. In addition, I selected the participants and questionnaires to be included from the PARENTS database, and reviewed the questionnaires. I undertook the data analyses in this study, under consultation with Dr Chris Frampton, Biostatistician, and Dr Janet Carter. I was responsible for interpretation of findings from the data analyses, and how the study contributed to the small body of existing literature. Finally, I addressed the implications of the study for clinical practice, the families of NICU infants, and for society as a whole.

1. INTRODUCTION

1.1 Overview

Everyone in the modern world experiences stress at least occasionally in life. Stress has been conceptualised in multiple ways, and its various psychological definitions are discussed. Stress has devastating effects on individual, interpersonal, and societal levels; therefore, it is important to understand its nature to assist development of interventions to mitigate these effects. One potentially stressful life event, which is the focus of this study, is the birth of an infant who is then cared for in a Neonatal Intensive Care Unit (NICU). A NICU is “a unit of a hospital specialising in the care of ill or premature newborn infants” (*NICUs: definition, 2006*).

In this chapter relevant models of parental stress from the NICU are reviewed, and one model is adapted to provide a conceptual framework for the present study. Of particular interest in this study is the role of NICU environment stressors, which have been measured using the Parental Stressor Scale: NICU (PSS:NICU). The PSS:NICU is utilised in this study, but first its psychometric properties are reviewed. The findings of studies that have used the PSS:NICU to describe sources of stress, and the greatest source of stress, are considered. Limitations of this research are also detailed, which provide reasons for inconsistencies in the literature and justification for the current study. This study focuses specifically on one particular NICU environment stressor: alteration to the parent-infant relationship. This factor is investigated in relation to parents’ personal characteristics, more specifically, past experience of the relationships with their own parents and their partners. This link has received insufficient attention in the previous literature.

1.2 General introduction

1.2.1 *The various definitions of stress*

Stress has been defined as “psychological and physical strain or tension generated by physical, emotional, social, economic, or occupational circumstances, events, or experiences that are difficult to manage or endure” (Colman, 2003, p. 711). This definition highlights the different

components of stress, including the psychological component that was the focus of this study. However, the concept of stress is ambiguous; as a result, it has been defined in various ways. In a stimulus-based definition it is conceptualised as a stimulus in a disturbing environment that acts on a person to produce a response (Cox, 1978; Davison & Neale, 2001). As a result of stimulus-based definitions of stress linking stress to a response, literature in this area contains unclear distinctions among stress, distress, anxiety, depression, anger, adaptation, and adjustment (Appley & Trumbull, 1967; Cox, 1978; Lazarus, 1966). A major problem with this type of definition, identified by Cox (1978), and Davison and Neale (2001), is lack of consideration of individual differences in response. These authors argued that an environment that produces a response in one person does not necessarily produce the same response in another. In contrast, a response-based definition accommodates individual differences in response, defining stress as a person's physiological or psychological response to stimuli in a disturbing environment (Cox, 1978; Magnusson, 1982; Quick, Quick, & Gavin, 2000). In this type of definition the stimuli are termed "stressors," and stress is treated as a dependent variable. Lastly, in an interactional-based definition, stress arises when the relationship between an individual and the environment is perceived to exceed his or her resources (Lazarus & Folkman, 1984). This type of definition extended the concept of individual differences in response by introducing the concept of a bi-directional relationship between a person and the environment (Cox, 1978). Furthermore, it integrated the stimulus-based and response-based definitions (Cox, 1978); consequently, stress may be a stimulus or a response. The current study adopted a response-based definition of stress, because of the aforementioned major problem with the stimulus-based definition of stress. An interactional-based definition was not adopted due to the descriptive design of the current study.

1.2.2 The importance of researching stress

Stress affects an individual positively or negatively by way of an evolutionary concept named the fight or flight response (Schooler, Dougall & Baum, 2000). A threatening situation puts stress on an individual, triggering the fight or flight response: an increase in metabolism and blood flow throughout the body, increasing the capacity to protect one's self or escape from the situation. The fight or flight response is often accompanied by cognitive appraisal of the situation, leading to emotions such as anger and fear (Gleitman, 1995). With regard to positive effect on an individual, when the situation is immediately threatening, for example the presence of a predator, the fight or

flight response promotes survival. In contrast, negative effects occur when the situation is not immediately threatening, for example threat to a person's job, health, or important relationships, which are common in the modern world. When changes in the body repeatedly occur from the fight or flight response, it becomes susceptible to disease such as heart attack, stroke, hypertension, and cancer (Gleitman, 1995; Schooler et al., 2000); and to mental illness such as anxiety and depression (Cox, 1978; Davison & Neale, 2001). These deadly or disabling effects on an individual in turn disturb others who are close to the individual. Furthermore, the monetary costs to society must consequently be enormous: directly, in terms of health care, and indirectly, in terms of loss of productivity. Therefore, it is important to research the nature of stress to assist the development of interventions to mitigate its negative effects on individual, interpersonal, and societal levels.

1.2.3 Parental stress and the Neonatal Intensive Care Unit

One potentially stressful life event is the birth of a child. It is not surprising then that the birth of a fragile child, who is then cared for in a NICU, can be particularly stressful for the parents (Carter, Mulder, Bartram, & Darlow, 2005; Gennaro, 1988; Jeffcoate, Humphrey, & Lloyd, 1979; Singer et al., 1999; Trause & Kramer, 1983). This response has been revealed by comparing parents of infants who were cared for in a NICU with parents of full-term infants, at various points in time. In the first week after their infant's birth, parents of NICU infants were more upset, anxious, and depressed compared with parents of full-term infants (Gennaro, 1988; Trause & Kramer, 1983). Psychological distress experienced by parents of NICU infants also appears to persist beyond 1 week postpartum: in a study by Jeffcoate et al. (1979), mothers' post-natal depression lasted longer than 1 week for mothers of NICU infants, in contrast to less than 1 week for mothers of full-term infants. In a study by Carter et al. (2005), a higher number of parents of NICU infants had clinically relevant anxiety and depression when assessed within 3 weeks of infant admission, compared to a control group of parents of full term infants. In the month following the birth of their infant, mothers of NICU infants, when compared with control mothers, scored higher on measures of the following: difficulty making decisions, depression, anxiety, and obsessive-compulsive behaviours (Singer et al., 1999). Further, at 1-3 years after the birth of their infant, the amount of stress experienced by parents of NICU infants was significantly higher compared with controls (Singer et al., 1999).

1.2.4 The importance of researching parental stress from having an infant cared for in the NICU

It is imperative that parental stress from having an infant cared for in the NICU is examined and understood, in terms of risk and protective factors, for a number of reasons. This is the case particularly in New Zealand, where no studies have been published. One reason is that there are substantial numbers of parents of infants who require care in NICUs who may be affected by stress. There are over 1,500 NICUs in the USA (McGrath, n.d.), each treating approximately 600 infants annually (Bell, 2004). In New Zealand there are nine NICUs (Ministry of Health, 2005), and approximately 10% of all newborns are admitted to one of these units (Darlow & Mulder, 2001). Moreover, due to an increase in premature births and survival rates, the number of infants requiring care in NICUs is increasing (Ministry of Health, 2005). Another reason is that parental stress can be detrimental to the parents' relationship with each other (Affleck, Tennen & Rowe, 1991; Leifer, Leiderman, Barnett & Williams, 1972). In the study by Leifer et al. (1972), there was a higher frequency of divorce in parents of premature infants, compared to parents of full term infants, when infants reached 1 year of age.

A further reason it is imperative to examine and understand parental stress from the NICU is that it can affect infant development. One way to conceptualise this idea is Bronfenbrenner's Ecological Systems theory (Bronfenbrenner & Evans, 2000), whereby the infant is nested within several levels of systems. The first level is the microsystem, which includes the infant's immediate family. The second level is the exosystem, which includes parents' work, and community health services such as the NICU. Another important concept in the model is that the systems are ever-changing, with bi-directional interactions between components, so that the infant is both a product and a producer of his or her environment.

The premise that parental stress from the NICU can affect infant development has been supported by research. In a study by Singer et al. (1999), the severity of maternal depression was linked to less favourable child cognitive development outcome for infants born with low birth weights. In Assel et al. (2002), parental stress, even at low levels, was shown to disturb the relationships of parents with their healthy infants. Moreover, a disturbed parent-infant relationship has been implicated in infant behavioural problems, emotional problems, and abuse (Klaus & Kennell, 1970). Promoting development is particularly pertinent for infants admitted to the NICU,

who have a higher risk of being born with physical (Bregman & Kimberlin, 1993; Theunissen et al., 2001) and psychological difficulties (Sameroff & Chander, 1964; Theunissen et al., 2001), compared to other infants.

1.3 A model of parental stress from the NICU

One way to conceptualise parental stress from the NICU is in terms of factors contributing to this response (Holditch-Davis & Miles, 2000; Wereszczak, Miles & Holditch-Davis, 1997). The Parental NICU Stress model (Wereszczak et al., 1997) identifies multiple factors in this response, as shown in Figure 1. It is also the only model designed specifically for parents of NICU infants. It was adapted from the Parental Intensive Care Unit Stress model (Miles & Carter, 1983), which was developed from theories of stress and relevant research. Theories and research regarding the NICU will be discussed in more detail in the proceeding sections, so will not be elaborated on in this section. The Parental Intensive Care Unit Stress model was designed in relation to the Paediatric Intensive Care Unit, as opposed to the NICU. Another comparable model is the Preterm Parental Distress model (Holditch-Davis & Miles, 2000). This model, however, only considers pre-term infants in the NICU, excluding other types of infants in the NICU such as low birth weight or critically ill full term infants.

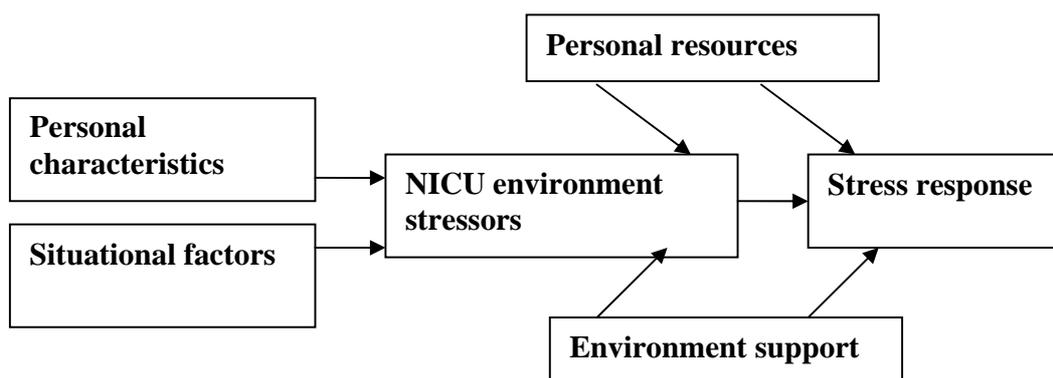


Figure 1. The Parental NICU Stress model (Wereszczak, Miles, & Holditch-Davis, 1997).

In the Parental NICU Stress model (Wereszczak et al., 1997), NICU environment stressors directly influence parents' stress response. Four major NICU environment stressors were identified and described in detail by Miles, Funk, & Carlson (1993). First, the factor "sights and sounds" was described as the physical environment, including the machines, equipment, lights, noises, infants, and staff. Second, the factor "infant appearance and behaviour" was described as how a parent's infant looked and behaved, usually quite different to a healthy new born infant because of illness and medical treatments. Third, the factor "parent-infant relationship" was described as alterations to the normal parent-infant relationship and parental role, due to nurses being the primary caregivers. Fourth, the factor "staff" was described as staff communication and behaviour towards the parents about their infant's condition or treatment. Figure 2 presents the conceptual framework of the current study.

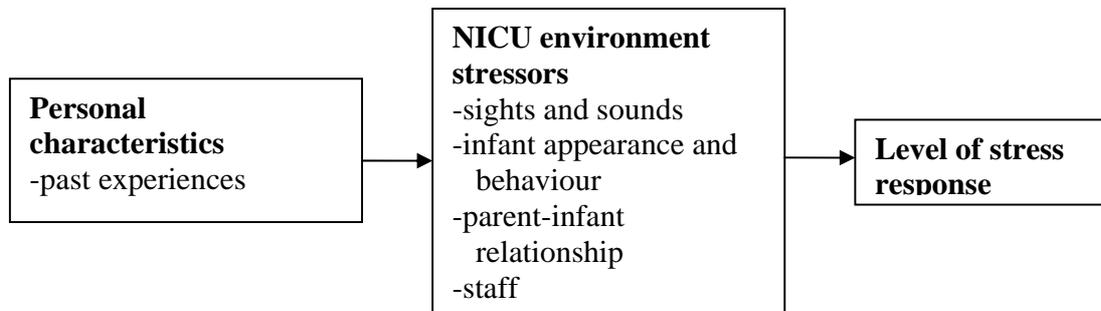


Figure 2. The conceptual framework of the current study, based on the Parental NICU Stress model proposed by Wereszczak, Miles, and Holditch-Davis (1997).

Factors outlined in the Parental NICU Stress model (Wereszczak et al., 1997), as shown in Figure 1, thought to influence a parent's experience of NICU environment stressors are: (1) personal characteristics of the parent, such as past experiences and concurrent life events; (2) situational factors, such as severity of the infant's illness and uncertainty about the illness; (3) personal resources of the parent, such as family support, cognitive resources, and financial resources; and (4) environmental support, such as support from staff or other parents in the NICU.

1.3.1 Previous research evaluation of the Parental NICU Stress model

Wereszczak et al. (1997) conducted the only study to evaluate all the components of the Parental NICU Stress model. A small number of mothers ($n = 44$) were interviewed about their experiences of the NICU when their infant was 3 years old. The interview was semi-structured, with open-ended questions, to enable mothers to recall any aspect of the NICU experience. Data analyses were used to identify the salient aspects of the unit for mothers. These salient aspects, which provided support for the model, included the environmental stressors identified by Miles et al. (1993): sights and sounds, infant appearance and behaviour, parent-infant relationship, and staff. Situational stressors identified included perceptions of severity and uncertainty about the infant's illness, and problems with a previous pregnancy. A personal resource stressor identified was lack of family support. Lastly, environment supports identified were staff, and stress management strategies. Personal characteristics, as outlined in the model, were not identified as salient to the mothers' NICU experience. A limitation of this study was that certain specific questions were not asked in the interview. Therefore mothers may have not mentioned personal characteristics, because they assumed this aspect was too far removed from their NICU experience.

1.3.2 Conceptual framework of the current study

The current study explored two factors implicated in the level of parental stress response from the Parental NICU Stress model (Wereszczak et al., 1997): NICU environment stressors, and personal characteristics. The exploration of situational factors, personal resources, and environment support, as shown in Figure 1, was beyond the scope of this study. The major NICU environment stressors identified by Miles et al. (1993) were investigated: sights and sounds, infant appearance and behaviour, parent-infant relationship, and staff. The stressor of alterations to the parent-infant relationship was further investigated in relation to parents' personal characteristics, more specifically, their past experiences. Further investigation of the other NICU environment stressors was beyond the scope of this study. These two areas of investigation are reviewed in turn in the following sections.

1.4 NICU environment stressors for parents

1.4.1 *The Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU; Miles et al., 1993)*

The four major NICU environment stressors identified by Miles et al. (1993), listed in Figure 2, provided the basis for the Parental Stressor Scale: NICU (Miles et al., 1993). Each corresponding subscale measures the level of stress experienced from that particular stressor. The PSS:NICU was developed from the Parental Stressor Scale: Paediatric Intensive Care Unit (Miles et al., 1993). The scale was based on Magnusson's (1982) stress theory, where stress is defined as an individual's reaction to demands that place pressure on his or her personal resources. Stressors were conceptualised as the actual environment, consisting of physical and psychosocial elements, and how the environment is perceived by an individual (Miles et al., 1993). An extensive literature review, NICU observations, consultation with neonatal professionals, and interviews with parents who had an infant admitted to a NICU also provided information for the development of the scale (Miles et al., 1993).

The psychometric properties of the PSS:NICU were originally evaluated in USA and Canada (Miles et al., 1993). Since then, studies with United Kingdom samples (Franck, Cox, Allen & Winter, 2005; Reid & Bramwell, 2003) have also examined its psychometric properties. None of these studies included use of the Staff subscale, however, because two thirds of parents had not experienced any (Franck et al., 2005; Miles et al., 1993), or many (Reid & Bramwell, 2003), of the items in this subscale.

Satisfactory validity for the PSS:NICU has been demonstrated by factor analyses, inter-scale correlations, and measurements of construct validity. Factor analysis by Miles et al. (1993) revealed six factors that collectively accounted for 71% of the variance in scale scores. Three major factors were identified by Franck et al. (2005) and Miles et al. (1993), accounting for 58-66% of the variance. These three factors corresponded to the Sights and Sounds, Infant Appearance, and Parent-Infant Relationship subscales. Inter-scale correlations indicated a moderate percentage of shared variance between the subscales (Miles et al., 1993; Reid & Bramwell, 2003). In Miles et al. (1993), the subscales were shown to be strongly correlated with the total scale, sharing 49-82% of the variance. In order to measure construct validity, correlation coefficients were obtained by Miles et al. (1993) between scores on the PSS:NICU and the State-Trait Anxiety Inventory (STAI,

Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Coefficients between the PSS:NICU and the State subscale of the STAI were shown to be statistically significant ($p < .05$): Sights and Sounds ($r = .20$), Infant Appearance ($r = .41$), Parent-Infant Relationship ($r = .40$), and the total PSS:NICU ($r = .45$). Similar correlations have been found by other authors between the total PSS:NICU and the State subscale of the STAI ($r = 0.48-0.54$, $p < 0.001$); and between the total PSS:NICU and the Trait subscale of STAI ($r = 0.21-0.37$, $p < 0.001$) (Franck et al., 2005; Miles, Funk, & Kasper, 1991).

Reliability, in the form of internal consistency, has been shown to be acceptable ($> .70$) for the PSS:NICU (Franck et al., 2000; Miles, et al., 1993; Reid & Bramwell, 2003). Cronbach's alpha coefficients ranged from .73 to .81 for the Sights and Sounds subscale, .83 to .90 for the Infant Appearance subscale, .83 to .90 for the Parent-Infant Relationship subscale, and .89 to 0.94 for the total scale.

The PSS:NICU is a promising tool in this area of research for a number of reasons. First, it systematically measures environmental stressors for parents from the NICU, and the level of stress each engenders. Second, it is the only one of its kind, with the most comparable scale being the Parental Stressor Scale: Paediatric Intensive Care Unit (Carter & Miles, 1989). Third, overall, it appears to be valid and reliable, although these properties have only been assessed by a small number of studies, and have not been assessed in New Zealand. Fourth, a consistent definition of stress can be applied between studies, which has been lacking in the literature, aiding integration of findings among studies. For these reasons the PSS:NICU was selected for use in the present study.

When using a questionnaire in a population, its psychometric properties with that population should be evaluated. The current study utilised a sample from New Zealand, and the psychometric properties of the PSS:NICU have not been evaluated in this country. New Zealand is most comparable to the United Kingdom in terms of language and culture, but it is likely there are differences in NICU practices, values, and interpretation of words that could affect responses, and the psychometric properties of the scale (Frank et al., 2005). Therefore, psychometric properties of the scale were analysed in the current study.

1.4.2 Findings of studies that utilised the PSS:NICU

Table 1 shows methodological characteristics and findings of studies that utilised the PSS:NICU. Parental stress arising from NICU environment stressors, as measured by the mean of the scale, has been reported to range from a little stressful (Dudek-Shriber, 2004; Franck et al., 2005; Miles et al., 1991) to moderately stressful (Miles et al., 1993). There have also been inconsistent findings in studies that have statistically compared mothers' and fathers' mean PSS:NICU scores. In the United Kingdom study by Franck et al. (2005) and the Canadian study by Perehudoff (1990), mothers were reported to experience more stress than fathers from the NICU environment. In contrast, for the USA study by Franck et al. (2005) and the Canadian study by Shields-Poe and Pinelli (1997), there were no significant differences in stress scores between mothers and fathers. A limitation with both Perehudoff (1990) and Shields-Poe and Pinelli (1997) were that the scoring method they used for the scale was not stated. In addition, a limitation with the USA sample in Franck et al. (2005) was that the number of fathers was small ($n = 10$), which reduces statistical power.

Table 1.

Review of Methodological Characteristics and Findings of Studies using the PSS:NICU

Study	Sample	Definition of infant characteristics	Infant inclusion criteria	Time PSS:NICU administered	PSS:NICU mean ^a	PSS:NICU subscale with greatest mean ^a
[1] Dudek-Shriber (2004)	Mothers: 130 Fathers: 32	Gestational age categorised into: extremely premature <28 weeks; premature 28 - 36 weeks; and full-term 37- 42 weeks Birth weight categorised into: average >2,500g; low: 1,500 - 2,500g; very low: 1,000 - <1,500g; and extremely low <1,000g Health status: Five diagnosis categories based on similarities, including prematurity with respiratory disorders Range of time infant in unit	NICU admission of at least 7 days	Various points during infant admission	2.36	Parent-Infant Relationship: 3.22
[2] Franck, Cox, Allen and Winter (2005)	UK mothers: 133 UK fathers: 63 USA mothers: 51 USA fathers: 10	Gestational age: mean (<i>SD</i>) Birth weight: mean (<i>SD</i>) Health status: Apgar score (5 mins) Clinical Risk Index for Babies (CRIB) score Diagnosis (five categories including prematurity) Mechanical ventilation (<i>n</i> and %) Surgery (<i>n</i> and %)	None	Various points 2 days after infant admission	UK: 2.35 USA: 2.24 UK mothers: 2.44 UK fathers: 2.15 USA mothers: 2.24 USA fathers: 2.22	UK: Parent-Infant Relationship, 2.98 USA: Parent-Infant Relationship, 2.75 UK mothers: Parent-Infant Relationship, 3.18 UK fathers: Parent-Infant Relationship, 2.58

						USA mothers: Parent-Infant Relationship, 2.82 USA fathers: Parent- Infant Relationship and Infant Appearance equal, 2.40 Infant Appearance: 3.70
[3] Miles (1989)	53 parents, mostly mothers (numbers of mothers and fathers not stated)	Gestational age: no information given Birth weight: no information given Health status: Complications of prematurity (%) Parental perception of infant severity (5 point scale)	None	Infants' most critical period: various points 2 days after admission; majority close to discharge or transfer	Not stated	
[4] Miles, Funk and Carlson (1993)	Mothers: 115 Fathers: 75	Gestational age: range and mean Birth weight: mean Health status: Mean number of complications	Stable condition	1-7 days of infant admission	2.63	Parent-Infant Relationship: 3.10
[5] Miles, Funk and Kasper (1991)	Mothers: 79 Fathers: 43	Gestational age: range and mean Birth weight: range and mean Health status: Respiratory assistance needed (%) Mean number of medical complications Parental perception of infant condition (5 point scale)	Premature Stable condition	1-5 days of infant admission	2.00	Parent-Infant Relationship: 2.50

[6] Perehudoff (1990)	31 mother-father couples	Gestational age: range and mean Birth weight: range and mean Health status: Prematurity complications Mean number of days in NICU	< 37 weeks gestation No congenital abnormalities NICU admission <7 days	1-7 days of infant admission	Mothers: 1.85 ^b Fathers: 1.31 ^b	Mothers: Parent-Infant Relationship, 2.84 ^b Fathers: Sights and Sounds, 1.73 ^b
[7] Reid and Bramwell (2003)	40 mothers	Gestational age: range and mean (<i>SD</i>) Birth weight: range and mean (<i>SD</i>) Health status variables included: Length of NICU admission, range and mean (<i>SD</i>) Days on oxygen, range and mean (<i>SD</i>)	Premature (< 34 weeks) and no other complications defined as ventilated for less than 24 hours; Apgar score of greater than 7 at 5 minutes; no history of maternal substance abuse; no congenital abnormality	2-5 days of infant admission	Not stated	Parent-Infant Relationship: 3.56 ^b
[8] Seidman et al. (1997)	Mothers: 19 Fathers: 12	Gestational age: preterm, mean Birth weight: low birth weight Health status: Mean length of stay in NICU Medical diagnosis	NICU admission of between 3 days and 3 months	Close to infant discharge	Not stated	Parent-Infant Relationship (score not stated)

[9] Shields-Poe and Pinelli (1997)	212 parents Balance of mothers and fathers (numbers not stated)	Gestational age: no information given Birth weight categorised into: < 1,500g; 1,500 - 2,499g; 2,500+g Health status: Morbidity scale score, range and mean (SD) Abnormality	NICU admission of at least 1 day	3 weeks after infant admission or just prior to discharge	Mothers: 1.86 ^b Fathers: 1.74 ^b	Mothers: Parent-Infant Relationship, 2.90 Fathers: Parent-Infant Relationship & Sights and Sounds equal, 2.20 ^b
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Notes

^a The PSS:NICU has three scoring methods: Metric 1, Metric 2, and Frequency (Miles & Funk, 1998). Metric 1 measures the level of stress experienced when a situation occurs. Metric 2 measures the overall stress experienced from the NICU environment. The Frequency method counts the number of items experienced by a parent. Metric 2 scores were reported in Table 1, because the focus in the present study was on the amount of overall stress experienced by a parent from the NICU. 1 = not at all stressful, 2 = a little stressful, 3 = moderately stressful, 4 = very stressful, 5 = extremely stressful

^b The scoring method used was not stated.

Another area of investigation has been to identify the greatest NICU environment stressor for parents. Findings detailed in Table 1 show that parents found the most stressful aspect of the unit, according to the PSS:NICU subscale means, to be alterations to their parent-infant relationship (Dudek-Shriber, 2004; Franck et al. 2005; Miles et al. 1993; Miles et al., 1991; Seidman et al., 1997). A small number of studies examined the greatest NICU environment stressor separately for mothers and for fathers (Franck et al., 2005; Perehudoff, 1990; Reid & Bramwell, 2003; Shields-Poe & Pinelli, 1997). These studies reported the most stressful aspect of the unit for mothers was the parent-infant relationship (Franck et al., 2005; Reid & Bramwell, 2003; Shields-Poe & Pinelli, 1997), while the most stressful aspect for fathers varied (Franck et al., 2005; Perehudoff, 1990; Shields-Poe & Pinelli, 1997). A limitation with the study conducted by Reid and Bramwell (2003) was that the scoring method used for the PSS:NICU was not stated.

1.5 Limitations of previous literature utilising the PSS:NICU

Whilst previous literature utilising the PSS:NICU has been valuable in the investigation of parents' stress from the NICU, limitations are evident. In this section more limitations of the literature are described. These limitations provide possible reasons for inconsistencies in findings, and further justification for the present study, which addresses these limitations.

1.5.1 Under representation of fathers and lack of mother-father comparisons

The majority of studies in Table 1 have under represented fathers in their samples. Unbalanced samples, with larger numbers of mothers compared to no or much smaller numbers of fathers, are utilised (Dudek-Shriber, 2004; Frank et al., 2005; Miles, 1989, Miles et al., 1993; Miles et al., 1991; Reid & Bramwell, 2003; Seidman et al., 1997). To make matters worse, the majority of these studies combined the unbalanced number of mothers and fathers in their analyses, and refer to their samples as "parents" (Dudek-Shriber, 2004; Miles, 1989; Miles et al., 1993; Miles et al, 1991; Seidman et al., 1997).

The implication is that the literature is more representative of mothers' experience as opposed to fathers' experience. This situation is inadequate considering first, the small amount of

PSS:NICU research that has considered fathers separately has shown that fathers also experience stress from the unit (Frank et al., 2005; Pehudoff, 1990; Shields-Poe & Pinelli, 1997). Second, theory and research has acknowledged the importance of the father (Levy-Shiff, Sharir & Mogilner, 1989). Furthermore, fathers of NICU infants have been shown to play an important role in maintaining family stability during their infant's admission (Affonso et al., 1992; Jeffcoate, et al., 1979), which Levy-Shiff et al. (1989) suggested is due to the mother and infant being in different hospitals, or the mother being physically incapacitated.

There has also been a lack of comparisons in this literature between mothers' and fathers' stress scores. Because mothers and fathers are not independent groups, as they share a relationship with their infant, in order to statistically compare these groups it is most appropriate to use a matched pair design. This design involves recruiting mother-father pairs. The only study in Table 1 that reported such a design is Pehudoff (1990). The other studies that compared mothers and fathers (Frank et al., 2005; Shields-Poe & Pinelli, 1997) are, therefore, methodologically flawed. Further research is needed comparing mothers' and fathers' stress scores, as this research gives health providers important information for targeting resources.

1.5.2 NICU infant characteristics poorly defined

NICU infants' characteristics have been poorly defined by some studies, as shown in Table 1. Studies have neglected to provide basic information such as gestational age and birth weight (Miles, 1989; Shields-Poe & Pinelli, 1997), while others have stated the infants had to be "stable" to be included in their study, but failed to define this term clearly (Miles et al., 1993; Miles et al., 1991). Blumberg (1980) defined stability in terms of gestational age, birth weight, and medical diagnosis. In addition, there is huge variation in the way infant health status has been defined, such as by medical tests, diagnosis, treatment, parental perceptions, and length of time in the unit. These factors make comparison across studies difficult, because it is unclear whether the parents and infants being compared have similar characteristics. This limitation is particularly pertinent to address given that units between regions and countries are thought to have different practices, such as for admission based on infant characteristics (Ens-Dokkum et al., 1992; Franck et al., 2005; Reid & Bramwell, 2003). In addition, the more severe parents perceived their infant's illness was shown by Shields-Poe and Pinelli (1997) to be a strong factor associated with higher stress from the NICU.

1.5.3 Infants unrepresentative of the diverse range admitted to NICUs

Infants sampled in previous studies have been unrepresentative of the diverse range admitted to NICUs for two reasons. First, the majority of studies in Table 1 placed restrictions on their samples in terms of infant characteristics. Restrictions include length of time infants were admitted to the NICU. This restriction appears quite arbitrary because of the variability between studies: at least 1 day (Shields-Poe & Pinelli, 1997), between 3 days and 3 months (Seidman et al., 1997), less than 7 days (Perehudoff, 1990), and at least 7 days (Dudek-Shriber, 2004). In addition, the authors gave no reasons for restricting their samples in this way. Other restrictions include infants having to be in a stable condition (Miles et al., 1993; Miles et al., 1991), and premature (Miles et al., 1991; Perehudoff, 1990; Reid & Bramwell, 2003). Second, parents of infants weighing less than 1,500 g were more likely to refuse to participate in Shields-Poe and Pinelli (1997), therefore this may also be true of other studies. The other studies cited in Table 1 did not provide parents' reasons for refusal to participate. Reid and Bramwell (2003), however, considered it unethical to provide reasons, given that these parents did not consent to be in the study. Parent refusal rates of studies cited in Table 1 range from 0-37% ($M = 16\%$). It is possible that these percentages are indicative of parents of infants with low or extremely low birth weights.

1.5.4 Variation in time of administration of the PSS:NICU within and between studies

Table 1 shows studies have a wide variation in the time of administration of the PSS:NICU, which may explain inconsistencies in findings. The majority of these studies report wide within study variation in the time of administration, rather than a more distinct time frame or point. These times include various points during infant admission (Dudek-Shriber, 2004; Frank et al., 2005; Miles, 1989), and around the time of infant discharge (Shields-Poe & Pinelli, 1997; Seidman, 1997). Different times of administration of the scale are also reported between studies, including: within 1 week of infant admission (Miles et al., 1993; Miles et al., 1991; Perehudoff, 1990; Reid & Bramwell, 2003), 3 weeks after infant admission (Shields-Poe & Pinelli, 1997), and at infant discharge (Seidman et al., 1997).

Wide variation in time of administration of the PSS:NICU in studies is a limitation because different events happen at particular times in the unit. In a study by Affonso et al. (1992),

interviews were conducted with mothers at four time points or frames, based on different events that happen related to the infant: 96 hours after birth, when mothers had received news of NICU admission (Time 1); within 2-3 weeks of life, when health status fluctuated between stable and instable (Time 2); within 5-6 weeks of life, indicative of improved health status or continued fluctuations in health stability (Time 3); and the week before discharge from the unit or hospital (Time 4). Findings showed different frequencies and intensities of stressors for mothers at these different times. The most common stressor and most intense stressor, respectively, at each time was: (Time 1) separation from the infant, infant appearance and behaviour; (Time 2) emotional issues, separation from the infant; (Times 3) financial issues, their partner or spouse; (Time 4) financial issues, emotional issues. Time of administration of the PSS:NICU is therefore an important factor to consider, and studies should only be compared with those that administered the questionnaire at a similar time.

1.6 Summary

With a better understanding of stress, interventions can be developed to mitigate its negative effects at individual, interpersonal, and societal levels. A potentially stressful life event is the birth of a fragile infant who is then cared for in a NICU. This event is experienced by a substantial number of parents, and the stress can affect not only their mental health, but also their partner relationships and infants' development. Multiple factors in the experience of parental stress from the NICU were identified by Wereszckak et al. (1997), and incorporated into the Parental NICU Stress model. The PSS:NICU (Miles et al., 1993) was selected in the current study to measure the level of stress experienced from four NICU environment stressors: sights and sounds, infant appearance and behaviour, parent-infant relationship, and staff. Previous research with the PSS:NICU, as shown in Table 1, found first that the level of parental stress from the unit ranged from a little to moderately stressful. Second, some studies found mothers were more stressed compared to fathers, while other studies found no difference across genders. Third, the greatest stressor in the unit for mothers was alterations to the parent-infant relationship, while for fathers it varied. Limitations of the research included: under representation of fathers and lack of mother-father comparisons, variation in time of administration of the questionnaire, poor definition of infant characteristics, and biased representation of infants. These limitations provided explanations for inconsistencies in findings and further justification for the present study. In addition, the

psychometric properties of the PSS:NICU had not been assessed with a New Zealand sample, making this a pertinent additional focus of the current study.

1.7 NICU environment stressor: alteration to the parent-infant relationship

In this section, the NICU environment stressor of alteration to the “normal” parent-infant relationship is further explained, as it is a focus of the current study. Possible alterations to the parent-infant relationship were detailed by Griffin (1990): (1) physical separation of the parent and infant, due to lack of space in the unit or hospital for parents; (2) mechanical barriers between the parent and infant; (3) parents’ psychological barriers, such as feelings of helplessness and guilt; and (4) nurses providing expert care for the infant that parents are unable to provide.

Only the Parent-Infant Relationship subscale of the PSS:NICU was investigated further, rather than all the subscales, for three reasons. First, alteration to the parent-infant relationship was shown by the majority of studies in Table 1 to be the greatest stressor for parents (Dudek-Shriber, 2004; Franck et al., 2005; Miles et al., 1993). Second, investigating all the subscales of the PSS:NICU was beyond the scope of the present study. Third, the Parent-Infant Relationship subscale is likely to be related to parent’s past experiences of relationships with their own parents and partner, another focus of the present study. This area of investigation is expanded further in the following sections.

1.8 The link between parental stress from alterations to the parent-infant relationship in the NICU and past experiences

The link between parents’ level of stress from alterations to the parent-infant relationship in the NICU and past experiences was not explained in detail in the Parental NICU Stress model (Wereszczak et al., 1997, refer to Figure 2). Reasons for this situation are that the stress theories on which the model was based were not specific to the NICU, and the paucity of research on the personal characteristics of parents of NICU infants (Wereszczak et al., 1997). The current study is particularly valuable because it attempts to describe the link between stress from alterations to the parent-infant relationship in the NICU and past experiences. Due to the lack of specific theory and research addressing this link, broad theory and research are reviewed in this section.

Literature in support of the link between parental stress and past experiences includes the developmental theory of continuity, whereby past experiences and the individual's adjustment to these are thought to influence later psychological functioning (Belsky, 1984; Sroufe, 1979). Positive past experiences are thought to promote later healthy functioning; conversely, aversive past experiences are thought to increase an individual's vulnerability to stress, such as from parenting. Holditch-Davis and Miles (2000) provided empirical support for continuity theory that was specific to the NICU. The authors utilised a small convenience sample of mothers ($n = 31$) of preterm infants, who were cared for in the NICU until they were 6 months old. Mothers were asked about their experiences of the unit in the form of a semi-structured interview, and responses were coded into themes based on the Preterm Parental Distress model (Holditch-Davis & Miles, 2000). There was some indication that past experience was a factor in the level of stress experienced from the unit. Past experience was indirectly measured, however, so mothers may have assumed it was too far removed from their experience of the unit to report.

One important kind of past experience in an individual's life is relationships. Two major relationships in individuals' lives are those with their parents and their partner. Difficulties with these relationships were theorised by Klaus and Kennell (1970) to disturb the normal mother-infant relationship. Minde, Whitelaw, Brown and Fitzhardinge (1983) investigated this idea empirically in the NICU environment. These authors sampled 184 mothers of premature, low birth weight infants who had a wide variety of illnesses from a NICU in Canada. The mothers were given a semi-structured interview, which included questions about relationships with their parents and the father of their infant. This interview was conducted 3-4 weeks after infant NICU admission. A positive association was found between mothers' past relationships and mother-infant interactions, for infants who were well or had short illnesses. In a similar study by Minde, Marton, Manning and Hines (1980), a smaller number of mothers of pre-term infants were sampled ($n = 32$). Mothers' high level of interaction with their infants, considered favourable, was associated with positive relationships with their own mothers and the fathers of their infants.

1.8.1 The link between the parent-infant relationship in the NICU and parents' relationships with their own parents in childhood

One conceptualisation of relationship continuity is based on the quality or style of parenting displayed by the individual's parents. Two parental qualities have been consistently identified in the literature: care and overprotection (Parker, Barrett & Hickie, 1992; Parker, Tupling & Brown, 1979). Care has been defined as "affection, emotional warmth, empathy and closeness" (Parker et al., 1979, p. 8). Overprotection has been defined as control, "intrusion, excessive contact, infantilisation, and prevention of independent behaviour" (Parker et al., 1979, p. 8; also Levey, 1970). Care appears to be the stronger construct of the two, as it accounted for more of the variance in a factor analysis by Parker et al. (1979). In this analysis, over 500 adults were included, who retrospectively identified their parents' behaviours and attitudes in childhood. In a review by Parker (1990), deficient care or high overprotection demonstrated by parents towards their children was linked to children's vulnerability to mental illness in adulthood.

A similar link was explored by Assel et al. (2002), but between parenting qualities an individual received in childhood, stress experienced in adulthood, and parenting qualities the individual employed with their own child. A large group of mothers ($n = 180$) of preterm infants with no significant medical illnesses were recruited. Parenting received as a child was measured using the Parental Acceptance Rejection Questionnaire, emotional stress was measured using the Symptom Checklist 90, and parenting qualities demonstrated towards their own children were observed in a structured manner. The constructs of "warm responsiveness" and "restrictiveness" were assessed in the observations, which correspond to care and overprotection, respectively. Structural equation modelling revealed significant pathways of influence: mothers who reported harsh and neglecting parenting qualities of their parents reported higher levels of stress, and displayed lower levels of warmth towards their own children. The pathway from maternal emotional stress to maternal restrictiveness was not significant. A limitation with this study, however, was the way maternal restrictiveness was defined. The definition allowed this quality to be either positive or negative.

In another study by Carter, Mulder & Darlow (2007), early care and overprotection were investigated specifically in relation to stress from the NICU. A sample similar to that used in the present study was utilised: 172 mother-father couples of infants who were being cared for in a

NICU. The authors used multiple measures that included the Parental Bonding Instrument (PBI; Parker et al., 1979), which retrospectively measured qualities of early parenting received during childhood, and the PSS:NICU. A linear mixed model analysis included the PBI subscales of care and overprotection as independent variables, and the PSS:NICU and its subscales as dependent variables. Findings showed maternal care received as a child was negatively associated with the total PSS:NICU. No significant effects were found, however, regarding the PSS:NICU Parent-Infant Relationship subscale or the PBI Overprotection subscale.

Another conceptualisation of a parent's relationships with his or her own parents in childhood is in terms of a bond. Various definitions of a bond are described in the literature, such as: feelings of love by a parent towards his or her infant (Bowlby, 1979; Gleitman, 1995; Sammons & Lewis, 1985); or a long enduring tie to an important and unique individual, who can not be replaced with any other individual (Ainsworth, 1991). Ainsworth (1991) theorised that an affectional bond develops in the context of a relationship, becomes internally represented in an individual, and exists after the relationship has finished. The definition of bond type used in the present study was provided by Parker et al. (1979), and is stated in terms of care and overprotection qualities demonstrated by a parent to his or her child. High care and low overprotection correspond to an optimal bond; other combinations of care and overprotection, including high care and high overprotection, low care and low overprotection or low care and high overprotection, correspond to a distorted bond.

A theory related to the concept of a bond is attachment theory. Ainsworth (1991) defined a secure attachment as the "experience of security and comfort in the relationship with the partner" (p. 38). In contrast, insecure attachment styles include anxious, dismissive-avoidant, and fearful-avoidant (Rholes & Simpson, 2004). The terms bond and attachment have been used interchangeably by some authors (Gleitman, 1995; Rholes & Simpson, 2004); whereas Ainsworth (1991) used "affectional bond" as a broad term encompassing bond and attachment. An attachment is generally thought of as operating in the direction of an infant towards his or her parent; in contrast, a bond operates in the direction of a parent towards his or her infant.

The type or style of attachment an individual develops in childhood was theorised by Bowlby (1979) to remain relatively unchanged into adulthood, and influence close relationships, such as that with the individual's child. In a secure attachment, the infant's signs of distress are

responded to sensitively by the caregiver in a timely manner (Mikulincer & Florian, 1998), and an internal working model is developed that allows the child to seek help from others in stressful situations (Feeney, 2004). In contrast, in an insecure attachment, the infant's distress is inadequately regulated by the caregiver (Mikulincer & Florian, 1998), who is unavailable, unresponsive, or unpredictable (Sroufe & Waters, 1977). Moreover, an internal working model is formed where alternative, less efficient strategies to social support are implemented in stressful situations (Feeney, 2004). The internal working model is thought to affect later behaviour and emotional processes that are particularly triggered when attachment relevant stressors occur (Rholes & Simpson, 2004), such as parenthood.

Mikulincer and Florian (1988) provided empirical support for attachment theory in two separate, but similar, studies: the first investigated adjustment to parenting of a healthy child; the second, investigated adjustment to parenting of a child with a mild mental handicap. The sample in the first study consisted of 80 mothers who had given birth to their first child 2-3 months previously, and 80 control women who had no children. The sample in the second study was smaller: 44 mothers who had a 4-5 year old child with a mild mental handicap, and 44 control mothers. The measures utilised in both studies were the Attachment-Style Scale (Hazan & Shaver, 1987), and the Mental Health Inventory (Veit & Ware, 1983). The findings across the two studies were similar: mothers with secure attachment styles in the experimental group experienced a similar level of stress to the control group. This level of stress was significantly lower than that seen in mothers in the experimental group who had insecure attachment styles.

1.8.2 The link between the parent-infant relationship in the NICU and the mother-father relationship

Attachment theory can also be used to conceptualise the link between the parent-infant relationship in the NICU and the mother-father relationship. Although Bowlby (1979) took the strict stance that early attachment models remain relatively unchanged into adulthood, later attachment theorists were more lenient. These theorists posited that early models may be modified through important relationships with others, such as a partner (Bartholomew, 1993; 1994; Rholes & Simpson, 2004). The majority of principles, however, are the same in early and later versions of attachment theory. One such principle is that adult attachment styles affect close relationships,

behaviour processes and emotional processes, particularly in stressful attachment relevant situations (Rholes & Simpson, 2004), such as alteration to the parent-infant relationship in the NICU.

Feeney (2004) investigated the link between adult attachment style, in the context of the couple relationship, and parent-infant relationship stress. In Study 1, the sample consisted of 92 married couples from Australia, who participated voluntarily. Questionnaires were used to measure attachment style and stress during two time frames: Time 1, during the second trimester of the women's pregnancies; and Time 2, 4-6 weeks after the women gave birth. A structural equation model provided partial support for the link between attachment style and parenting strain: relationship anxiety predicted parenting being rated as stressful for men, but not for women. In Study 2, the Australian sample consisted of 75 married couples with a child, and 75 married couples who were childless. The study had a prospective design, with measures taken at the same time frames as Study 1. Questionnaires tapping attachment security were utilised during Time 1, and a measure of maternal depression was taken at Times 1 and 2. Regression analysis indicated that for the wives with a child, controlling for depression at Time 1, relationship insecurity at Time 1 predicted depression at Time 2. This effect was not found for the childless (control) wives.

Attachment theory also allows the partner relationship to be conceptualised as a support. Miles, Carlson and Funk (1996) defined support as interpersonal transactions perceived as helpful in decreasing stress. In a study conducted by Doering, Moser and Dracup (2000), the link between social support and decreased stress from the NICU was supported. These authors utilised a convenience sample of 469 parents, which included 136 mother-father pairs. The parents completed a set of questionnaires prior to their infants' discharge from the unit. The questionnaires measured anxiety, depression, hostility, adjustment to their infants' illness, perceived social support, family functioning, and perceived control of their infants' health. In a stepwise multiple regression with these variables, where anxiety, depression, hostility, and adjustment were treated as outcome measures, 17-29% of the total variance was explained. Lower levels of social support were shown to be significantly associated with higher levels of anxiety, depression, hostility, and poorer adjustment to their infants' illnesses.

1.9 Summary

Alteration to the parent-infant relationship in the NICU is a salient stressor for parents, and is likely to be related to past experiences of relationships with their own parents and partner. This link was not detailed in the Parental NICU Stress model (Wereszczak et al., 1997), probably due to lack of specific theory and research. Care or overprotection in an individual's childhood has been linked to level of stress experienced when the individual becomes a parent (Assel et al., 2000; Carter, Mulder & Darlow, 2007). The link was theorised to occur by way of an internalised attachment style (Parker et al., 1979; Ainsworth, 1991). Similarly, attachment theory was used to conceptualise the link between stress from alterations to the parent-infant relationship and the mother-father relationship. This link has received empirical support, with partner relationship security predictive of level of stress experienced by parents (Doering et al., 2000; Fenney, 2004).

1.10 Overall summary

To investigate the stresses to parents arising from having an infant admitted to a NICU, the current study was conducted in three parts. The aim of Part A was to assess the psychometric properties of the PSS:NICU with a New Zealand sample. Because a small number of studies in different countries have found the scale to be valid and reliable (Franck et al., 2005; Miles et al., 1993; Reid & Bramwell, 2003), it was hypothesised this would be the case in New Zealand.

The aim of Part B was to describe the level and sources of stress experienced by parents of infants admitted to a New Zealand NICU using the PSS:NICU, as was done in previous studies listed in Table 1. The findings of these studies can be summarised as follows. First, the level of parental stress from the NICU ranged from a little stressful to moderately stressful. Second, some studies found mothers were more stressed than fathers, while other studies found no difference across genders. Third, the greatest stressor for mothers in the NICU was alterations to the parent-infant relationship. It was therefore hypothesised that this would be the case for mothers in the current study. For fathers, findings varied as to which stressor had the greatest impact. No other hypotheses were formulated because of the inconsistencies in the findings of previous research.

The aim of Part C was to examine the extent to which parents' stress from alterations to the parent-infant relationship in the NICU is linked to relationships with: (1) their own parents in childhood, and (2) their partners. Due to the lack of theory and research addressing these specific links, only exploratory hypotheses were made in the current study. First, a hypothesis was made regarding a link between stress from the parent-infant relationship in the unit and care parents received from their own parents in childhood. No hypothesis was made regarding overprotection received as a child, because it was the weaker of the two factors, care and overprotection. Second, a hypothesis was made regarding a link between stress from the parent-infant relationship in the unit and a parent's adjustment to his or her partner relationship.

1.11 The current study: specific aims and hypotheses

The aims and hypotheses of the current study are detailed in this section according to three parts: A, B, and C.

PART A

Aim 1

To assess the psychometric properties of the PSS:NICU using a sample of mothers and fathers whose infants were being cared for in the NICU at Christchurch Women's Hospital, New Zealand.

Hypothesis 1

Overall, the PSS:NICU will be valid and reliable when used with a sample of mothers and fathers whose infants were being cared for in the NICU at Christchurch Women's Hospital.

PART B

Aim 2

To describe and compare the level and sources of stress experienced by mothers and by fathers from the NICU at Christchurch Women's Hospital. Sources of stress include: sights and sounds of the NICU, infant appearance and behaviour, alterations to the parent-infant relationship, and staff communication.

Hypothesis 2

The greatest source of stress in the NICU at Christchurch Women's Hospital for mothers will be alterations to the parent-infant relationship.

PART C**Aim 3**

To examine the extent to which mothers' and fathers' stress on the Parent-Infant Relationship subscale of the PSS:NICU is associated with the parenting they received as children.

Hypothesis 3

The level of stress reported by mothers and by fathers from alterations to the parent-infant relationship in the NICU will be negatively correlated with the level of care they received from their parents as children.

Aim 4

To examine the extent to which mothers' and fathers' stress on the Parent-Infant Relationship subscale of the PSS:NICU is associated with adjustment to their couple relationships.

Hypothesis 4

The level of stress reported by mothers and by fathers from alterations to the parent-infant relationship in the NICU will be negatively correlated with level of couple adjustment.

2. METHOD

2.1 Setting

The setting for the current study was the NICU of Christchurch Women's Hospital in Canterbury, New Zealand. This unit services a wide geographical area that typically produces 7000 births annually. Infants in the area are admitted to the unit for a variety of reasons including a birth weight of less than 1,800g, gestation of less than 34 weeks, or substantive illness. The NICU has the facilities and expertise to cater for Level III or high dependency infants (from 24 weeks gestation), including those needing ventilation or intravenous feeding (Ministry of Health, 2005).

2.3 Participants and recruitment

The participants in this study were mothers and fathers of infants who were admitted to the NICU, and were recruited as part of the PARENTS study. There were 578 infants admitted to the unit in the target year, from February 2001 to February 2002, and a selection of 296 of these infant's mothers were approached for recruitment into the PARENTS study. Of the 296 infants, the majority ($n = 290$) were selected from the NICU admission register using random numbers. In the last 4 months of recruitment, owing to the number of admissions to the unit falling below the expected number, all mothers of NICU admissions were approached to take part in the PARENTS study. Of the 296 mothers, 242 (82%) provided informed consent to participate in the study. A father was only asked to be a participant if he was cohabitating with the mother of the infant ($n = 212$). Of these 212 fathers, 205 (97%) provided informed consent to participate in the study. The most common reason given by parents for refusal to participate was time constraint.

Of the recruited mothers ($n = 242$) and fathers ($n = 205$) in the PARENTS study, inclusion criteria for the present study were as follows. First, the parent had to have returned their PSS:NICU, which was necessary for all the main statistical analyses. This criterion excluded 30 mothers and 22 fathers. Second, the mother of the infant had to be in a cohabitating relationship with the father, because Aim 4 focused on this cohabitating relationship, and fathers were only recruited if they were cohabitating with the mother. This criterion excluded one mother who was living in a

homosexual *de facto* relationship, and 29 mothers whose marital status was either separated, divorced, widowed, or single. Therefore, a total of 182 mothers and 183 fathers participated in the current study.

2.3 Procedure

The PARENTS study was approved by the Canterbury Ethics Committee. Mothers and fathers were approached by the PARENTS study researchers following their infant's birth for written informed consent to participate. Following consent, parents were asked to provide their contact details within 24 hours, and self-report questionnaires were distributed to them. Participants were asked to complete the questionnaires independently of their partner. Information regarding the main variables of interest in the current study was provided by these questionnaires. The clinically trained interviewer then made contact with consenting parents within 2-3 weeks ($M = 17.63$ days, $SD = 11.81$), to conduct a structured clinical interview and collect completed questionnaires. Interviews with parents were carried out individually, at either Christchurch Women's Hospital or their family home. Information regarding mothers' and fathers' background characteristics in the present study was obtained from these interviews. If this information was jointly applicable to the couple, it was collected from only the mothers. Following the parents' consent, information on their infants' clinical characteristics was obtained from the FOOTPRINT study.

2.4 Mothers' and fathers' background characteristics

Table 2 describes the background characteristics of the mothers and fathers who participated in the current study. During the interview, a characteristic was recorded or coded into the most applicable category. Marital status was coded into: 1=married, 2=*de facto*, 3=separated, 4=divorced, 5=widowed, or 6=never married. *De facto* was defined as a cohabitating relationship of any length of time. Mothers who were separated, divorced, widowed, or never married were excluded from the present study, according to the rationale described in Section 2.2. Mothers were asked whether her current partner was the father of her baby, and the answer coded as yes or no. Family income before tax for the last 12 months was coded as: 1= less than \$15,000; 2= \$15,000 – less than \$25,000; 3=\$25,000 – less than \$40,000; 4=\$40,000 – less than \$50,000; 5=\$50,000 – less

than \$70,000; 6=\$70,000 and above. Age at last birthday was requested from each parent. Parent's qualifications or level of high school education were recorded or coded as follows: School Certificate in one or more subjects (yes or no), Sixth Form Certificate (yes or no), seventh form (yes or no), further qualification since leaving school (yes or no), type of further qualification if any. Seventh form level is equivalent to what is presently called Year 13 in New Zealand. Qualifications or education levels were combined in the current study, and overlapping information deleted, to provide a more concise single variable. This new variable was termed highest qualification or education level: 0=no School Certificate, 1=School Certificate in one or more subjects, 2=Sixth Form Certificate, 3=seventh form, 4=trade or secretarial qualification, 5=professional qualification with or without a degree. Parents also specified their ethnicity: 1=NZ European, 2=NZ Maori, 3=Other European, 4=Samoaan, 5=Tongan, 6=Niuean, 7=Asian, or 8=Other.

Table 2 shows mothers' and fathers' characteristics analyzed according to means, standard deviations, frequency counts, and percentages, as appropriate to the data. For relational status, the majority of couples were married (68%), with the remaining in a *de facto* relationship (32%). All mothers stated that their current partner was the father of their baby. Total family income was relatively evenly spread among most of the income brackets, as each of these income brackets contained around 20% of families: \$25,000 – less than \$40,000; \$40,000 – less than \$50,000; \$50,000 – less than \$70,000; and \$70,000+. According to their mean ages, fathers ($M = 33.23$, $SD = 5.95$) were older than mothers ($M = 30.80$, $SD = 4.68$). Moreover, a dependent samples *t*-test, using matched couples, showed that fathers' mean age was significantly higher than mothers' mean age, $t(178) = 7.25$, $p < .000$. Mothers appeared to obtain a similar highest qualification or education level compared to fathers. Furthermore, regarding this variable, a Wilcoxin signed ranks test using matched couples showed that mothers were not significantly different from fathers, $Z(178) = -1.69$, $p = .091$. Lastly, the most frequently endorsed ethnicity was NZ European for both mothers (80%), and fathers (82%).

Table 2

Mothers' and Fathers' Background Characteristics

Characteristic	Mothers <i>N</i> = 182 Mean (<i>SD</i>) or % (<i>n</i>)	Fathers <i>N</i> = 183 Mean (<i>SD</i>) or % (<i>n</i>)
Relational status^a		
Married	68% (124)	
Defacto	32% (58)	
Partner father of baby		
Yes	100% (182)	
No	0% (0)	
Total family income for previous year^{ab}		
<\$15,000	2% (3)	
\$15,000 - < \$25,000	11% (20)	
\$25,000 - < \$40,000	21% (38)	
\$40,000 - < \$50,000	20% (36)	
\$50,000 - < \$70,000	22% (40)	
\$70,000+	24% (44)	
Age (years)	30.80 (4.68)	33.23 (5.95)
Highest qualification or education level		
No School Certificate	13% (24)	8% (15)
School Certificate (1+ subjects)	15% (28)	13% (23)
Sixth Form Certificate	8% (14)	5% (10)
Seventh form	7% (12)	8% (14)
Trade or secretarial qualification	25% (45)	41% (75)
Professional qualification	32% (59)	25% (46)
Ethnicity		
New Zealand European	80% (145)	82% (150)
New Zealand Maori	5% (10)	4% (7)
Other European	9% (16)	8% (14)
Samoan	0% (0)	1% (2)
Tongan	0% (0)	0% (0)
Nieuan	0% (0)	0% (0)
Asian	2% (4)	0% (1)
Other	4% (7)	5% (9)

Note:

^aThe information for “relational status,” “partner father of baby,” and “total family income for previous year” was collected from only the mothers, but relates to the couple.

^bOne mother’s data point is missing.

2.5 Infants' clinical characteristics

Infants' clinical characteristics examined in the current study were: gestational age; birth weight; whether the infant was a singleton or part of a multiple birth; and the primary reason a near or full-term infant was admitted to the NICU. In the case of a multiple birth, the weight of the smaller infant was recorded, and only live births were recorded. A descriptive profile was obtained of the 183 infants, consisting of frequency counts, percentages, ranges, means, and standard deviations.

Figure 3 shows the distribution of infants according to their number of weeks gestation. According to the definitions used by Dudek-Shriber (2004), most of the infants (51%, $n = 94$) were premature (28-36 weeks), a large number of infants (44%, $n = 80$) were full-term (37-42 weeks), and a small number of infants (5%, $n = 9$) were extremely premature (less than 28 weeks). The mean of infants' gestational ages was 35.45 ($SD = 3.73$).

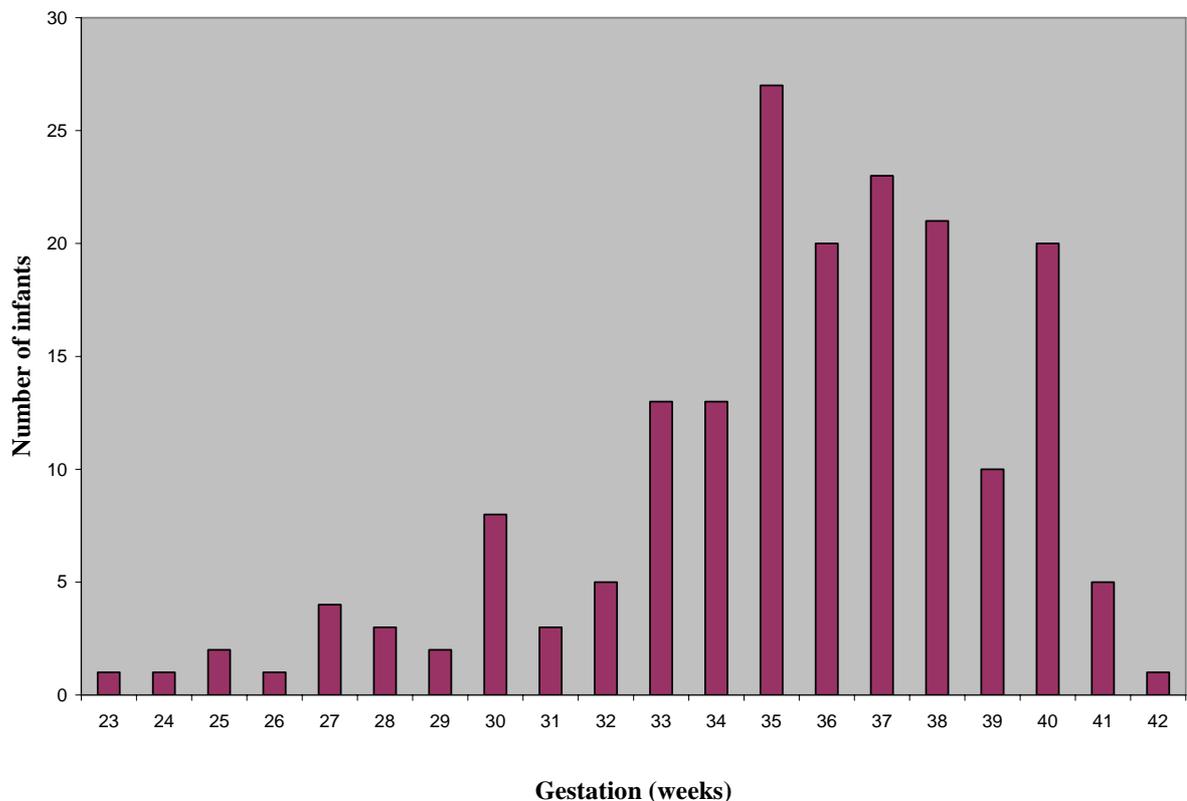


Figure 3. The distribution of infants according to gestational age.

Figure 4 shows infants' birth weights, according to categories used by Dudek-Shriber (2004). Most infants (54%, $n = 98$) had an average birth weight, a large number of infants (35%, $n = 64$) had a low birth weight, and a small number of infants had a very low or an extremely low birth weight (11%, $n = 21$). Infants' birth weights ranged from 510 to 4850g, and the mean was 2577.93 ($SD = 911.86$).

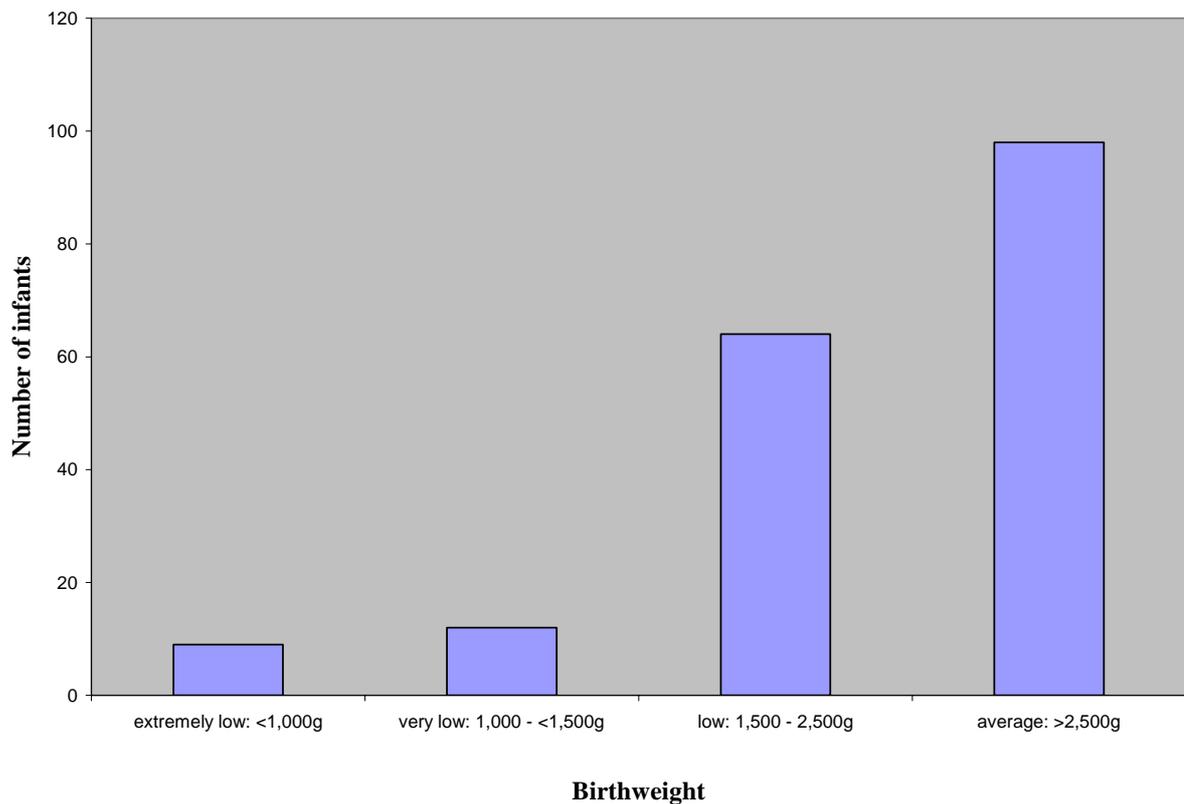


Figure 4. The distribution of infants according to birth weight category.

With regard to infants' multiple birth status, 161 were singletons, and 22 were one of a set of twins. In the PARENTS study, the primary reasons near or full term infants, defined as 36-42 weeks gestation, were admitted to the unit were: respiratory distress (36%), hypoglycemia (16%), suspected sepsis (9%), feeding difficulty (8%), possible hypoxic-ischaemic encephalopathy (7%), jaundice treatment (6%), and surgical conditions (5%).

2.6 Self-report measures

The self-report questionnaires selected for use in the current study, from the PARENTS study, were as follows: the PSS:NICU, the Hospital Anxiety and Depression Scale – Anxiety subscale (HADS-A; Zigmond & Snaith, 1983), the State-Trait Anxiety Inventory – Trait subscale (STAI-T; Spielberger, Gorsuch, & Lushene, 1970), the Parental Bonding Instrument (PBI; Parker et al., 1979), and the Dyadic Adjustment Scale (DAS; Spanier, 1976). The PSS:NICU was the primary measure selected in the current study, and was used in Parts A, B, and C. This scale enabled the Part A and B aims (Aims 1 and 2) to be met. The HADS-A and STAI-T were selected to examine their association with the PSS:NICU or the construct validity of the PSS:NICU, a component of Aim 1. Anxiety measures were chosen for this purpose because anxiety and stress are thought to be closely related constructs (Quick et al., 2000). The measures selected that enabled the Part C aims to be met were: The Parent-Infant Relationship subscale of the PSS:NICU (Aims 3 and 4), the PBI (Aim 3), and the DAS (Aim 4).

2.6.1 Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU)

The PSS:NICU contains 46 items, corresponding to four subscales and a general stress item. The four subscales and their numbers of items are as follows: Sights and Sounds, 5 items; Infant Appearance, 19 items; Parent-infant Relationship, 10 items; and Staff, 11 items. Permission was obtained from the authors to use the scale, and it is reproduced in Appendix A. Participants were asked to rate each item, according to how stressful the situation described in each item was for them: 1=not at all stressful, 2=a little stressful, 3=moderately stressful, 4=very stressful, and 5=extremely stressful. Stress was defined as feeling anxious, upset or tense. If participants had not experienced a particular situation, they were asked to indicate this by answering “not applicable”. If a participant had multiple infants in the unit, questions on the scale relating to a single infant were requested to be answered with regard to the most applicable infant.

The PSS:NICU allows three scoring methods: Metric 1 or Stress Occurrence Level, Metric 2 or Overall Stress Level, and Frequency or the number of situations experienced by a parent (Miles & Funk, 1998). Metric 1 measures the level of stress experienced only when the situation(s) occur.

This scoring method only employs items that have been rated from 1-5 by a parent, so items rated “not applicable” are treated as missing. The possible range of total scores, according to Metric 1 are: Sights and Sounds (0-25); Infant Appearance (0-95); Parent-Infant Relationship (0-50); Staff (0-55); General Stress (0-5); and the whole scale (0-230). Metric 2 measures the overall stress experienced from the NICU. In this scoring method, an item rated as “not applicable” by a participant is given a score of one. The possible range of total scores, according to Metric 2, are: Sights and Sounds (1-25); Infant Appearance (1-95); Parent-Infant Relationship (1-50); Staff (1-55); General Stress (1-5); and the whole scale (1-230). For both Metric 1 and Metric 2, high scores indicate high levels of stress. Lastly, the Frequency scoring method simply counts the number of situations experienced by a parent, according to each subscale or the total scale. This method of scoring was not used in the current study.

The scoring methods of Metric 1 and Metric 2 were used to meet Aims 1 and 2 in the current study. Metric 2 was used to meet Aims 3 and 4, as recommended by Miles and Funk (1998), because the focus was the amount of overall stress experienced by parents from the unit. The psychometric properties of the PSS:NICU were not stated in this section, because they were previously reported in the Introduction chapter.

2.6.2 *Hospital Anxiety and Depression Scale – Anxiety subscale (HADS-A)*

The Hospital Anxiety and Depression Scale (HADS) was designed to measure anxiety and depression symptoms of individuals in a hospital setting (Zigmond & Snaith, 1983). Symptoms relating to both anxiety and depression were not included in the scale, to achieve a more accurate measure of each (Zigmond & Snaith, 1983). Hence, the HADS consists of two subscales: the Anxiety subscale; and the Depression subscale. The current study used only the HADS Anxiety subscale (HADS-A), which measures a transitory state of anxiety (Snaith & Zigmond, 1994). The HADS-A has seven statements that participants were asked to rate according to the past week (Zigmond & Snaith, 1983). The Likert-type rating scale ranges from 0-3, and refers to agreement, frequency, or severity of each particular statement. The subscale takes only 1-3 minutes to complete (Herrmann, 1996). With regard to scoring (Zigmond & Snaith, 1983), first the items 1, 3, 5, 11, 13 are reverse scored. The HADS-A items are then summed to obtain a subscale total for each

individual (Snaith & Zigmond, 1994). The possible range of the total subscale score is 0-21, with a high score indicating a high level of anxiety (Zigmond & Snaith, 1983).

The HADS-A was developed from the Hamilton Anxiety Scale, and standardised on a sample of non-psychiatric hospital outpatients (16-65 years old), who were compared to a control group (Zigmond & Snaith, 1983). In a review of studies that utilised the HADS, Bjelland, Dahl, Haug and Neckelmann (2002) concluded that the HADS was a valid and reliable measure when used with physically ill patients, psychiatric patients, and the general population.

Validity information has been provided for the HADS-A, in the form of factor analyses and construct validity. In the majority of studies reviewed by Bjelland et al. (2002) and Herrmann (1997), a two factor structure was obtained corresponding to the Anxiety and Depression subscales. With regard to construct validity, the HADS-A has been correlated with a psychiatric interview rating of anxiety, $r=.74$, $p<.001$ (Zigmond & Snaith, 1983). In other construct validity analyses (Bjelland et al., 2002), the HADS-A was compared to these other commonly used anxiety questionnaires: the General Health Questionnaire, Spielberger State-Trait Anxiety Inventory; the Clinical Anxiety Scale; the Symptom Checklist 90 scale; and the Hamilton Anxiety Scale. Correlation coefficients between the HADS-A and these anxiety questionnaires were good, ranging from .44 to .81.

Reliability information for the HADS-A has been provided in the forms of internal consistency and test-retest reliability. Internal consistency was shown to range from $r = .41$ to $r = .93$ (Bjelland et al., 2002; Herrmann, 1996; Zigmond & Snaith, 1983). In three studies reviewed by Herrmann (1996), test-retest reliability was $r = 0.84$ over a 2 week period, and $r = 0.70$ over a 6 week period.

The HADS-A was utilised in the current study to assess the construct validity of the PSS:NICU for two reasons. First, it was designed specifically for use in a hospital setting (Zigmond & Snaith, 1983), to minimize the effect of physical health condition on test scores. Second, lots of research has supported its validity and reliability (Bjelland et al., 2002; Herrmann, 1996; Zigmond & Snaith, 1983).

2.6.3 *State-Trait Anxiety Inventory - Trait subscale (STAI-T)*

The State Trait Anxiety Inventory (STAI), Form X, consists of two subscales designed to separately measure trait and state anxiety (Spielberger et al., 1970). The present study utilised the STAI Trait subscale (STAI-T), to measure the stable propensity of individuals to react to situations perceived as threatening. Only the trait subscale was utilised, rather than both the subscales, as state anxiety was measured with the HADS-A. The questions in the STAI-T were developed from other trait anxiety measures, and standardised on more than 3,000 college students; 500 psychiatric or medical patients; and approximately 200 prisoners (Spielberger et al., 1970).

In accordance with the STAI instruction, each participant was asked to rate 20 statements according to how he or she generally felt (Spielberger, et al., 1970). The rating system uses a Likert-type scale, whereby 1=almost never, 2= sometimes, 3= often, and 4=almost always. The STAI-T takes approximately 8-10 minutes for a participant to complete.

With regard to scoring, first items that were positively worded were reverse scored: 1; 6; 7; 10; 13; 16; and 19 (Spielberger et al., 1970). There were 15 individuals who did not respond to a minority of items in the STAI-T (one to three items per individual). For such an individual, the mean of the items that had been completed was calculated and used to provide a score for items with no responses. The total subscale score was then calculated by summing the item scores for each individual (Spielberger et al., 1970). The possible range of the total subscale score is 20 to 80, with high scores indicative of a high level of anxiety (Spielberger et al., 1970).

The validity of the STAI-T has been examined with factor analyses, interscale correlations, and concurrent validity analyses. In a review of previous literature that examined the factor structure of the STAI, Ramanaiah, Franzen & Schill (1983) concluded there were inconsistent findings on the number and nature of factors in the STAI. Interscale correlations, between the STAI Trait and State subscales, have been reported to range from .44 to .69 (Ramanaiah et al., 1983; Spielberger et al., 1970). In concurrent validity analyses, correlations were calculated by Spielberger et al. (1970), between the STAI-T and other measures of trait anxiety: the Institute for Personality and Anxiety Testing Anxiety Scale; and the Taylor Manifest Anxiety Scale. These correlations were high, ranging from .75 to .83.

Reliability of the STAI-T has been supported in the forms of internal consistency and test-retest reliability. Good internal consistency was indicated with Cronbach's alpha coefficients that ranged from $r = .86$ to $r = .92$ (Knight, Waal-Manning & Spears, 1983; Ramanaiah et al., 1983; Spielberger et al., 1970). Test-retest data for the STAI-T over one hour showed reasonably high correlations that ranged from $r = .73$ to $r = .86$ (Spielberger et al., 1970).

The STAI-T was used in the present study to assess the construct validity of the PSS:NICU for three reasons. First, this procedure ensures ease of comparison of the present study to earlier studies that have utilised this procedure (Franck et al., 2005; Miles et al., 1991). Second, research has supported the subscale's psychometric properties (Knight et al., 1983; Ramanaiah et al., 1983; Spielberger et al., 1970). Third, the validity of the STAI-T with a large New Zealand sample, similar to the sample used in this study, has been supported (Knight et al., 1983).

2.6.4 Parental Bonding Instrument (PBI)

The PBI was designed by Parker et al. (1979) to retrospectively measure perceived parental input to a parent-child bond. These authors stated a potential use of the scale as investigating the influence of parents on the psychological and social functioning of an individual. There are two subscales of the PBI, theoretically derived: (1) Care, pertaining to warmth, affection, and empathy, as opposed to indifference or rejection; and (2) Overprotection, pertaining to parental control over a child, intrusion and excessive contact, as opposed to allowance of autonomy and independence.

The PBI was typically administered to each participant twice, first regarding the mother, and second regarding the father. Participants were requested to not answer the questionnaire if it was not applicable to the particular parent, that is if the parent was absent from the participant's childhood. Participants were asked to retrospectively rate attitudes and behaviours of their parents, during the participants' first 16 years of life (Parker et al., 1979). There are a total of 25 items in the scale: the Care subscale contains 12 items, and the Overprotection subscale contains 13 items. Participants rated each item on a four point Likert-type scale, that ranged from 0=very like, to 1=moderately like, to 2=moderately unlike, to 3=very unlike. The PBI is not copyrighted, and is shown in Appendix B. Four measures for each participant were possible: maternal care, maternal overprotection, paternal care, and paternal overprotection.

With regard to scoring, items that were negatively termed in the Care subscale (items 2, 4, 14, 16, 18, 24), and positively termed in the Overprotection subscale (items 3, 7, 15, 21, 22, 25) were reverse scored (Parker et al., 1979). Individual's subscale scores were then calculated by summing the scores of items according to each subscale. The possible ranges of the subscale scores are: 0-36 for the Care subscale, and 0-39 for the Overprotection subscale. A high score on the Care subscale or Overprotection subscale indicates a high degree of care or overprotection, respectively. Conversely, a low score on the Care subscale or Overprotection subscale indicates a low degree of care or overprotection, respectively.

The validity of the Care and Overprotection subscales has been supported by factor analyses in clinical and non-clinical samples (Mackinnon, Henderson, Scott & Duncan-Jones, 1989; Parker et al., 1979; Parker, 1990). Two factors were found in these studies, the first indicative of care versus indifference and/or rejection. The second factor was indicative of control and/or overprotection versus allowance of autonomy and independence. These factors explained 28% and 17% of the variance, respectively (Parker et al., 1979).

Reliability of the PBI has been demonstrated via split-half reliability, and test-retest reliability. In the study by Parker et al. (1979), split-half reliability coefficients of $r = 0.88$ for the Care subscale, and $r = 0.74$ for the Overprotection subscale were reported. In other studies, test-retest reliability coefficients ranged from $r = 0.63$ to $r = 0.95$ for the Care subscale, and from $r = 0.56$ to $r = 0.90$ for the Overprotection subscale (Mackinnon et al., 1989; Wilhelm & Parker, 1990). These test-retest coefficients were moderate when measured over yearly periods up to 10 years, and high when measured over monthly periods.

There were three reasons the Parental Bonding Instrument (PBI) was used in the current study. The primary reason was that the PBI is the only scale that retrospectively measures an adult's childhood relationship with his or her parents. The second reason was that the PBI was standardised on an Australian sample (Parker et al., 1979), and subsequently used with other Australian samples (MacKinnon et al., 1989; Wilhelm & Parker, 1990). New Zealanders are most comparable to Australians, as opposed to other ethnicities, due to similarities in language and culture. Finally, the PBI appears to be valid and reliable (MacKinnon et al., 1989; Parker 1990; Parker et al., 1979; Wilhelm & Parker, 1990).

2.6.5 Dyadic Adjustment Scale (DAS)

The Dyadic Adjustment Scale (DAS) was used in the present study, because it was designed to measure the quality of adjustment of an individual to his or her couple relationship (Spanier, 1976). The scale was developed mainly from items of previous marital adjustment scales, and from a few newly developed items. There are four subscales in the DAS. The Dyadic Satisfaction subscale measures happiness or satisfaction, and includes items about the frequency of arguments, and extent to which the individual has considered separation. The Dyadic Cohesion subscale measures amount of time spent on interests and activities together, such as recreation, discussion, and projects. The Dyadic Consensus subscale measures agreement on major issues in the relationship, such as money, friends, religion, and household tasks. Lastly, the Affectional Expression subscale measures agreement about and the expression of love, sex, and affection.

There are a total of 32 items in the DAS: Dyadic Satisfaction subscale, 10 items; Dyadic Cohesion subscale, 5 items; Dyadic Consensus subscale, 13 items; and Affectional Expression subscale, 4 items (Spanier, 1976). Participants, for the majority of items, were asked to rate each item on a 6-point scale. The Likert-type scale was used, in conjunction with a particular item, as a measure of agreement, frequency, happiness, or perception of the future of the relationship. The DAS is reproduced in Appendix C, with permission from the author of the scale.

Participant's scores on each item were summed according to the subscales, and all items were summed to produce an overall dyadic adjustment score (Spanier, 1976). If a participant did not respond to an item in a particular subscale, the subscale score was not calculated, and consequently the overall DAS score was not calculated. The possible range of total scores for the subscales, and overall scale are: Dyadic Satisfaction (0-50), Dyadic Cohesion (0-24); Dyadic Consensus (0-65); Affectional Expression (0-12); and overall scale (0-151). Low scores are indicative of poor adjustment, and high scores are indicative of good adjustment.

Validity information for the DAS has been provided in the forms of factor analyses, content validity, and construct validity. Findings from factor analyses showed four factors, corresponding to the subscales (Eddy, 1991; Spanier, 1976), or a single overall factor (Antill & Cotton 1982; Sharpley & Cross, 1982). Content validity of the scale was examined by Spanier (1976). Participants rated the importance of each item in the scale for evaluating marriage, and the majority

of items were rated as very important. Construct validity was also demonstrated in the same study: the DAS was strongly correlated with the Locke-Wallace Marital Adjustment Scale ($r = .86$).

Reliability of the DAS has been supported in the forms of internal consistency, test-retest reliability, inter-rater reliability, and analyses of different characteristics of participants and their scale scores. Internal consistency coefficients were reported in a review by Spanier (2001): Dyadic Consensus ($r = .73$ to $r = .92$); Dyadic Satisfaction ($r = .77$ to $r = .94$); Dyadic Cohesion ($r = .72$ to $r = .86$); Affectional Expression ($r = .58$ to $r = .73$); and, the total scale ($r = .84$ to $r = .96$). Test-retest reliability coefficients were high over two weeks: Dyadic Consensus $r = .85$, Dyadic Satisfaction $r = .81$, Dyadic Cohesion $r = .77$, Affectional Expression $r = .75$, and the total scale $r = .87$ (Carey, Spector, Lantinga, & Krauss, 1993). An acceptable amount of inter-rater reliability was shown by Antill and Cotton (1982), by way of correlations between husband-wife ratings of their relationships. In this study correlations were: Dyadic Consensus $r = .44$; Dyadic Satisfaction $r = .58$; Dyadic Cohesion $r = .53$; Affectional Expression $r = .58$; and total scale $r = .59$. Lastly, DAS scores did not differ as a function of participant gender, age, educational level, number of children, relationship duration (Carey et al., 1993), or marital status (Spanier, 2001).

There were three reasons for utilising the DAS, as opposed to other dyadic scales. First, the majority of other dyadic scales should only be used with married couples, while the DAS can be used with married and unmarried cohabitating couples (Spanier, 2001). The current study's sample included married couples and *de facto* couples. Second, this scale is one of the most widely used dyadic instruments (Spanier, 2001). It has four language translations, and has been used in over 1,000 studies. The DAS has been used with Australian samples (Antill & Cotton, 1982), which are comparable to the New Zealand sample in this study, due to similarities in language and culture. Third, the scale is brief compared to other dyadic scales, but is still a comprehensive measure (Burnett, 1987).

2.7 Data analyses

All data were analysed using the computer software "Statistical Package for the Social Sciences" (SPSS) for Windows (version 12.0.1). Missing data, for example if a questionnaire was not returned or certain questions were not answered on a questionnaire, was handled using the

pairwise method, whereby missing values are excluded from the analysis. In the listwise method participants with missing values are excluded from the analysis. The pairwise method was used, as opposed to listwise, so that not too much participant data was lost (Stevens, 2002). The suitability of *t*-tests or *ANOVA* analyses were considered by examining cell sizes, plots of the normality of each variable, as well as the homogeneity of variances. Prior to correlation analyses being conducted, scatter plots were examined to exclude a curvilinear relationship between the variables. All *t*-test *p* values reported were two-tailed comparisons with a significance level of $p < .05$, unless stated otherwise. Further detail of the data analyses is included in the Results and Discussion chapter.

3. RESULTS AND DISCUSSION

3.1 Overview of the Results and Discussion chapter

The Results and Discussion chapter is organised in order of Parts A, B and C, followed by a general discussion. The results for Part A, B or C are presented together with the discussion for that particular Part.

Part A examines the validity and reliability of the PSS:NICU with a sample of parents whose infant was cared for in the NICU at Christchurch Women's Hospital. The validity of the scale was examined using factor analyses, inter-scale correlations, and construct validity analyses. The reliability of the scale was assessed using inter-item correlations. The majority of these analyses were calculated separately for mothers and for fathers.

Part B describes the sources of stress experienced by mothers and by fathers from the NICU as measured by the four subscales of the PSS:NICU: Sights and Sounds of the unit, Infant Appearance, Parent-Infant Relationship, and Staff Communication.

Part C examines the extent to which parents' reported stress on the Parent-Infant Relationship subscale of the PSS:NICU was associated with: (1) the parenting they received as a child, and (2) parent's adjustment to their couple relationship. These associations were examined separately for mothers and for fathers.

The general discussion first describes the strengths of the current study, including in relation to limitations with previous studies that utilised the PSS:NICU. Limitations of the current study, not already discussed in the interpretation of each part of the results, are described. A summary and integration of the Results and Discussion chapter thus far is provided with conclusions, before considering the clinical and societal implications of the study. The chapter closes with suggestions for future research.

PART A

3.2 Part A results: psychometric properties of the PSS:NICU

3.2.1 Frequencies of responses by parents to each item on the PSS:NICU

Table D1 in Appendix D shows the frequencies of responses by mothers and by fathers to each PSS:NICU item calculated according to each rating: N/A= not applicable, 1=not at all stressful, 2=a little stressful, 3=moderately stressful, 4=very stressful, 5=extremely stressful. Items were identified that more than two thirds of mothers had answered “not applicable”: items e, f, i, m, r, and s from the Infant Appearance subscale in Table D1; and items g, i, j, and k from the Staff subscale in Table D1. Items were then identified in the same manner for fathers: items e, f, i, m, n, o, and s from the Infant Appearance subscale in Table D1; item e from the Parent-Infant Relationship subscale in Table D1; and items j and k from the Staff subscale in Table D1. Item descriptions presented in bold font in Table D1 indicate that the particular item was scored “not applicable” by more than two thirds of mothers or fathers or both. These items were considered to be rarely experienced; consequently, they were excluded from all further analyses. More than two thirds was chosen as an exclusion criterion based on the premise that an item in a questionnaire should be applicable to the majority of people who are tested with it. Similar criteria for item exclusion was used in the original PSS:NICU validation study (Miles et al., 1993), and subsequent validation studies (Reid & Bramwell, 2003; Franck et al, 2005). The same items were excluded for mothers and fathers in this analysis, for ease of comparability between the genders in the proceeding analyses.

3.2.2 Factor structure of the PSS:NICU

Principle component analysis with varimax rotation (Kaiser normalisation) was used as the extraction method for factor analyses of PSS:NICU items. Participants’ raw data were used in the factor analyses, because these analyses focused on the relationships among items. Mothers’ and fathers’ ratings of items were combined for factor analyses. This procedure was done so that these two groups could be more easily compared in proceeding analyses, which used modified PSS:NICU

subscales based on the factor analysis findings. The initial factor analysis identified seven factors that together explained 62% of the variance.

A factor analysis forced to four factors was then performed, so that the result could be compared to the four main subscales of the PSS:NICU: Sights and Sounds, Infant Appearance, Parent-Infant Relationship, and Staff. Based on this four-factor solution, as shown in Table 3, all items met the criterion used by Miles et al. (1993) for retaining an item on a factor: a loading of more than 0.40. Together, these four factors explained 51% of the variance. Table 3 shows the items generally group into the four main subscales, except for three items from the Infant Appearance subscale, which load most strongly on the Sights and Sounds subscale. These three items were “tubes and equipment on or near my baby,” “seeing needles and tubes put in my baby,” and “my baby being fed by an intravenous line or tube.” Accordingly, all further analyses were conducted with these items moved into the Sights and Sounds subscale. Further analyses in Part A were also conducted without these items being moved, to examine whether this had any effect on validity and reliability estimates. From this point onwards, to avoid confusion, the two original subscales are referred to as Sights and Sounds^a and Infant Appearance^a. The two modified subscales are referred to as Sights and Sounds^b and ‘Infant Appearance^b.

Table 3.

Four-factor Analysis of the PSS:NICU

PSS:NICU item	Factor loading			
	Factor 1	Factor 2	Factor 3	Factor 4
Sights and Sounds	<u>.761</u>	.017	.347	.085
(a) Monitors and equipment	<u>.797</u>	.074	.232	.076
(b) Noises of monitors and equipment	<u>.775</u>	.087	.181	.024
(c) Sudden monitor alarms	<u>.616</u>	.113	.117	.168
(d) Other sick babies	<u>.496</u>	.123	.030	.269
(e) Large number of staff				
Infant Appearance	<u>.687</u>	.181	.322	.151
(a) Tubes and equipment	.336	<u>.544</u>	.114	.079
(b) Bruises, cuts or incisions	.307	<u>.621</u>	-.063	.150
(c) Unusual colour	.222	<u>.509</u>	.094	-.164
(d) Breathing patterns	.006	<u>.570</u>	.229	.091
(g) Small size	-.097	<u>.620</u>	.009	.075
(h) Wrinkled appearance	<u>.471</u>	.411	.284	.188
(j) Needles and tubes put in	<u>.496</u>	.224	.349	.153
(k) Intravenous feed line or tube	.206	<u>.533</u>	.292	.218
(l) Pain	.070	<u>.490</u>	.148	.247
(p) Limp and weak	.058	<u>.524</u>	.271	.209
(q) Jerky or restless movements				
Parent-Infant Relationship	.265	.138	<u>.720</u>	.126
(a) Separation	.110	.041	<u>.721</u>	.174
(b) Can't feed	.129	.047	<u>.747</u>	.031
(c) Can't provide care	.098	.071	<u>.777</u>	.042
(d) Can't hold	.209	.154	<u>.635</u>	.122
(f) Can't share baby with family	.300	.275	<u>.605</u>	.107
(g) Feel helpless and can't protect	.181	.211	<u>.499</u>	.088
(h) Afraid of touching or holding	.111	.186	<u>.516</u>	.253
(i) Feeling staff are closer to my baby than I am	.396	.137	<u>.602</u>	.234
(j) Feeling helpless about how to help my baby				
Staff	.094	-.018	.139	<u>.720</u>
(a) Explaining things too fast	.070	.131	.081	<u>.616</u>
(b) Words I don't understand	.163	.059	.098	<u>.695</u>
(c) Conflicting things about baby	.134	.151	.123	<u>.795</u>
(d) Not enough info. about tests & treatments	.113	.120	.035	<u>.787</u>
(e) Not talking to me enough	.227	.116	.172	<u>.685</u>
(f) Too many different staff talking to me	.015	.202	.232	<u>.625</u>
(h) Not sure will be called about changes in baby				

Note:

182 mothers and 183 fathers were included in this analysis.

PSS:NICU item statements have been abbreviated in the Table.

Underlined figures indicate the factor on which an item loaded most strongly.

3.2.3 Interscale correlations of the PSS:NICU subscales and total scale

Table 4 presents interscale Pearson correlation coefficients computed from total scores for each PSS:NICU subscale and the total scale. Correlations between the subscales were low to moderate, and were all statistically significant at the $p < .01$ level. For these correlations, the lowest correlation occurred for fathers: Metric 1 between the Sights and Sounds^a subscale and the Staff subscale, ($r = .27$). The highest correlation occurred for mothers: Metric 2 between the Sights and Sounds^b subscale and the Parent-Infant Relationship subscale ($r = .67$). Correlations between each subscale and the total scale were moderate to high, ranging from $r = .66$ to $r = .89$, and were all statistically significant at the $p < .01$ level. Although not statistically tested, each Sights and Sounds^b correlation appeared slightly higher than its corresponding Sights and Sounds^a correlation. In contrast, each Infant Appearance^b correlation appeared slightly lower than its corresponding Infant Appearance^a correlation.

Table 4.

Intercorrelations of the PSS:NICU Subscales and Total Scale

PSS:NICU scale	PSS:NICU subscale					
	Sights & Sounds ^a	Sights & Sounds ^b	Infant Appearance ^a	Infant Appearance ^b	Parental Role	Staff
Mothers: Metric 1						
Infant Appearance ^a	.49**					
Infant Appearance ^b	.38**	.52**				
Parent-Infant	.52**	.63**	.61**	.52**		
Staff	.37**	.42**	.40**	.35**	.36**	
Total scale	.69**	.82**	.84**	.75**	.85**	.68**
Fathers: Metric 1						
Infant Appearance ^a	.53**					
Infant Appearance ^b	.42**	.53**				
Parent-Infant	.49**	.56**	.55**	.48**		
Staff	.27**	.36**	.48**	.44**	.47**	
Total scale	.66**	.78**	.87**	.79**	.82**	.71**
Mothers: Metric 2						
Infant Appearance ^a	.53**					
Infant Appearance ^b	.42**	.57**				
Parent-Infant	.55**	.67**	.65**	.57**		
Staff	.43**	.48**	.44**	.39**	.40**	
Total scale	.72**	.85**	.86**	.77**	.87**	.69**
Fathers: Metric 2						
Infant Appearance ^a	.61**					
Infant Appearance ^b	.49**	.60**				
Parent-Infant	.50**	.58**	.58**	.51**		
Staff	.29**	.40**	.51**	.48**	.48**	
Total scale	.70**	.82**	.89**	.81**	.83**	.70**

Note:

182 mothers and 183 fathers were included in this analysis.

** $p < .01$

3.2.4 Construct validity of the PSS:NICU according to anxiety measures

Table 5 provides an examination of the construct validity of the PSS:NICU, by reporting its associations with two separate measures of anxiety: the State Trait Anxiety Inventory Trait subscale (STAI-T), and the Hospital Anxiety and Depression Scale Anxiety subscale (HADS-A). Pearson correlation coefficients between respondents total score on each PSS:NICU subscale, the total scale, and their total score on each anxiety measure were calculated. Numbers of mothers and fathers included in the construct analyses varied depending on a small number of missing STAI or HADS questionnaires.

Table 5.

Intercorrelations between the PSS:NICU and Measures of Anxiety

Anxiety questionnaire	PSS:NICU						
	Sights & Sounds ^a	Sights & Sounds ^b	Infant Appearance ^a	Infant Appearance ^b	Parent-Infant	Staff	Total scale
Mothers: Metric 1							
STAI-T (<i>n</i> =180)	.24**	.25**	.27**	.27**	.26**	.33**	.36**
HADS-A (<i>n</i> =180)	.29**	.29**	.28**	.26**	.26**	.32**	.36**
Fathers: Metric 1							
STAI-T (<i>n</i> =182)	.19*	.23**	.35**	.35**	.25**	.23**	.35**
HADS-A (<i>n</i> =181)	.25**	.28**	.37**	.36**	.31**	.24**	.40**
Mothers: Metric 2							
STAI-T (<i>n</i> =180)	.24**	.24**	.26**	.27**	.26**	.32**	.34**
HADS-A (<i>n</i> =180)	.28**	.29**	.27**	.26**	.27**	.30**	.35**
Fathers: Metric 2							
STAI-T (<i>n</i> =182)	.20**	.24**	.35**	.36**	.27**	.23**	.35**
HADS-A (<i>n</i> =181)	.24**	.29**	.37**	.37**	.33**	.28**	.41**

Note:

HADS-A = Hospital Anxiety and Depression Scale - Anxiety subscale

STAI-T= Spielberger State Trait Anxiety Inventory - Trait subscale

* $p < .05$

** $p < .01$

The results in Table 5 show that the correlations were all positive, significant at the $p < .01$ level, and small to moderate. The only exception was for fathers: Metric 1 on the Sights and Sounds^a subscale versus the STAI-T, which was significant at the $p < .05$ level. More specifically, with regard to mothers' STAI-T correlations, PSS:NICU Metric 1 correlations were reasonably consistent with PSS:NICU Metric 2 correlations (ranging from $r = .24$ to $r = .36$). Likewise, for the fathers' STAI-T correlations, PSS:NICU Metric 1 correlations were reasonably consistent with PSS:NICU Metric 2 correlations (ranging from $r = .19$ to $r = .36$).

With regard to mothers' HADS-A correlations, PSS:NICU Metric 1 correlations were reasonably consistent with PSS:NICU Metric 2 correlations (ranging from $r = .26$ to $r = .36$). Likewise, for the fathers' HADS-A correlations, again PSS:NICU Metric 1 correlations were reasonably consistent with PSS:NICU Metric 2 correlations (ranging from $r = .24$ to $r = .41$). Lastly, the correlations for Sights and Sounds^a were similar to Sights and Sounds^b (ranging from $r = .19$ to $r = .29$); likewise, the correlations for Infant Appearance^a were similar to Infant Appearance^b (ranging from $r = .26$ to $r = .37$).

3.2.5 *Inter-item correlations for each PSS:NICU subscale*

Table 6 presents the Cronbach alpha coefficients produced from inter-item correlations according to each PSS:NICU subscale. Generally, the correlations for each of the subscales were high, ranging from $r = .81$ to $r = .95$. More specifically, the correlations were similar between Metric 1 and Metric 2, and similar between mothers and fathers. Lastly, the correlations for Sights and Sounds^a were similar to Sights and Sounds^b; likewise, the correlations for Infant Appearance^a were similar to Infant Appearance^b.

Table 6.

Inter-item Correlations for each PSS:NICU Subscale

PSS:NICU subscale	Cronbach's alpha coefficient	
	Metric 1	Metric 2
Mothers (<i>n</i> = 182)		
Sights and Sounds ^a	.81	.81
Sights and Sounds ^b	.86	.85
Infant Appearance ^a	.91	.81
Infant Appearance ^b	.85	.81
Parent-Infant Relationship	.93	.88
Staff	.95	.87
Fathers (<i>n</i> = 183)		
Sights and Sounds ^a	.82	.82
Sights and Sounds ^b	.89	.88
Infant Appearance ^a	.92	.81
Infant Appearance ^b	.89	.81
Parent-Infant Relationship	.87	.85
Staff	.94	.85

3.3 Part A discussion

The findings in Part A supported Hypothesis 1: that overall the PSS:NICU would be valid and reliable when used with a sample of mothers and fathers whose infants were being cared for in the NICU at Christchurch Women's Hospital.

Findings from the factor analyses of the PSS:NICU items showed firstly, seven factors that explained 62% of the variance, consistent with the only other comparable analysis reported by Miles et al. (1993). When forced to four factors, 51% of the variance was explained, and overall the items grouped into the *a priori* subscales: Sights and Sounds, Infant Appearance, Parent-Infant Relationship, and Staff. These findings are consistent with previous factor analyses conducted by Franck et al. (2005) and Miles et al. (1993). In the current study, there were three items that did not group according to the four *a priori* subscales; similarly, seven items did not group according to these subscales in Franck et al. (2005). The seven factor result does not support the validity of the

subscales developed by Miles et al. (1993). The four factor result, however, provides an acceptable amount of support for the validity of these subscales.

There were significant low to moderate correlations between the PSS:NICU subscales, and moderate to high correlations between each subscale total and the total scale. These findings are consistent with previous studies that conducted comparable analyses (Franck et al., 2005; Miles et al., 1993; Reid & Bramwell, 2003). Hence, each subscale appeared to be measuring different elements of parental stress, with every subscale important in making up the whole PSS:NICU.

Positive significant small to moderate correlations were found between the PSS:NICU and two separate measures of anxiety: the STAI-T and the HADS-A. This finding is consistent with previous studies that conducted comparable analyses (Franck et al., 2005; Miles et al., 1993; Miles et al., 1991), and is indicative of satisfactory construct validity. Inter-item correlations according to each PSS:NICU subscale were high, consistent with previous studies findings of correlations over .70 (Franck et al., 2005; Miles et al., 1993; Reid & Bramwell, 2003). This finding indicates good reliability of the PSS:NICU in the form of internal consistency.

Of the 46 items in the PSS:NICU, thirteen (28%) were rated “not applicable” by more than two thirds of mothers or fathers or both; consequently, they were excluded from further analyses. The numbers of items according to each subscale were as follows: Sights and Sounds (0), Infant Appearance (8), Parent-Infant Relationship (1), and Staff (4). Of these items, two items from the Infant Appearance subscale were of particular interest. “Having a machine breathe for my baby” and “clapping on baby’s chest for chest drainage” indicated that the majority of infants were not ill enough to require these medical treatments.

When individual items rated as not applicable by more than two thirds of parents were compared with items of the same status from previous studies (Franck et al., 2005; Miles, 1989; Miles et al., 1993; Miles et al., 1991; Reid & Bramwell, 2003), on the whole no matches were found. Possible explanations for this finding are cultural differences in interpretation and responding to the scale, or unit practices. These explanations further justified the psychometric evaluation of the scale with this New Zealand sample. The four items from the Staff subscale

identified in the current study, however, did match with the majority of previous studies findings (Franck et al., 2005; Miles et al., 1993; Miles et al., 1991; Reid & Bramwell, 2003). This finding is suggests some staff practices in the NICU make these items irrelevant to the current study's sample. The Christchurch Women's NICU, and other NICUs around the world, are beginning to adopt infant developmental and family-centered care practices (Westrup, in press). Principles behind these practices, which relate to Staff subscale items, include: (1) respect for the individuality of the infant and his or her family, and (2) inclusion of the family as part of the health care team. It may, therefore, be beneficial to revise the Staff subscale of the PSS:NICU for use in the Christchurch Women's NICU, and possibly in New Zealand.

Interestingly, the majority of items in the Staff subscale remained after removing items scored as not applicable by more than two thirds of parents, in contrast to the majority of previous studies (Franck et al., 2005; Miles et al., 1993; Miles et al., 1991; Reid & Bramwell, 2003). One possible reason for this discrepancy is that the time frame the scale was administered varied between this study and previous studies. The average time point of administration in the current study was approximately 2 weeks after infant admission, compared to 2-7 days after infant admission (Miles et al., 1993; Reid & Bramwell, 2003), and various times during infant admission (Franck et al., 2005). In support of this idea is a study by Affonso et al. (1992), who found that mothers rated the negative stressor of staff communication as low in frequency and intensity 4 days after their infant's birth, but higher in frequency and intensity 2-3 weeks after their infant's birth. This finding was largely due to the mothers' perception of the staff providing incomplete and conflicting information regarding their infant. This perception corresponds to two of the remaining items in the Staff subscale: "telling me different (conflicting) things about my baby's condition," and "not telling me enough about tests and treatments being done to my baby."

Overall, the findings provide support for the psychometric properties of the PSS:NICU for mothers and fathers, and for Metrics 1 and 2. In addition, when comparing the results between the *a priori* and modified versions of the Infant Appearance and Sights and Sounds subscales, there appeared to be little or no difference between them.

PART B

3.4 Part B results: NICU environment stressors experienced by mothers and by fathers

The aim of this section was to describe and compare the sources of stress experienced by mothers and by fathers from the NICU. Sources of stress were measured using the four subscales of the PSS:NICU: Sights and Sounds of the unit; Infant Appearance; Parent-Infant Relationship; and Staff Communication. As demonstrated in Part A, the scale had satisfactory psychometric properties when used with this sample.

Table 7 describes the sources of stress experienced by mothers and by fathers whose infant was being cared for in the unit, according to means and standard deviations for each subscale and the total scale. These analyses used the original version of the scale, and Metric 1 and Metric 2 scores. The analyses were also conducted with three items moved from the Infant Appearance subscale into the more appropriate Sights and Sounds subscale, based on the four-factor analysis in Part A. These two modified subscales are referred to as Sights and Sounds^b and Infant Appearance^b, whereas Sights and Sounds^a and Infant Appearance^a refer to the original versions of the subscales. Analyses were calculated separately for mothers and for fathers whose partner participated in this thesis ($n = 179$ couples). This procedure was followed so that direct comparisons between mothers' and fathers' mean scores could be made within the couple dyad, using dependent samples t -tests. The dependent samples t -test is the more appropriate test, as opposed to an independent samples t -test, because mothers and fathers are linked by their couple status and their infant.

Table 7.

Comparison of PSS:NICU Means across Mothers and Fathers Matched as Couples

PSS:NICU scale	Mothers (<i>n</i> = 179)	Fathers (<i>n</i> = 179)	<i>t</i>	<i>p</i> -value
	Mean (<i>SD</i>)	Mean (<i>SD</i>)		
Metric 1				
Sights & Sounds ^a	2.11 (0.54)	1.82 (0.55)	4.98	<.001
Sights & Sounds ^b	2.38 (0.57)	2.01 (0.57)	6.24	<.001
Infant Appearance ^a	2.82 (0.71)	2.32 (0.71)	6.71	<.001
Infant Appearance ^b	2.80 (0.77)	2.32 (0.77)	5.78	<.001
Parent-Infant	3.24 (0.76)	2.21 (0.77)	12.72	<.001
Staff	2.30 (0.82)	1.93 (0.81)	3.91	<.001
Total scale	2.75 (0.56)	2.15 (0.56)	10.29	<.001
Metric 2				
Sights & Sounds ^a	2.07 (0.73)	1.81 (0.67)	4.60	<.001
Sights & Sounds ^b	2.29 (0.75)	1.95 (0.72)	5.52	<.001
Infant Appearance ^a	2.24 (0.73)	1.93 (0.71)	4.79	<.001
Infant Appearance ^b	2.08 (0.72)	1.83 (0.71)	3.97	<.001
Parent-Infant	2.80 (1.00)	1.91 (0.73)	11.77	<.001
Staff	1.69 (0.88)	1.49 (0.69)	3.22	.002
Total scale	2.43 (0.72)	1.97 (0.62)	8.61	<.001

Note:

1= not at all stressful, 2 = a little stressful, 3 = moderately stressful, 4 = very stressful, 5 = extremely stressful

^aThe original subscale, not modified according to the four-factor analysis in this study.

^bThe modified version of the subscale based on the four-factor analysis in this study. Three items from the Infant Appearance subscale were moved into the Sights and Sounds subscale, as the factor analysis revealed these items loaded most strongly on the Sights and Sounds subscale.

For *Metric 1* scores, to obtain mean scores that could be compared among the scales, an individual's total score for each subscale and the total scale was divided by the number of items experienced in the particular scale by that individual (Miles & Funk, 1998). Individual's scores were then added together according to each subscale and the total scale, and these totals were divided by the number of individuals who had experienced at least one item on the particular scale. The possible range of these mean scores was 1-5.

The results in Table 7 for *Metric 1* show that overall the NICU environment was "moderately stressful" for mothers, and "a little stressful" for fathers. Moreover, mothers had significantly

higher stress scores for each subscale and the total scale compared to fathers ($p < .001$). Mothers' greatest subscale score occurred on the Parent-Infant Relationship subscale ($M = 3.24$, $SD = 0.76$). Fathers' greatest subscale score, on the other hand, occurred on both the Infant Appearance^a ($M = 2.32$, $SD = 0.71$) and the Infant Appearance^b ($M = 2.32$, $SD = 0.77$) subscales. These findings are further illustrated in Figure 5.

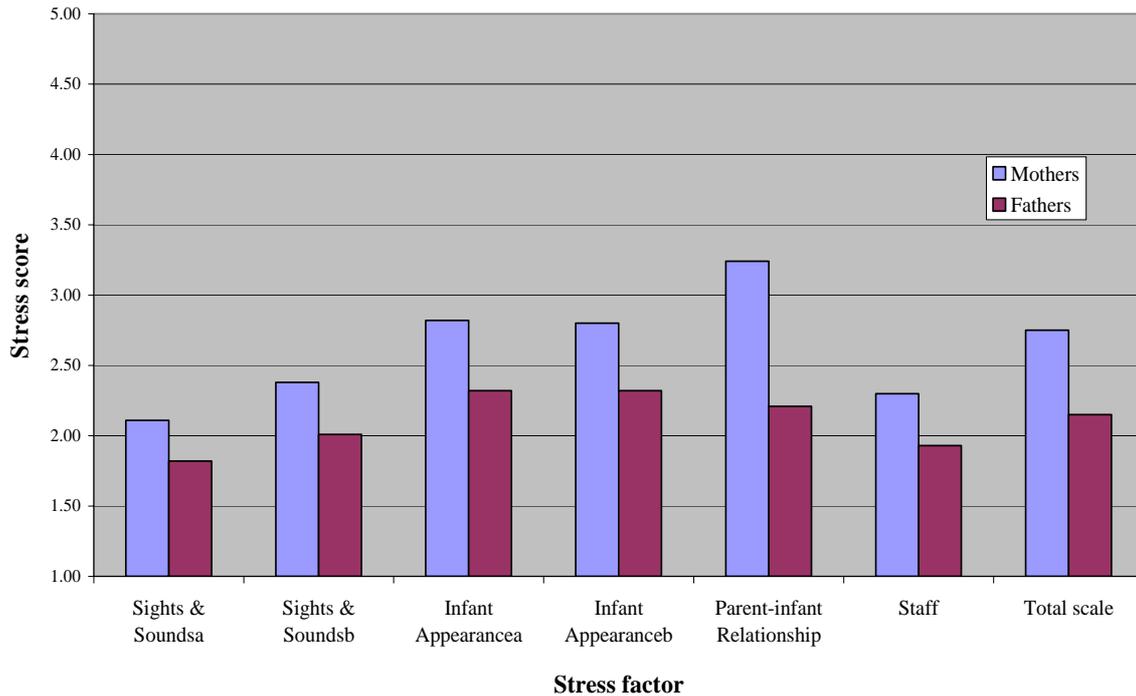


Figure 5. PSS:NICU Metric 1 mean stress scores for mothers and for fathers.

For *Metric 2* scores, to obtain mean scores that could be compared among the scales, an individual's total score for each subscale and the total scale were divided by the number of items in the particular scale (Miles & Funk, 1998). Individuals' scores were then added together according to each subscale and the total scale, and divided by the number of individuals. The possible range of these mean scores was 1-5.

The results in Table 7 for *Metric 2* show that overall the NICU environment was "a little stressful" for both mothers and fathers. Moreover, mothers had significantly higher stress scores for each subscale and the total scale compared to fathers ($p < .01$). Finally, mothers' greatest subscale

score occurred on the Parent-infant Relationship subscale ($M = 2.80$, $SD = 1.00$); whereas fathers' greatest subscale score occurred on the Sights and Sounds^b subscale ($M = 1.95$, $SD = 0.72$). These findings are further illustrated in Figure 6.

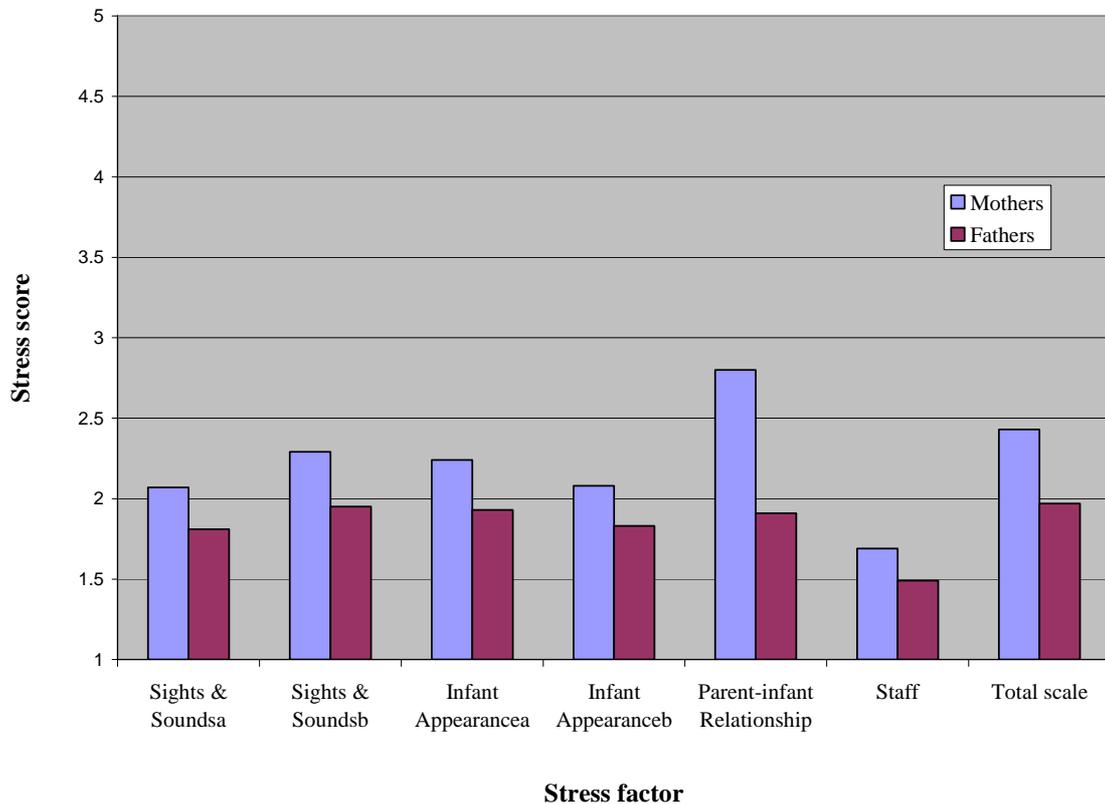


Figure 6. PSS:NICU Metric 2 mean stress scores for mothers and for fathers.

In summary, mothers experienced the NICU environment as moderately stressful or a little stressful, depending on the scoring method. Fathers experienced the NICU environment as a little stressful. Mothers experienced greater stress according to every aspect of the unit environment compared to fathers. The most stressful aspect of the unit for mothers was alterations to the parent-infant relationship. For fathers, on the other hand, the most stressful aspect was their infant's appearance and behaviour or the sights and sounds of the unit, depending on the scoring method.

3.5 Part B discussion

Interpretation of the Part B results focused on Metric 2 scores, rather than Metric 1 and Metric 2 scores, because interest was on the amount of overall stress experienced (Miles & Funk, 1998).

3.5.1 *Overall stress level experienced by mothers and by fathers from the NICU*

The means of mothers' and fathers' total stress scores indicated that overall, they experienced a low level of stress from having their infant cared for in the unit. This finding is consistent with the one other study that investigated mothers and fathers separately (Franck et al., 2005), and the majority of previous studies that investigated parents as a whole (Dudek-Shriber, 2004; Miles et al., 1991). There are a number of possible explanations for this finding. First, the Christchurch Women's NICU, as is common with many NICUs, implements a number of practices related to parents designed to promote a warm atmosphere (Carter et al., 2005). These practices include tours of the unit; information provision about their infant's condition, treatment, and the unit; no restriction on visiting hours; access to their infant's medical record; inclusion in medical decision making regarding their infant; early skin to skin contact with their infant; and having one staff member as a main contact person. It may be that parents thought, especially because of these practices, that their infant was being cared for in the best possible way. Another explanation is, as Holditch-Davis and Miles (2000) suggest, parents did not want to rate the unit negatively while their infant was reliant on care from the unit. This is a less plausible explanation as the confidentiality of their answers was assured.

3.5.2 *Gender differences in experience of stress from the NICU*

Mothers experienced the NICU as significantly more stressful compared to fathers, as shown by their respective means of the total scale. Furthermore, this finding was also true with regard to each aspect of the unit, as shown by mothers' and fathers' means of each subscale of the PSS:NICU. In general, these findings are consistent with the UK sample in Franck et al. (2005), and the Canadian sample in Pehudoff (1990). These findings are also consistent with the Canadian sample

in Shields-Poe & Pinelli (1997), but only with regard to the sights and sounds of the NICU, and alterations to the parent-infant relationship. In contrast, Franck et al. (2005) found no significant differences between mothers and fathers in their USA sample. These comparisons indicate that the New Zealand sample in the current study is most similar to a UK sample, supported by the fact that New Zealand was colonised by England.

The finding of a gender difference in the experience of stress from the NICU in the current study may reflect an actual difference, as supported by a similar, more robust finding in the area of major depression. The estimated point prevalence rate of major depression for women is estimated to be double that for men, with rates of 5-9% and 2-3% respectively (*American Psychiatric Association, 2000*). A number of possible explanations for the gender difference have been provided by Affleck et al. (1991). First, it may be due, in part, that fathers employ more effective coping strategies to decrease stress. In a NICU study by these authors, mothers utilised more escapist coping, which related to negative mood, whereas fathers utilised more minimisation and instrumental coping, which related to positive mood. Second, mothers' experience of greater stress may be due to more negative appraisals of their infant's difficulties. Mothers have been shown to perceive their premature infant as more difficult compared to fathers, at admission and discharge (Levy-Shiff et al., 1989). A similar result was found by Affleck et al. (1991), whereby more mothers than fathers were worried about their infant's future difficulties regarding health and development at discharge. Last, a mother's greater stress, early in her infant's NICU admission, may be due to mood disturbances from the birth of her baby through "baby blues," postpartum mood disorder, or obstetric procedures.

A final interpretation of the finding that mothers experienced more stress from the NICU compared to fathers is artifactual. The items in the PSS:NICU may be more representative of the experiences of mothers, as opposed to fathers. This is plausible, given that the sample the scale was originally evaluated with in Miles et al. (1993) included slightly more mothers ($n = 115$) than fathers ($n = 75$). In addition, it is unclear from their study, which developed the scale, whether mothers and fathers were equally represented when using information from sources including: interviews, a self-help group, a literature search, and a pilot group.

3.5.3 *The most stressful aspect of the NICU for mothers and for fathers*

For mothers, the aspect of the NICU experienced as the most stressful was alterations to the parent-infant relationship, providing support for Hypothesis 2. This finding is consistent with previous literature (Franck et al., 2005; Reid & Bramwell, 2003; Shields-Poe & Pinelli, 1997), and can be interpreted in the context of evolutionary and socialisation theories. Evolutionary theory posits that the biological makeup of females and males orientates them towards different activities, because they serve an adaptive function in human survival (Berk, 2006). Females are orientated towards rearing children; males are orientated towards competing for mates. Socialisation theory posits that different orientations of each gender come about, at least in part, by parents' teaching their children (Gilligan, 1988). Parents' focus on morality of care with regard to girls, whereas instrumental or task orientated activities are reinforced for boys. Therefore, it would follow that alterations to the parent-infant relationship in the unit is a great stressor for mothers.

Another possible reason that the greatest stressor in the NICU was alterations to the parent-infant relationship for mothers, as opposed to fathers, is an extension of the artefact argument. It may be that the PSS:NICU Parent-Infant Relationship subscale is more representative of mothers than fathers. In support of this idea is a study of parents of preterm infants, who were interviewed about the most important part of their parental role (Jeffcoate et al., 1979). The majority of mothers perceived this to be either caring (for example, giving love or understanding), or nurturing (for example, feeding, washing, changing nappies, or being there incase needed). In contrast, fathers' perceptions were more varied, including either: caring, responsibility (for example, as provider and protector), discipline (for example, setting and maintaining standards for the family), or teaching (for example, socialisation). Nurturing was not commonly mentioned by fathers. Two items from the Parent-Infant Relationship subscale could, therefore, be more representative of mothers as opposed to fathers: "Not feeding my baby myself" and "Not being able to care for my baby myself (for example, changing nappies, bathing)".

No hypothesis was made regarding the most stressful aspect of the unit for fathers, because of inconsistencies in the previous literature. Fathers experienced sights and sounds as the most stressful aspect of the unit, which was found in two previous studies (Perehudoff, 1990; Shields-Poe & Pinelli, 1997). It is suggested that the way the NICU was set up made the sights and sounds particularly salient to fathers. Fathers may not have been as prepared for this experience, compared

to mothers, due to work commitments and staff being only available at certain times to orientate them to the unit.

PART C

3.6 Part C results: the link between parents' experience of stress from the parent-infant relationship in the NICU and their past relationships

The purpose of Part C was to examine the extent to which mothers' and fathers' reported stress on the PSS:NICU Parent-Infant Relationship subscale was associated with two measures of relationship experiences. These two measures were: (1) parenting received as a child, and (2) adjustment to the couple relationship. Metric 2 scores of the Parent-Infant Relationship subscale were used in Part C, because the focus was the amount of overall stress experienced (Miles & Funk, 1998). The finding that mothers experienced the parent-infant relationship as a key stressor in the NICU further justified the use of this subscale in Part C, at least regarding mothers. Parenting received in childhood was measured using the Parental Bonding Instrument (PBI). Adjustment to the couple relationship was measured using the Dyadic Adjustment Scale (DAS).

3.6.1 PBI: comparison of means across mothers and fathers matched as couples

Aim 3 was to examine the extent to which mothers' and fathers' reported stress on the PSS:NICU Parent-Infant Relationship subscale was associated with parenting they received as a child. To provide a context for these analyses, the PBI was used to measure respondents' retrospective experiences of parenting they received as children. Table 8 shows means and standard deviations calculated according to the PBI subscales, separately for mothers and for fathers. Only parents of the NICU infants whose partner participated in this study were included in these analyses. This procedure was followed so that direct comparisons between mothers' and fathers' mean scores could be made within the couple dyad, using dependent samples *t*-tests. Findings showed that with regard to the Maternal Care subscale, fathers' scores were significantly higher than mothers' scores, ($p = .015$). There were no significant differences between mothers' and fathers' mean scores on the other PBI subscales: Paternal Care, Maternal Overprotection, and Paternal Overprotection.

Table 8.

Comparison of PBI Subscale Means across Mothers and Fathers Matched as Couples

PBI subscale	<i>n</i>	Mothers	Fathers	<i>t</i>	<i>p</i>
		Mean (<i>SD</i>)	Mean (<i>SD</i>)		
Care:					
Maternal	170	26.44 (9.35)	28.50 (6.43)	-2.46	.015
Paternal	151	24.15 (9.10)	23.93 (7.57)	0.24	.810
Overprotection:					
Maternal	170	12.04 (8.75)	11.90 (6.72)	0.16	.871
Paternal	151	11.26 (7.90)	10.01 (5.90)	1.64	.104

3.6.2 Association between the PSS:NICU Parent-Infant Relationship subscale and the PBI

The extent to which parents' reported stress on the PSS:NICU Parent-Infant Relationship subscale was associated with parents' relationships with their own parents in childhood was examined (Aim 3). Pearson correlations were calculated between the Parent-Infant Relationship subscale Metric 2 total, as calculated in Part A, and the PBI subscale totals. These correlations, as shown in Table 9, were calculated separately for mothers and for fathers.

Table 9.

Association between the PSS:NICU Parent-Infant Relationship subscale and each PBI Subscale for Mothers and for Fathers

PBI subscale	PSS:NICU Parent-Infant Relationship subscale (Metric 2)		
	<i>n</i>	Correlation coefficient (<i>r</i>)	<i>p</i>
Mothers			
Care:			
Maternal	179	-0.21	.005
Paternal	169	-0.00	.956
Overprotection:			
Maternal	179	0.01	.903
Paternal	169	0.10	.188
Fathers			
Care:			
Maternal	176	-0.08	.273
Paternal	165	0.04	.574
Overprotection:			
Maternal	176	0.13	.092
Paternal	165	0.05	.532

Findings showed a low, negative correlation between the PSS:NICU Parent-Infant Relationship subscale and the PBI Maternal Care subscale for mothers, which was statistically significant, $r(179) = -0.21$, $p = .005$. The rest of the correlation coefficients for mothers between the PSS:NICU Parent-Infant Relationship subscale and each of the PBI subscales (Paternal Care, Maternal Overprotection, and Paternal Overprotection) were not significant. The correlation coefficients for fathers between the PSS:NICU Parent-Infant Relationship subscale and each of the PBI subscales (Maternal Care, Paternal Care, Maternal Overprotection, and Paternal Overprotection) were not significant.

3.6.3 Association between parent-infant relationship stress according to categories and the PBI subscales

The extent to which parents' reported stress on the Parent-Infant Relationship subscale of the PSS:NICU was linked with parenting they received as a child is further examined in this section. Table 10 shows associations between parent-infant relationship stress according to categories and mothers' perceptions of parenting they received during childhood. Table 11 shows the same analyses for fathers. The Parent-Infant Relationship subscale Metric 2 mean scores, as calculated in Part B, were categorised into three stress groups: low, moderate or high. These three groups were formed based on corresponding PSS:NICU ratings. Ratings of 1=not at all stressful and 2=a little stressful were categorised as "low stress"; ratings of 3=moderately stressful were categorised as "moderate stress"; ratings of 4=very stressful and 5=extremely stressful were categorised as "high stress". This procedure was carried out separately for mothers' and fathers' scores. Of the 182 mothers, the number included in each stress group was: 75 in the low group, 63 in the moderate group, and 44 in the high group. Because fathers had significantly lower Parent-Infant Relationship mean stress scores compared to mothers, as shown in Part B, the numbers of fathers in the low, moderate and high groups were less evenly distributed across the groups. Of the 183 fathers, the number included in each stress group was: 148 in the low group, 31 in the moderate group, and four in the high group. Any association between the stress groups and each PBI subscale was examined using a one-way ANOVA, and if a significant association was found a test for linearity was conducted. Differences between the stress groups were examined using a Games-Howell Post Hoc Comparison test. This test was chosen, as opposed to other Post Hoc Comparison tests, because of the unequal cell numbers.

Table 10.

Analyses of Variance between Categories of Parent-Infant Relationship Stress according to each PBI Subscale for Mothers

PBI subscale <i>M(SD)</i>	PSS:NICU Parent-Infant Relationship subscale (Metric 2)						<i>F</i>	df	<i>p</i>
	<i>n</i>	Low	<i>n</i>	Moderate	<i>n</i>	High			
Care:									
Maternal	74	28.70 (7.65)	63	25.94 (8.63)	42	23.10 (11.53)	5.31	2	.006
Paternal	70	24.83 (8.60)	61	23.66 (8.98)	38	25.21 (10.25)	0.42	2	.657
Overprotection:									
Maternal	74	11.45 (7.33)	63	13.25 (9.89)	42	11.50 (9.02)	0.86	2	.424
Paternal	70	10.46 (6.96)	61	11.70 (8.64)	38	12.21 (8.44)	0.73	2	.486

Table 11.

Analyses of Variance between Categories of Parent-Infant Relationship Stress according to each PBI Subscale for Fathers

PBI subscale <i>M(SD)</i>	PSS:NICU Parent-Infant Relationship subscale (Metric 2)						<i>F</i>	df	<i>p</i>
	<i>n</i>	Low	<i>n</i>	Moderate	<i>n</i>	High			
Care:									
Maternal	143	28.87 (6.27)	30	26.83 (6.96)	3	31.00 (6.25)	1.48	2	.230
Paternal	133	23.71 (7.35)	29	23.10 (8.30)	3	35.00 (1.00)	3.50	2	.033
Overprotection:									
Maternal	143	11.46 (6.39)	30	14.80 (7.51)	3	8.33 (2.08)	3.68	2	.027
Paternal	133	10.27 (6.20)	29	10.66 (5.82)	3	6.33 (1.16)	0.68	2	.506

The results of the ANOVAs for *mothers* in Table 10 reveal a significant association between mother Parent-Infant Relationship stress level and PBI Maternal Care subscale score ($p = .006$). Specifically, women with higher parent-infant relationship stress scores also tended to report higher care from their mothers. In addition, for the Maternal Care subscale, a test of linearity demonstrated a significant linear relationship between the stress levels, $F(1)=10.61$, $p=.001$. A Games-Howell

Post Hoc Comparison test for the Maternal Care subscale revealed a significant difference between the low and high stress groups ($p = .018$), no significant difference between the low and moderate stress groups, ($p = .124$), and no significant difference between the moderate and high stress groups ($p = .366$). There were no significant differences between the stress groups for the other PBI subscales: Paternal Care, Maternal Overprotection, and Paternal Overprotection.

The results of the ANOVAs for *fathers* in Table 11 reveal a significant association between the Parent-Infant Relationship stress groups and the PBI Paternal Care subscale ($p = .033$). In addition, there was no significant linear relationship between the groups, $F(1)=1.16$, $p = .284$. A Games-Howell Post Hoc Comparison test for the Paternal Care subscale revealed a significant difference between the low and high stress groups ($p = .000$), a significant difference between the moderate and high stress groups ($p = .000$), and no significant difference between the low and moderate stress groups ($p = .929$). There was also a significant association between the stress groups and the PBI Maternal Overprotection subscale ($p = .027$); in addition, this was not a significant linear relationship, $F(1)=2.65$, $p=.106$. A Games-Howell Post Hoc Comparison test for the Maternal Overprotection subscale revealed a significant difference between the moderate and high stress groups ($p = .014$), no significant difference between the low and moderate stress groups ($p = .073$), and no significant difference between the low and high stress groups ($p = .192$). There were no significant associations for fathers between the stress groups and the other PBI subscales: Maternal Care and Paternal Overprotection.

3.6.4 DAS: comparison of means across mothers and fathers matched as couples

Aim 4 was to examine the extent to which mothers' and fathers' reported stress on the PSS:NICU Parent-Infant Relationship subscale was associated with adjustment to their couple relationship. To provide a context for these analyses, the DAS was used to measure respondents' experiences of their couple relationships. Table 12 shows the means and standard deviations calculated according to the DAS subscales and total scale, separately for mothers and for fathers. Only parents whose partner participated in this thesis were included in these analyses. This procedure was followed so that direct comparisons between mothers' and fathers' mean scores could be made within the couple dyad, using dependent samples t -tests. Low scores are indicative of poor adjustment, and high scores are indicative of good adjustment (Spanier, 1976).

Table 12.

Comparison of DAS Subscale Means Across Mothers and Fathers Matched as Couples

Dyadic Adjustment Scale	<i>n</i>	Mothers	Fathers	<i>t</i>	<i>p</i>
		Mean (<i>SD</i>)	Mean (<i>SD</i>)		
Dyadic Satisfaction	176	42.32 (4.73)	41.74 (5.23)	1.72	.087
Dyadic Cohesion	175	18.13 (3.68)	17.66 (3.59)	1.85	.066
Dyadic Consensus	174	53.50 (6.63)	52.83 (7.09)	1.39	.168
Affectional Expression	168	10.03 (1.93)	9.57 (2.11)	3.19	.002
Total scale	166	123.91 (13.57)	121.70 (14.64)	2.41	.017

Findings in Table 12 show that with regard to the Affectional Expression subscale, mothers were significantly more adjusted than fathers ($p = .002$). According to the DAS total scale, mothers were also significantly more adjusted than fathers ($p = .017$). There were no significant differences between mothers' and fathers' mean scores on the other DAS subscales: Dyadic Satisfaction, Dyadic Cohesion, and Dyadic Consensus.

3.6.5 Association between the PSS:NICU Parent-Infant Relationship subscale and the DAS

The extent to which parents' reported stress on the PSS:NICU Parent-Infant Relationship subscale was associated with parents' perceptions of their couple relationships was examined (Aim 4). Pearson correlations were calculated between the Parent-Infant Relationship subscale Metric 2 total, as calculated in Part A, and each DAS subscale or the DAS total. These calculations were carried out separately for mothers and for fathers. Findings of these analyses are presented in Table 13, and show that each coefficient is not statistically significant.

Table 13.

Association between the PSS:NICU Parent-Infant Relationship subscale and the DAS for Mothers and for Fathers

Dyadic Adjustment subscale	PSS:NICU Parent-Infant Relationship subscale		
	<i>n</i>	Correlation coefficient (<i>r</i>)	<i>p</i>
		Mothers	
Dyadic Satisfaction	181	0.07	.355
Dyadic Cohesion	181	0.00	.961
Dyadic Consensus	179	-0.06	.462
Affectional Expression	177	-0.04	.628
Total scale	176	-0.01	.931
		Fathers	
Dyadic Satisfaction	180	0.00	.979
Dyadic Cohesion	179	0.00	.973
Dyadic Consensus	180	-0.07	.347
Affectional Expression	175	0.01	.913
Total scale	174	-0.04	.612

3.6.6 Association between parent-infant relationship stress according to categories and the DAS

The extent to which parents' reported stress on the PSS:NICU Parent-Infant Relationship subscale was linked with the couple relationship is further examined in this section. Table 14 describes the association between categories of parent-infant relationship stress and mothers' perceptions of their couple relationships. Table 15 shows the same analyses for fathers. The Parent-Infant Relationship subscale Metric 2 mean scores were categorised into low, moderate or high stress, using the same procedure as the analogous PBI analyses. No significant associations were found between stress levels and the DAS subscales or total scale using one-way ANOVAs.

Table 14.

Analyses of Variance between Categories of Parent-Infant Relationship Stress according to the DAS for Mothers

DAS subscale	PSS:NICU Parent-Infant Relationship subscale (Metric 2)						<i>F</i>	df	<i>p</i>
	<i>n</i>	Low	<i>n</i>	Moderate	<i>n</i>	High			
Mean (<i>SD</i>)									
DS	75	41.49 (5.87)	62	42.61 (3.60)	44	42.91 (4.19)	1.52	2	.221
DCoh	75	17.99 (4.16)	62	18.02 (3.13)	44	18.34 (3.82)	0.14	2	.871
DCon	74	53.58 (7.27)	61	52.49 (6.01)	44	53.93 (6.85)	0.69	2	.502
AE	73	10.00 (1.90)	60	9.90 (1.84)	44	10.05 (2.23)	0.08	2	.925
Total scale	73	123.07 (16.31)	59	122.66 (10.79)	44	125.23 (13.27)	0.48	2	.619

Note: DS = Dyadic Satisfaction, DCoh =Dyadic Cohesion, DCon = Dyadic Consensus, AE = Affectional Expression

Table 15.

Analyses of Variance between Categories of Parent Infant Relationship Stress according to the DAS for Fathers

DAS subscale	PSS:NICU Parent-Infant Relationship subscale (Metric 2)						<i>F</i>	df	<i>p</i>
	<i>n</i>	Low	<i>n</i>	Moderate	<i>n</i>	High			
Mean (<i>SD</i>)									
DS	145	41.81 (5.20)	31	41.52 (5.60)	4	42.00 (3.37)	0.04	2	.957
DCoh	144	17.70 (3.48)	31	17.52 (3.94)	4	16.25 (4.50)	0.34	2	.712
DCon	145	52.92 (7.00)	31	52.13 (7.36)	4	54.75 (6.29)	0.32	2	.731
AE	140	9.60 (2.13)	31	9.68 (2.07)	4	10.25 (1.26)	0.20	2	.823
Total scale	139	121.99 (14.33)	31	120.84 (15.96)	4	123.25 (4.99)	0.10	2	.905

Note: DS = Dyadic Satisfaction, DCoh =Dyadic Cohesion, DCon = Dyadic Consensus, AE = Affectional Expression

3.7 Part C discussion

3.7.1 *PBI: comparison of means across mothers and fathers matched as couples*

Mothers' mean scores on the PBI indicated that they perceived their parents demonstrated a high degree of care, and a low degree of overprotection, towards them in their childhood. Similar results, to these results for mothers, were found for fathers. The scores were generally comparable to two previous Australian studies: the original normative study (Parker et al., 1979), and MacKinnon et al. (1989).

In the current study, with regard to the Maternal Care subscale, fathers' scores were significantly higher than mothers' scores. There were no significant differences between mothers' and fathers' scores on the other PBI subscales: Paternal Care, Maternal Overprotection, and Paternal Overprotection. These findings are, overall, consistent with previous general population studies cited in a review by Parker (1990), which found no effect of the test taker's sex. Possible factors contributing to the difference in findings are differences in study samples, including: culture (Parker, 1990); cohort (MacKinnon et al., 1989); and demographics such as marital status, or age (MacKinnon et al., 1989).

3.7.2 *The link between the PSS:NICU Parent-Infant Relationship subscale and the PBI*

The findings from the analyses of the PSS:NICU Parent-Infant Relationship subscale and the PBI partially supported Hypothesis 3: that the level of stress reported by parents from alterations to the parent-infant relationship in the unit would be negatively correlated with the level of care they received as a child from their parents. This was demonstrated by a weak, but significant negative correlation for mothers between the Parent-Infant Relationship subscale and the PBI Maternal Care subscale. The findings that did not support Hypothesis 3 were first, for mothers, no significant correlation between the Parent-Infant Relationship subscale and the PBI Paternal Care subscale. Second, for fathers, there were no significant correlations between the Parent-Infant Relationship subscale and the PBI Care subscales. Last, regarding the PBI Overprotection subscales, there were

no significant correlations between these subscales and the Parent-Infant Relationship subscale, for mothers or for fathers.

For *mothers*, the factors of stress from the infant relationship and parenting received as a child were further examined using *ANOVA* analyses. The findings were consistent with those from the corresponding correlation analyses. There was a significant difference for Maternal Care between the low and high parent-infant relationship stress groups, and a test of linearity demonstrated this was a linear relationship. Moreover, a low level of stress from the parent-infant relationship in the unit was associated with a high level of maternal care in childhood. Conversely, a high level of stress from alterations to the parent-infant relationship in the NICU was associated with a low level of maternal care in childhood. There was not a significant difference for Maternal Care between the moderate stress group and the low or high stress groups. Lastly, for mothers, there were no significant associations between the stress groups and the other PBI subscales: Paternal Care, Maternal Overprotection, and Paternal Overprotection.

For *fathers*, findings of similar *ANOVA* analyses to those conducted for mothers were examined. Significant differences were found between the parent-infant relationship stress groups for the Paternal Care and the Maternal Overprotection subscales, which were connected to the high stress group. These findings contrasted those found in the corresponding correlation analyses, and were discounted due to the small number of fathers ($n = 4$) in the high stress group reducing statistical power (Meltzoff, 1998). There were no significant associations between the stress groups and the other PBI subscales: Maternal Care and Paternal Overprotection, which was consistent with the corresponding correlation analyses.

The finding of a link for mothers between parent-infant relationship stress and maternal care is consistent with the majority of broad research in this area (Assel et al., 2000; Mikulincer & Florian, 1998; Parker et al., 1990). This finding provides support for continuity theory (Belsky, 1984; Sroufe, 1979), and the Parental NICU Stress model (Wereszczak et al., 1997). Based on theory the independent variable was maternal care, and the dependent variable was parent-infant relationship stress. However, the direction of cause and effect between the variables could not be determined, because of the correlational nature of the analyses.

Overall, the results for mothers and fathers revealed a lack of strong links between the Parent-Infant Relationship subscale and the PBI subscales. No significant links to the Overprotection subscale parallel past research (Assel et al. 2000; Parker et al., 1979), which suggested this factor is the weaker of the two factors: care and overprotection. The lack of strong significant findings can be interpreted in the context of contemporary attachment theory. An individual's internal working model, developed in childhood, is thought to be modifiable in later life through important relationships (Bartholomew, 1993; 1994; Rholes & Simpson, 2004). Therefore, individuals' relationships with their parents in childhood may not be an important factor in later experience of stress from the parent-infant relationship in the NICU.

Another possible explanation for the lack of strong, significant results is the retrospective nature of the PBI. Given that about 15 years had lapsed between individuals' childhoods and administration of the scale, responses may have been subject to bias. One such bias is selective recall of remembered information, due to memory loss. Another bias is changes in attitudes due to events happening in the time that had lapsed (Parker et al., 1992; Parker et al., 1979; Mackinnon et al., 1989), including development of the relationships with their parents (Halverson, 1988), and becoming a parent themselves (Mackinnon et al., 1989). Support for this position has been provided by test-retest coefficients, reported to decrease from high levels at a one month period to moderate levels at a 10 year period (Mackinnon et al., 1989; Parker, 1990; Wilhelm & Parker, 1990). Ideally a prospective measure, as opposed to a retrospective measure, would have been used in the current study. The difficulties of employing this type of design, however, were unpractical: in terms of cost and time to track an individual from childhood to having an infant admitted to the NICU.

Finally, a procedural limitation, which may have contributed to the potency of results for the paternal version of the PBI, is the order of administration of the two versions of the scale. For all individuals in the study, the maternal version was administered before the paternal version. There may have been order effects, such as fatigue or boredom, due to similar questions across the two versions. Balancing the order of administration, by presenting a randomised half of the sample with the paternal version before the maternal version, would have controlled for any order effects.

3.7.3 *Dyadic Adjustment Scale: comparison of means across mothers and fathers matched as couples*

The means calculated from the total DAS scores, for both mothers and fathers, were over 100, indicating good dyadic adjustment (Spanier, 2001). The means were, in general, similar to those in previous studies with heterosexual couples cited in a review by Spanier (2001). In the present study, mothers were significantly more adjusted than fathers with regard to the Affectional Expression subscale, and the DAS total scale. These gender differences are consistent with a minority of previous research cited in a review by Spanier (2001). Belsky and Isbella (1985) found husband-wife differences for individuals who reported their parents were cold and rejecting in childhood. Based on mothers' and fathers' mean PBI scores in the current study, however, their parents were not cold and rejecting in childhood. Another explanation for the gender differences is different communication styles across genders about marital difficulties (Spanier, 2001). Lastly, the different demographic variables of age and level of education across genders may have contributed to the gender differences. This is unlikely, however, given that Carey, Spector, Lantinga & Krauss (1993) found DAS scores did not differ as a function of these variables.

There were no significant differences between mothers' and fathers' mean scores on the other DAS subscales: Dyadic Satisfaction, Dyadic Cohesion, and Dyadic Consensus. This finding is consistent with the majority of studies reporting no significant differences on the DAS between men and women of married couples or couples in therapy (Banmen & Vogel, 1985; Carey et al., 1993; White, Speisman, Jackson, Bartis & Costos, 1986).

3.7.4 *The link between the PSS:NICU Parent-Infant Relationship subscale and the DAS*

The findings in Part C failed to support Hypothesis 4: that the level of stress reported by parents from alterations to the parent-infant relationship in the NICU would be negatively correlated with their level of couple adjustment. There were no significant correlations for mothers or for fathers between the Parent-Infant Relationship subscale and the DAS. Likewise, further examination using categories of Parent-Infant Relationship stress and the DAS revealed no significant associations for mothers or for fathers. Findings regarding fathers in the high stress group were, however, discounted due to the small number of fathers ($n = 4$) in this group reducing

statistical power (Meltzoff, 1998). These findings are inconsistent with the Parental NICU Stress model (Wereszczak et al., 1997), continuity theory (Belsky, 1984; Sroufe, 1979), attachment theory (Bartholomew, 1993; Bowlby, 1979; Rholes & Simpson, 2004), and broad research on the topic (Doering et al., 2000; Feeney, 2004;). It could therefore be suggested that the Parental NICU Stress model, attachment theory, and continuity theory should be discounted in relation to this area of investigation. This would be premature, however, because of the exploratory nature of the analyses and the limitations with the present study.

One major limitation with the whole of Part C is that the independent variables were confounded by extraneous factors, which can lead to an under or over estimation of the actual association between the target variables. One independent variable, such as relationship with a parent or partner, is most likely insufficient to fully describe stress from the parent-infant relationship. A variety of types of extraneous factors are depicted in the Parental NICU Stress model (Wereszczak et al., 1997), including situational factors, personal resources, and environment support. More specifically, extraneous factors previously examined and related to high stress on the PSS:NICU are: low income, younger age, no previous NICU admission of an infant, high anxiety, dysfunctional personality traits, unwanted pregnancy, seeing the infant for the first time in the unit, seeing the infant one or more days after birth, severe infant illness, and low frequency of infant visitation (Carter, Mulder & Darlow., 2007; Dudek-Shriber, 2004; Franck et al., 2005; Reid & Bramwell, 2003; Shields-Poe & Pinelli, 1997).

Another possible reason for the lack of significant findings in Part C is that the theoretical constructs of interest were not adequately captured by the PBI and DAS. Measures developed specifically from attachment theory would have been more appropriate, because attachment theory links the independent and dependent variables. The selection of measures in the current study was, however, constrained due to the use of data previously collected as part of the PARENTS study.

GENERAL DISCUSSION

3.8 Strengths of the current study

General strengths of the current study, as well as strengths relative to previous studies that utilised the PSS:NICU, are provided in this section. The vast majority of limitations of previous

literature that utilised the PSS:NICU, as described in the Introduction chapter, were addressed in this study.

3.8.1 The representative nature of the sample

The sample in this study is argued, for several reasons, to be representative of mother-father couples whose infant was admitted to the unit in the target year. First, the vast majority of the infants whose parents were approached for recruitment were randomly selected (290 out of 296). The six infants that were not randomly selected, due to the number of admissions to the unit being lower than expected, is unlikely to have affected the representative nature of the sample. Second, high percentages of parents who were approached consented to participate (82% of mothers and 97% of fathers). Third, a large proportion of the population was sampled: 182 mothers and 183 fathers of infants in the unit out of the 578 infants admitted in the target year.

On the other hand, it is unlikely that the findings from this study would generalise to other national or international NICUs. This situation is because care practices are thought to vary between NICUs (Ens-Dokkum et al., 1992; Franck et al., 2005; Reid & Bramwell, 2003). Given that New Zealand is an international leader in survival rates of premature infants (Ministry of Health, 2005), it is also unlikely that this study's findings would generalise to NICUs in other parts of the world.

3.8.2 Large sample size

A large sample of mothers ($n = 182$) and fathers ($n = 183$) participated in this study. These numbers provided sufficient power to detect statistically significant associations and differences between groups (Meltzoff, 1998). The exception was in the Part C ANOVA analyses for fathers, where there was a small number of fathers in the high stress group ($n = 4$). This small number was due to fathers in general experiencing a low level of stress from the NICU.

3.8.3 Systematic data analyses

Another strength of the current study is its systematic data analyses. First, analyses clearly detailed a range of parents' and infants' characteristics. The description of infant characteristics, in terms of gestation and birth weight, was a particular strength because some previous PSS:NICU studies (Miles, 1989; Shields-Poe & Pinelli, 1997) had poorly defined these basic characteristics. Detailed descriptions of infants' and parents' characteristics aided consideration of: (1) the appropriateness of making comparisons with previous findings, (2) the influence of these characteristics, such as level of infant illness, on the target variables, and (3) the generalisability of the findings.

In Part A, providing a table with the frequency of responses to each item on the PSS:NICU is advantageous for ease of comparisons with other studies. Removal of items that were rarely experienced by participants provided a more concise scale for use with this sample. In Parts A and B, analyses were conducted with the *a priori* PSS:NICU subscales and the modified subscales derived from factor analysis. This procedure allowed an assessment to be made as to which version of the scale was more reliable and valid, and therefore more appropriate for future use in New Zealand. In addition, both Metric 1 and Metric 2 scores were employed. These procedures exercised in Parts A and B allow ease of comparisons between the current study's findings and other studies using the PSS:NICU. In Part C, correlations were used to examine the link between parents' stress from the parent-infant relationship in the unit and past relationships. Additional analyses included categorization of stress into three categories (low, moderate, and high), ANOVAs, tests for linearity, and *post hoc* comparison tests, which provided more detail about the links.

3.8.4 Reliable and valid measures

Support was provided in the current study for various types of validity and reliability of the measures. Further, the measures were well established and standardised previously in the literature; several of the measures had been previously used with New Zealand or Australian samples. These properties enabled more confidence to be held in the meaning and stability of the results in the current study, and ease of comparisons between the current study and other studies.

3.8.5 Representation of fathers and mother-father comparisons

Strengths of this study, compared to previous studies using the PSS:NICU, were the representation of fathers, and comparisons between mothers' and fathers' stress scores. Fathers were represented fairly, with a large balanced sample of mothers and fathers, and these two groups were considered separately in the majority of data analyses. In addition, a large number ($n = 179$) of mother-father couples were recruited, which enabled appropriate comparisons across genders using matched pair statistical analyses. The importance of representing the father in this type of research was detailed in the Introduction chapter, and included: (1) evidence that fathers experience stress from the unit (Franck et al., 2005; Pehudoff, 1990; Shields-Poe & Pinelli, 1997); and (2) theory and research demonstrating that fathers play an important role in the family, particularly with regards to the NICU (Affonso et al., 1992; Jeffcoate et al., 1979; Levy-Shiff et al., 1989).

3.8.6 Parents representative of the diverse range of infants admitted to NICUs

Another strength of the current study, in contrast to previous PSS:NICU studies (Dudek-Shriber, 2004; Miles et al., 1993; Miles, et al., 1991; Pehudoff, 1990; Reid & Bramwell, 2003; Seideman et al., 1997; Shields-Poe & Pinelli, 1997), is that the infants of parents sampled were representative of the diverse range admitted to NICUs. First, parents were recruited from the Christchurch Women's NICU, which caters for low, moderate and high dependency infants. Parents were not excluded by way of their infant's gestational age, birth weight, or type of medical condition, and these characteristics were described in detail. Reason for refusal to participate in the study was asked of parents, and the most common reason given was time constraint. Therefore, refusal of parents due to their infant having a low or extremely low birth weight was considered unlikely.

3.8.7 Distinct time frame of administration of the PSS:NICU

The present study administered the PSS:NICU within a distinct time frame, of 2-3 weeks after infant admission to the unit. In contrast, the majority of previous studies that utilised the scale

administered it at various points during infant admission (Dudek-Shriber, 2004; Franck et al., 2005; Miles, 1989), or around the time of infant discharge (Seideman, 1997; Shields-Poe & Pinelli, 1997). This variation in time point of administration within studies is a possible reason for inconsistencies in the findings of these previous studies. Support for this idea has been provided by Affonso et al. (1992), who found different frequencies and intensities of stressors at four different times during infants' NICU admissions. The different times, related to the infant, that these authors administered the scale were: (1) 96 hours after birth, (2) within 2-3 weeks of birth, (3) within 5-6 weeks of birth, and (4) a week before discharge. Therefore, the use of a distinct time frame of administration of the PSS:NICU is a strength of the current study, because it helps control for the potential confound of time point of administration of the scale.

3.9 Limitations of the current study

Various limitations of the current study have previously been discussed in relation to the interpretation of the results of Parts A, B and C. This section describes more general methodological limitations of the current study.

3.9.1 Descriptive design

Due to the descriptive nature of this study, the independent variables were not manipulated. In Part B, sources of stress experienced by parents from the unit were described. Part C examined the extent that stress from the parent-infant relationship in the unit was associated with past relationships. Consequently, inferences of cause or effect and mechanisms of action, such as attachment, could not be made. Only explanatory studies are able to make these types of inferences, but these studies should only be conducted once findings have been established in the descriptive literature. Hence, this study adopted a descriptive design because first, no prior research similar to the present study had been conducted in New Zealand or in the case of Part C, internationally. Second, inconsistencies existed among findings in the previous literature.

3.9.2 *Lack of contrast groups in the methodological design*

Another limitation of this study was the lack of contrast groups in its methodological design (Meltzoff, 1998). Inclusion of a group of parents from Christchurch Women's Hospital, whose newborn infant was not admitted to the NICU, would have enabled stress from having an infant cared for in the NICU to be distinguished from the stress of having a newborn infant. A difficulty, however, is finding a stress measure to use with control parents that is comparable to the highly specific PSS:NICU. Given that stress is thought to be a similar construct to anxiety or depression (Cox, 1978; Quick et al., 2000), a measure of these states would likely be comparable. Carter et al. (2005) conducted a study with a similar sample to this study and a control group, using the Edinburgh Postnatal Depression scale and the Hospital Anxiety and Depression scale. Higher levels of clinically relevant anxiety and depression were found in the NICU parents compared to the controls.

The present study used a cross-sectional design, as opposed to a longitudinal design, whereby the questionnaires were administered to parents during one time frame: within 2-3 weeks of their infant's NICU admission. Parents' stress levels during the first 2-3 weeks of their infant's admission could, therefore, not be distinguished from those prior to, at other times during, or after their infant's admission. Identifying parents prior to their infant's NICU admission would, however, require a large scale prospective study that would likely be impractical, due to the expense and time needed. Follow-up research is being conducted by the PARENTS study to identify whether psychological distress of parents of NICU infants continues over time. A disadvantage with measuring parents' stress at a time point long after their infant is discharged from the unit is that the PSS:NICU is no longer applicable. Findings from one follow-up of the PARENTS study indicated that psychiatric symptoms of parents who had an infant in the NICU decreased by 9 months, to levels similar to parents of healthy infants (Carter, Mulder, Darlow & Frampton, 2007). Furthermore, time point of measurement was a potential factor in the lack of significant associations found in Part C. If the questionnaires were administered at a different time during infant's admission, significant associations may have been found. In support of this idea is a NICU study by Affonso et al. (1992), of parental stressors including care giving and the partner relationship. These stressors were rated as high in frequency and intensity 5-6 weeks after infant birth or close to infant discharge, but were not rated as important stressors at earlier times during infant admission.

3.9.3 *Self-report questionnaire measures*

Although self-report questionnaires are a valuable type of measure in psychological research, sole reliance on them is a limitation because of the potential for subjective report bias. For example, social desirability refers to the tendency of individuals to present themselves in a positive light according to social norms or values (Colman, 2003). Research with the PBI and corroborative reports by siblings, twins and parents, however, has supported it as an accurate measure of parenting (Parker, 1990). Utilisation of various types of measures of the target variables in this study, such as parental interviews and observations, with involvement of family, friends, and NICU staff, would have provided a more comprehensive measure of the variables.

3.10 Summary and conclusions

In Part A, overall, satisfactory psychometric properties of the PSS:NICU was demonstrated when used with a large sample of parents whose infant was in the NICU at Christchurch Women's Hospital. Previous literature demonstrated reliability and validity of the scale in the United Kingdom, USA and Canada (Franck et al., 2005; Miles et al., 1993; Reid & Bramwell, 2003); the present study extends this finding to a New Zealand sample. Preliminary support for extension of the reliability and validity of the PSS:NICU to mothers and to fathers is also provided in this study. Although the modified subscales, based on the factor analysis, were used in Part B, findings from Part A suggest there is little value in modifying the subscales for future use in the Christchurch Women's NICU.

In Part B, the level and sources of stress experienced by parents from the NICU were described. First, it was shown that, overall, both mothers and fathers experienced a low level of stress from having their infant cared for in the unit, consistent with the majority of previous literature. Second, mothers experienced the unit as more stressful compared to fathers. This was true for the overall NICU experience, and each aspect of the unit: sights and sounds, infant appearance and behaviour, alterations to the parent-infant relationship, and staff communication. Due to the mixed findings of previous studies regarding gender differences in experience of stress from the NICU, the gender difference found in the present study needs replication. Third, the aspect

of the unit experienced as the most stressful by mothers was alterations to the parent-infant relationship, extending this finding to a New Zealand sample. Lastly, the most stressful aspect of the unit for fathers was sights and sounds of the unit and, given the inconsistencies in previous studies regarding this finding, replication is needed.

In Part C, the extent to which parents' stress from the parent-infant relationship in the unit was associated with parenting they received as a child, and their couple relationship, was explored. Lack of evidence was found for associations between these variables. The exception was for mothers: a weak but significant negative correlation was found between level of stress from the parent-infant relationship and level of maternal care received in childhood. Possible reasons for the lack of strong significant findings were provided, including: the retrospective nature of the PBI, potential confounding variables, and the theoretical constructs not being adequately captured by the PBI or DAS. Given the paucity of previous literature in this area and limitations with the present study, the findings from Part C are regarded as tentative.

3.11 Implications

The present study provides important information for health care professionals working with parents in the NICU at Christchurch Women's Hospital. This information can be used to prevent stress or facilitate adaptation and coping with regard to stress. Because satisfactory psychometric properties of the PSS:NICU was demonstrated in this unit, its future use in the unit for further research and clinical assessment purposes is supported. Overall, parents appeared to achieve a satisfactory level of adaptation to the unit during the early stage of their infant's admission. Therefore, it is unnecessary to provide a general intervention, further to what is already being practiced in the unit, with all parents. There are, however, some parents that do find the NICU environment more stressful, and they may benefit from increased clinical attention.

Justification was provided for specific clinical attention to be targeted to the following areas. Priority should be given towards preparing the mother for, and supporting the mother concerning, alterations to the normal relationship with her infant in the unit. The mother should be educated on her infant's condition, treatment options, and ethical issues, so she can be involved as much as possible in the decision making regarding her infant. Attention should be given to teaching the

mother specific NICU care skills and techniques for use with her infant. The mother should be allowed to stay with her infant throughout the NICU admission. This would require provision of beds beside infants in the unit, as at present mothers can only stay in the postnatal ward or nearby accommodation (Ministry of Health, 2005). Visitation by friends and family should be considered. All of these practices would work to promote mother-infant bonding. In addition, health care professionals should be aware of the potential risk factor for mothers of low maternal care in childhood. This factor could be identified in individual assessment, and addressed in treatment with psychotherapy or social support. Priority should also be given to making staff available to prepare, orientate, and support the father regarding the sights and sounds of the unit. Medical equipment should be made as least invasive as possible. A staff member should be available outside fathers' work hours to orientate them to the unit. These interventions correspond to family-centered and infant developmental care principles (Harrison, 1993; Westrup, in press). The aim of these principles is to shift the focus of care from traditional procedure based practices to processes and relationships, including increased involvement of parents.

Efforts to lower parental stress has considerable advantages for a parent, his or her family, and society as a whole, as outlined in Bronfenbrenner's Ecological Systems theory (Bronfenbrenner & Evans, 2000). On an individual level, physical health benefits include lower risk of heart attack, stroke, hypertension, and cancer (Gleitman, 1995; Schooler et al., 2000); moreover, mental health benefits include lower risk of anxiety and depression (Cox, 1978; Davidson & Neale, 2001). Lower parental stress may transfer to lower rates of divorce in parents of NICU infants (Leifer et al., 1972). Decreased parental stress can promote infant's cognitive, behavioural, and emotional development (Assel et al., 2002; Singer et al., 1999), particularly pertinent for infants admitted to the NICU who are disadvantaged compared to other infants. Lastly, the monetary benefits to society are huge, in terms of decreases in health care costs and increases in productivity.

3.12 Suggestions for future research

The findings from Part A indicate two directions for future research regarding the PSS:NICU. First, further exploration of the scale with a view to decrease the number of items in the scale and provide a more concise measure. This direction is justified because the initial factor analysis did not provide support for the *a priori* subscales, and four items from the Staff subscale

were rarely experienced by parents in this study and previous studies. Second, further investigation could determine whether the PSS:NICU fully represents the stress experience of fathers. Investigation could take the form of qualitative information from fathers such as interviews, consultation with self-help groups and pilot groups. Findings from this investigation may indicate the scale would benefit from revision based on a balanced sample of mothers and fathers.

Further research is needed into differences in regional and geographical NICU care practices, to determine their contribution to inconsistencies in the parental stress response literature, and the generalisability of the findings of this literature. Inconsistencies include whether gender differences exist in the level of stress experienced from particular aspects of the NICU, and the most stressful aspect of the unit for fathers. NICUs in different cultural contexts should be sampled and their care practices, such as those based on infant developmental care and family-centered care principles (Westrup, in press), assessed in relation to parental stress. Based on the assessment of these practices, development of the best universal care practices would undoubtedly be beneficial for infants and their families (Harrison, 1993).

Research with a longitudinal design would allow any patterns in mothers' and fathers' stress responses to be tracked over time. It could then be determined if parental stress during and after infant's NICU admission is for example, transient, wavering, or chronic. Time points or frames of measurement should be distinct and systematic, such as those used by Affonso et al. (1992) based on different events happening at the particular times. In addition, the PSS:NICU could be administered during infant admission and retrospectively, at a short time after infant discharge. This type of design would help to determine if parents tend to not rate the NICU negatively when their infant is reliant on care from the unit.

A point for consideration in future research similar to the current study is regarding measurement. Measures should be chosen that adequately capture the theoretical constructs of interest, in order to test theory. Because attachment theory linked the independent and dependent variables in this study, the Attachment Interviews (Bartholomew & Horowitz, 1991), appear to be a more applicable measure, compared to the PBI and the DAS. The Attachment Interviews include assessment of attachment styles in childhood and adult romantic relationships. A variety of types of measures, such as interviews, questionnaires, and observations, with corroborating sources, such as

family, friends, and NICU staff, should also be utilised to provide a more comprehensive measure of the target variables.

A large quantity of theoretical and empirical work is still required to achieve a comprehensive understanding of the target variables in this study, extraneous variables, and the mechanisms linking these variables. Extraneous variables have been described in the Parental NICU Stress model, including personal characteristics, situational factors, personal resources, and environment support (Wereszczak et al., 1997), and identified by research (Carter, Mulder & Darlow, 2007; Dudek-Shriber, 2004; Franck et al., 2005; Reid & Bramwell, 2003; Shields-Poe & Pinelli, 1997). The first step is to establish findings in the descriptive literature, and use complex statistical analyses to incorporate the wide range of variables. Only then can studies be designed to determine the mechanisms linking the variables.

Using the same rating scale, indicate how stressful in general, the experience of having your baby hospitalised in NICU has been for you

	NA	Not at all stressful	A little stressful	Moderate- ly stressful	Very stressful	Extremely stressful
12. How stressful has the experience of having your baby hospitalised been for you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for your help. Now, was there anything else that was stressful for you during the time that your baby has been in the neonatal intensive care unit? Please discuss below:

APPENDIX B

PBI

THIS SECTION LISTS VARIOUS ATTITUDES AND BEHAVIOURS OF PARENTS

Questions 1 to 25 apply specifically to your **MOTHER**; Questions 26 to 50 apply specifically to your **FATHER**.

IF THESE QUESTIONS ARE NOT APPLICABLE TO ONE OR BOTH OF YOUR PARENTS, OMIT THAT SECTION AND NOTE THE REASONS WHY.

As you remember your **MOTHER** in your first 16 years of life, would you place an **X** in the most appropriate space next to each question.

She...	Very like	Moderately like	Moderately unlike	Very unlike
1. Spoke to me with a warm and friendly voice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Did not help me as much as I needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Let me do those things I liked doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Seemed emotionally cold to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Appeared to understand my problems and worries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was affectionate to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Liked me to make my own decisions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Did not want me to grow up.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Tried to control everything I did.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Invaded my privacy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Enjoyed talking things over with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Frequently smiled at me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Tended to baby me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Did not seem to understand what I needed or wanted. ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Let me decide things for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

She...	Very like	Moderately like	Moderately unlike	Very unlike
16. Made me feel I wasn't wanted.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Could make me feel better when I was upset.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Did not talk with me very much.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Tried to make me dependent on her.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Felt I could not look after myself unless she was around.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Gave me as much freedom as I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Let me go out as often as I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Was over protective of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Did not praise me.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Let me dress in any way I pleased.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

As you remember your **FATHER** in your first 16 years of life, would you place an **X** in the most appropriate space next to each question.

He...	Very like	Moderately like	Moderately unlike	Very unlike
26. Spoke to me with a warm and friendly voice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Did not help me as much as I needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Let me do those things I liked doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Seemed emotionally cold to me.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Appeared to understand my problems and worries. .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Was affectionate to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Liked me to make my own decisions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

He...	Very like	Moderately like	Moderately unlike	Very unlike
33. Did not want me to grow up.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Tried to control everything I did.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Invaded my privacy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Enjoyed talking things over with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Frequently smiled at me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Tended to baby me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Did not seem to understand what I needed or wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Let me decide things for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Made me feel I wasn't wanted.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Could make me feel better when I was upset.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Did not talk with me very much.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Tried to make me dependent on him.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Felt I could not look after myself unless he was around.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Gave me as much freedom as I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Let me go out as often as I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Was over protective of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Did not praise me.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. Let me dress in any way I pleased.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	All the time	Most of the time	More often than not	Occasion- ally	Rarely	Never
16. How often do you discuss or have you considered divorce, separation, or terminating your relationship?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. How often do you or your mate leave the house after a fight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. In general, how often do you think that things between you and your partner are going well?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Do you confide in your mate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Do you ever regret that you married (or lived together)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. How often do you and your partner quarrel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. How often do you and your mate "get on each other's nerves"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. The boxes on the following line represent different degrees of happiness in your relationship. The middle box, "happy" represents the degree of happiness of most relationships. Please place an X in the box which best describes the degree of happiness, all things considered, of your relationship.

Extremely unhappy	Fairly unhappy	A little unhappy	Happy	Very happy	Extremely happy	Perfect
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. Which of the following statements best describes how you feel about the future of your relationship?
Please write the number of the response that describes your situation best in the box.

1. I want desperately for my relationship to succeed, and would go to almost any length to see that it does.
2. I want very much for my relationship to succeed, and will do all I can to see that it does.
3. I want very much for my relationship to succeed, and will do my fair share to see that it does.
4. It would be nice if my relationship succeeded, but I can't do much more than I am doing now to help it succeed.
5. It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going.
6. My relationship can never succeed, and there is no more that I can do to keep the relationship going.

	Every day	Almost every day	Occasionally	Rarely	Never
25. Do you kiss your mate?	<input type="checkbox"/>				

	All of them	Most of them	Some of them	Very few of them	None of them
26. Do you and your mate engage in outside interests together?	<input type="checkbox"/>				

How often would you say the following events occur between you and your mate?

	Never	Less than once a month	One or twice a month	Once or twice a week	Once a day	More often
27. Have a stimulating exchange of ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Laugh together	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Calmly discuss something	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Work together on a project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

These are some things about which couples sometimes agree and sometimes disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks. (Check yes or no).

	Yes	No
31. Being too tired for sex	<input type="checkbox"/>	<input type="checkbox"/>
32. Not showing love	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX D

Table D1.

Frequencies of Responses by Mothers and by Fathers^a to Individual Items of the PSS:NICU

Item(s) according to subscale ^b	N/A M (F)	1 M (F)	2 M (F)	3 M (F)	4 M (F)	5 M (F)
<i>1. Sights and Sounds</i>						
(a) Presence of monitors & equipment	5 (4)	41 (80)	75 (66)	41 (26)	17 (5)	3 (2)
(b) Presence of constant noises	5 (4)	40 (69)	76 (71)	42 (29)	13 (8)	6 (2)
(c) Sudden noises	13 (6)	15 (26)	49 (73)	66 (49)	27 (23)	12 (6)
(d) Other sick babies	10 (3)	65 (95)	66 (57)	30 (22)	8 (4)	3 (2)
(e) Large number of people working in the unit	6 (5)	137(145)	20 (22)	13 (8)	6 (2)	0 (1)
<i>2. Infant Appearance</i>						
(a) Tubes and equipment	9 (9)	12 (34)	56 (75)	53 (41)	38 (19)	14 (5)
(b) Bruises, cuts or incisions	48 (63)	14 (17)	35 (38)	37 (38)	27 (17)	21 (10)
(c) Unusual colour	46 (51)	34 (36)	47 (54)	35 (23)	15 (14)	5 (5)
(d) Unusual breathing	66 (47)	7 (16)	24 (47)	40 (31)	24 (30)	21 (12)
(e) Suddenly changes colour	150(141)	3 (4)	4 (9)	3 (8)	13 (13)	9 (8)
(f) Stops breathing	151(148)	1 (0)	2 (3)	2 (7)	6 (15)	20 (10)
(g) Small size	77 (65)	23 (50)	29 (32)	32 (22)	17 (9)	4 (5)
(h) Wrinkled appearance	101 (77)	50 (79)	18 (19)	11 (4)	1 (2)	1 (2)
(i) Having a machine breathe for my baby	136(125)	8 (13)	13 (19)	11 (17)	7 (7)	7 (2)
(j) Needles and tubes	31 (34)	8 (19)	38 (62)	36 (30)	42 (19)	27 (19)
(k) Intravenous line or tube	26 (26)	36 (65)	53 (48)	33 (26)	22 (12)	12 (6)
(l) Baby seemed to be in pain	64 (83)	1 (8)	11 (23)	24 (30)	37 (25)	45 (14)
(m) Crying for long periods	127(133)	4 (2)	12 (14)	12 (22)	13 (7)	14 (5)
(n) Baby looked afraid	110(134)	6 (3)	16 (21)	19 (9)	13 (9)	18 (7)
(o) Baby looked sad	96(123)	6 (8)	26 (26)	14 (11)	19 (13)	21 (2)
(p) Limp and weak	115(100)	9 (21)	18 (28)	13 (18)	16 (12)	11 (4)
(q) Jerky movements	66 (76)	26 (45)	49 (33)	22 (13)	10 (11)	9 (5)

(r) Baby not being able to cry like other babies	123(122)	16 (32)	20 (16)	10 (7)	8 (5)	5 (1)
(s) Clapping on baby's chest for drainage	177(175)	4 (4)	0 (2)	0 (1)	0 (1)	1 (0)
<i>3. Parent-infant Relationship</i>						
(a) Separated from baby	7 (18)	4 (26)	13 (48)	39 (51)	54 (27)	65 (13)
(b) Not feeding baby myself	21 (97)	12 (46)	32 (17)	41 (15)	43 (5)	33 (3)
(c) Not being able to care for baby myself	45 (52)	15 (63)	39 (38)	35 (19)	24 (8)	24 (3)
(d) Not being able to hold baby when I want	43 (38)	5 (31)	29 (54)	29 (31)	33 (21)	43 (8)
(e) Sometimes forgetting what baby looks like	118(131)	8 (22)	17 (12)	13 (11)	12 (2)	14 (5)
(f) Not being able to share baby with family	42 (52)	17 (46)	36 (48)	43 (24)	26 (12)	18 (1)
(g) Feeling unable to protect baby from pain	30 (39)	6 (20)	22 (48)	31 (29)	42 (26)	51 (21)
(h) Afraid of touching baby	69 (60)	25 (53)	34 (37)	17 (21)	20 (11)	17 (1)
(i) Feeling staff are closer to baby than I am	75 (81)	39 (62)	23 (26)	18 (9)	12 (2)	15 (3)
(j) Helpless about how to help my baby	21 (33)	10 (34)	32 (53)	46 (27)	26 (26)	47 (10)
<i>4. Staff</i>						
(a) Explaining things too fast	95 (94)	35 (49)	29 (27)	12 (11)	8 (1)	3 (1)
(b) Using words I don't understand	101 (89)	31 (48)	27 (30)	12 (10)	6 (3)	5 (3)
(c) Telling me conflicting things about baby's condition	89 (89)	12 (25)	29 (25)	19 (19)	13 (17)	20 (8)
(d) Not telling me enough about tests and treatments done to baby	105 (89)	18 (41)	21 (19)	14 (19)	10 (8)	14 (7)
(e) Not talking to me enough	112(103)	15 (36)	21 (21)	16 (10)	7 (7)	11 (6)
(f) Too many different people (doctors, nurses, others) talking to me	69 (82)	44 (58)	28 (20)	17 (12)	9 (7)	15 (4)
(g) Difficulty in getting information or help	125(122)	30 (37)	9 (14)	10 (6)	3 (3)	5 (1)
(h) Not sure I will be called about changes in baby's condition	102(106)	22 (34)	23 (22)	13 (12)	11 (7)	11 (2)

(i) Staff looking worried about baby	127(119)	16 (27)	14 (14)	9 (10)	8 (10)	8 (3)
(j) Staff acting as if they did not want parents around	128(134)	23 (24)	7 (13)	5 (6)	11 (3)	8 (3)
(k) Staff acting as if they did not understand my baby's behaviour or special needs	138(141)	18 (23)	12 (9)	7 (7)	4 (3)	3 (0)
5. <i>General stress</i>						
(a) How stressful has the experience of having baby hospitalised been for you?	2 (5)	6 (20)	36 (62)	56 (47)	45 (35)	37 (14)

Note:

M=mothers ($n = 182$), F=fathers ($n = 183$).

N/A = not applicable, 1=not at all stressful, 2=a little stressful, 3=moderately stressful, 4=very stressful, 5=extremely stressful.

^aFathers' responses are in parentheses.

^bPSS:NICU item statements have been shortened in the table.

^cBold font indicates items that were scored "not applicable" by more than two thirds of mothers or fathers or both.

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