Development of Children Born Preterm: Are Dysfunctional Parenting Styles Associated with Poor Behavioural Outcomes?

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Abstract

Children born preterm are more likely to have poor behavioural functioning, such as attention and conduct problems, than children born full-term. Though this is well documented in the academic literature, factors associated with such outcomes are still being examined. Dysfunctional parenting styles are recognised as being associated with adverse behaviours in full-term children, but when this relationship has been examined in a preterm population, the findings have been inconsistent. Only few studies have also investigated this association in older preterm children, and in children who are at high risk of poor developmental outcomes. Thus, the association between styles of parenting and child behavioural difficulties in a preterm population remains unclear. Accordingly, the current study aimed to investigate the behavioural functioning of 440 5-year-olds born <29 weeks gestation, with and without parents who had dysfunctional parenting styles. The cohort was assessed using the Strengths and Difficulties Questionnaire and the Parenting Scale, as reported by the parents. After controlling for potential confounding socioeconomic factors, results revealed that preterm children with parents who had dysfunctional parenting styles displayed more symptoms of conduct difficulties. Dysfunctional parenting styles were also associated with almost two times the odds of preterm children presenting with conduct problems that were indicative of clinical significance. The results of the present study highlight the importance of child and parental guidance to support conduct developmental outcomes in children born preterm. They further highlight the potential to alleviate clinically concerning conduct problems from continuing into later childhood and adolescence.

Keywords: prematurity, childhood behaviour, behavioural problems, parenting styles

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

September 2020

Contribution Statement

In writing this thesis, I collaborated with my supervisors to gain access to data from a pre-conducted study. This study was a follow-up of the N-3 (omega-3) Fatty Acids for Improvement in Respiratory Outcomes (N3RO) study, which examined the effects of docosahexaenoic acid on physiological bronchopulmonary dysplasia outcomes in infants born preterm. With knowledge of the data that was collected as a part of the follow-up, I formulated my own research question and thus the basis of the current investigation. I also collected data in addition to what had already been collected. This research was funded by the National Health and Medical Research Council (NHMRC) Australia, and the Women's and Children's Hospital Foundation.

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CHAPTER 1

Introduction

Children born preterm are at heightened risk of a range of childhood developmental difficulties. They are more prone to serious medical complications in the neonatal period (Behrman & Butler, 2007), and also chronic neurosensory deficits and major developmental delay (Wilson-Costello & Payne, 2016). However, even those without severe disability are at risk of poor development, particularly in cognitive, motor, and behavioural domains. There is also an increased likelihood for preterm children to experience poor behavioural and emotional functioning (Aarnoudse-Moens et al., 2009; Arpi & Ferrari, 2013). Despite the known association between prematurity and adverse psychological outcomes, little research has concerned the influence of parenting styles on these outcomes. Parenting styles play a large role in the behavioural development of full-term children, however there has been limited consideration of this association amongst a preterm population, particularly at an age where behaviours are stable and established. Of the studies that have been published, the findings are also contradictory. Thus, there remains a shortfall in the literature regarding whether certain parenting styles are associated with poor behavioural outcomes in preterm-born children. Moreover, the research involving relationships between parenting styles and outcomes of children delivered at very early gestational ages, who are most at risk of less favourable developmental outcomes (Behrman & Butler, 2007), is particularly scarce. Therefore, the current study aims to address these research gaps.

1.1 Preterm Birth

Preterm birth (henceforth PTB) refers to the delivery of an infant before 37 completed weeks of gestation, whereas a full-term infant is born closer to 40 weeks gestation (World Health Organisation, 2012). According to the World Health Organisation (2015), *extremely preterm* infants are born at less than 28 weeks, *very preterm* infants at 28 to 32 weeks, and *moderate-late preterm* infants at 32 to 37 weeks. Infants born with low birth weight (LBW), that is below <2500g at birth (Johansson & Cnattigius, 2010), have formerly contributed to the definition of prematurity. However, as LBW infants can be born full-term, but are simply small for gestational age because of factors that have restricted their growth (Johansson & Cnattigius, 2010), PTB now refers only to gestational age (World Health Organisation, 2015). Hence, some of the previous literature regarding PTB, which will be discussed, includes LBW participants.

1.2 Changing Neonatal Care and Incidence of Preterm Birth

Since recent advancements in perinatal/neonatal intensive care technology, preterm infants are surviving more than ever before (Arpi & Ferrari, 2013; Healy, 2010). In Australia, approximately 25% of infants born <32 weeks gestation were reported to survive in 1979, in comparison to 85% in 2013 (Maternal and Perinatal Mortality Committee, 2015). Those born preterm are now also less likely to experience severe neurodevelopmental impairment but are at greater risk of more subtle developmental abnormalities, such as delayed motor skills and learning difficulties (Arpi & Ferrari, 2013; Keller-Margulis et al., 2011). More recently, prematurity has been identified as a risk factor for a range of behavioural and emotional difficulties (Delobel-Ayoub et al., 2006). However, as this is a more recent area of inquiry, the association and its potential confounding factors are still being examined (Delobel-Ayoub et al.,

2006). It is therefore recognised that further investigation is required to identify how prematurity may be indicative of the behavioural problems that preterm children experience (Delobel-Ayoub et al., 2006).

1.3 Preterm Birth and Behavioural Outcomes

Emotional, conduct, hyperactivity, and peer difficulties are common behavioural problems that children encounter (Goodman, 1997; Ogundele, 2018). When referring to externalising problems, the literature refers to destructive behaviours directed toward the external environment (e.g. aggression, hyperactivity), and when referring to internalising problems, the literature refers to destructive behaviours within the individual (e.g. anxiety, depression) (Ogundele, 2018). Such problems, inclusive of the abovementioned, have shown to emerge in preterm children as early as infancy (Arpi & Ferrari, 2013).

1.3.1 Preterm birth and behavioural outcomes in infancy.

Preterm infants (ages 0-2) are at risk of an array of behavioural problems. Shirley (1939) first discovered the relationship between preterm children and problematic behaviour in 1939, when she described preterm infants as hyperactive, irritable, shy, susceptible to distraction, and over-dependent on their mothers. The relationship was again identified 30 years later, however Drillien (1972) noticed that the problematic behaviours were not stable and disappeared in a child's second year of life. In a more recent study, Janssens et al. (2009) discovered an increased prevalence of developmental disorders, regulatory disorders, and emotional functioning disorders in preterm infants at 1 year of age, when compared to term-born peers. Increased emotional, conduct, and internalising difficulties have been similarly reported to prevail in preterm infants at a later timepoint of 2 years of age (Spittle et al., 2009; Stoelhorst et al., 2003). At ages 2 and 3,

Janssen et al. (2008) recognised increased orientation/engagement problems in children born *very preterm*, however they indicated no difference between preterm and term-born comparisons in emotional functioning (Janssen et al., 2008). Though the reliability of behavioural diagnosis is debated at infancy, this being due to the unstable nature of behaviours at this age, it is evident that preterm infants have more behavioural problems than full-term infants do (Arpi & Ferrari, 2013).

1.3.2 Preterm birth and behavioural outcomes at preschool-age.

Preterm children continue to exhibit poorer behavioural functioning than term-born children at preschool-age (ages 3-5). A study examining more than one thousand 3-year-olds born *very preterm* found increased difficulties on every scale of the Strengths and Difficulties Questionnaire (SDQ); that is, increased emotional, hyperactivity, conduct, peer, prosocial, and total behavioural difficulties when compared to term-born comparisons (Delobel-Ayoub et al., 2006). At age 5, follow-up testing indicated that the total behavioural difficulties had risen to double that of the comparison group (Delobel-Ayoub et al., 2009). Further studies have similarly discovered increased total behavioural difficulties (Potharst et al., 2011; Roberts et al., 2011), and attention and social problems (Reijneveld et al., 2006), for preterm children at age 5. Parent and teacher ratings, too, have indicated the prevalence of attention and internalising difficulties in preterm/LBW children at preschool-age when compared to term-born children, though they revealed no significant group differences in externalising problems (Aarnoudse-Moens et al., 2009). On the other hand, a study examining *moderate-late preterm* children at 4 years of age found that they were much more likely than term-born controls to experience externalising difficulties (Potjik et al., 2012). Behavioural problems are more constant, stable, and established in preterm children at preschool-age than at infancy (Arpi & Ferrari, 2013; Delobel-Ayoub et al.,

2006). As this is an age in which they can first be reliably detected (Arpi & Ferrari, 2013), more work is needed to screen for behavioural problems in the preterm population at preschool-age. This would also work towards reducing the endurance of such problems into adolescence (Johnson & Marlow, 2014), which will now be discussed.

1.3.3 Preterm birth and behavioural outcomes past preschool-age.

Studies that have examined the preterm population at a later age have recognised the continuity of behavioural problems into later childhood. A meta-analysis comparing 4125 *very preterm*/LBW individuals with 3197 term-born children, who were at least 5 years of age, found that preterm/LBW individuals continued to lag behind term-born peers during transition into young adulthood (Aarnoudse-Moens et al., 2009). At age 6, *moderate-late preterm* children have increased internalising and attention problems (Talge et al., 2010), and at age 8, an increased risk for behavioural problems relating to attention and delinquent behaviour (Higa et al., 2015). As the behaviours of preterm children have potential for long-lasting adverse outcomes, it is important to understand why this population is more vulnerable to behavioural problems than full-term children.

1.4 Risk Factors for Problematic Behaviour in Preterm Children

1.4.1 Social risk factors and gestational age as a risk factor.

There are a variety of known reasons why preterm children have more behavioural difficulties than children born full-term. Whilst there is no medical indicator that can identify which preterm child will experience behavioural problems and which will not, it is evident that there are factors that can exacerbate such outcomes (Arpi & Ferrari, 2013). Though some studies have found behavioural problems to remain in preterm children after controlling for social risk

factors, they have also found an greater prevalence of these to associate with increased behavioural problems (Delobel-Ayoub et al. 2006; Johnson & Marlow, 2007; Potjik et al., 2012; Reijneveld et al., 2006; Spittle et al., 2009; Stoelhorst et al., 2003). These factors include lower parental education level, lower socio-economic status, lower maternal age at time of birth, and a single-parent/separated family structure (Delobel-Ayoub et al. 2006; Johnson & Marlow, 2007; Spittle et al., 2009).

Further to these, Behrman and Butler (2007) recognised that those born at the earliest gestational ages, particularly <33 weeks gestation, are at greatest risk of poor behavioural and emotional functioning. Thus, more work is needed examining behaviour within this population to target children born at very early gestational ages, who are most likely to have behavioural difficulties.

1.4.2 Maternal mental wellbeing as a risk factor.

Negative maternal mental wellbeing is another factor that can exacerbate poor behavioural outcomes in children born preterm. This is because it can adversely change the way a mother interacts with her child (Muller-Nix et al., 2004; Zelkowitz et al., 2009). Parents of a high-risk infant will often experience increased levels of stress, anxiety, and depression, compared to parents of a low-risk infant (Muller-Nix et al., 2004; Zelkowitz et al., 2009). This is often due to their more complicated experience with pregnancy or birth, feelings of grief or loss, and ultimately the fear of their child's survival and long-term outcome (Hummel, 2003). A study examining preterm children at preschool-age emphasised the dependency of behavioural outcomes on parents' stress levels (Korja et al., 2014). Other studies have highlighted the effect of maternal anxiety and post-traumatic stress on dysfunctional mother-child interactions (Muller-Nix et al., 2004; Zelkowitz et al., 2009). Mothers that had experienced these, compared to

mothers of full-term infants that had not, were less sensitive and more controlling towards their child at 6 months old (Muller-Nix et al., 2004; Zelkowitz et al., 2009). This interactional pattern remained when later observed at 18 months, and it was correlated with maternal traumatic stress and problematic child behaviours (Muller-Nix et al., 2004; Zelkowitz et al., 2009). Therefore, these studies imply an adverse effect of PTB on mothers' mental wellbeing, which negatively changes the way a mother parents her child. It is this negative parenting pattern that is suggested to associate with problematic behaviours in preterm children, rather than a direct association between PTB and later problematic child outcomes (Muller-Nix et al., 2004; Zelkowitz et al., 2009).

1.5 Parenting Styles and Child Behaviour

Mother-child interactions, particularly mothers' parenting styles, play an important role in the development of a child's behaviour (Arnold et al., 1993). Traditionally, parenting styles, commonly referred to as discipline strategies, were defined according to a two-dimensional framework: support and control (Maccoby & Martin, 1983). The support dimension entailed parental behaviours toward a child that made the child feel accepted and comfortable, whereas the control dimension entailed parental behaviour that placed demands on and controlled the child (Maccoby & Martin, 1983). From these broad dimensions, four specific parenting styles were identified: authoritative (high support-high control), authoritarian (low support-high control), permissive (high support-low control), and neglecting (low support-low control) (Maccoby & Martin, 1983). An authoritative parenting style is considered the ideal discipline strategy for ideal child behaviour, suggesting that most children behave best when parents have rules but are flexible with these to meet their child's needs (Shucksmith et al., 1995). On the

other hand, authoritarian, permissive, and neglectful parenting styles have associated with poor child behaviour (Barnes & Farrell, 1992; Baumrind, 1968; Coie & Dodge, 1998; Gau & Chang, 2013; Patterson et al., 1984). Studies on parenting have continually discovered relationships between harsh, inconsistent, permissive, and lax parental styles and problematic child behaviour, particularly child aggression and delinquency (Bandura & Walters, 1959; Baumrind, 1968; McCord et al., 1961). They have also recognised the reinforcement of problematic child behaviours when parents are coercive, relaxed, inconsistent, or give the child attention during discipline encounters (Forehand et al., 1978; Lobitz & Johnson, 1975; Patterson & Fleischman, 1979). Thus, it is evident that there are styles of parenting associated with problematic behaviours in term-born children.

1.6 Parenting Styles and the Behaviour of Preterm Children

Parenting styles have likewise been associated with poor behavioural functioning within a preterm population. In a study examining the relationship between parenting styles at 9 months and the behaviours of preterm children at 3 years, an association between critical parenting and externalising behavioural problems was identified (Poehlmann et al., 2012). Similarly, Forcada-Guex et al. (2006) found that mothers of preterm infants who were controlling were likely to have infants with maladaptive emotion regulation at both 6 months and 2 years of age. They also revealed increased behavioural, internalising, eating, personal, and social problems in those born prematurely, when compared to term-born peers (Forcada-Guex et al., 2006). This was suggested to be due to the increased levels of maternal control, maternal unresponsiveness, and lower levels of sensitivity that prevailed in mother-preterm infant dyads (Forcada-Guex et al., 2006). Both Poehlmann et al.'s (2012) and Forcada-Guex et al.'s research is considered highly valid due to

their controlling of socioeconomic factors; variables known to be associated with styles of parenting and behavioural outcomes in preterm children (Poehlmann et al., 2012). Moreover, though socio-economic factors were not controlled for, another study revealed that parenting which was controlling/demanding was associated with greater symptoms of anxious and withdrawn behaviour in *very preterm* children at 2 years of age (Treyvaud et al., 2009).

However, contrary to the negative behavioural outcomes associated with negative parenting in other studies, Treyvaud et al. (2009) reported that parents who were more demanding had preterm children with more optimal psychomotor development. They also identified no association between parenting styles and externalising behavioural problems in preterm children (Treyvaud et al., 2009). Likewise, Neel et al.'s (2018) study revealed no significant association between preterm child behaviour and parental demandingness, but rather found that it was associated with improved cognition (Neel et al., 2018). The only significant predictor of problematic behaviour in this systematic review was parental rejection (Neel et al., 2018). However, approximately half of the study samples used in this review included infants (Neel et al., 2018). Thus, its findings could be unreliable due to the instability of behaviours at infancy (Arpi & Ferrari, 2013). Bilgin & Wolke (2015) also discovered no significant difference between the parenting behaviours of caregivers with *moderate-late preterm* infants and the parenting behaviours of caregivers with full-term infants. However, this study examined preterm children born at late gestational ages who are least at risk of developmental deficits (Behrman & Butler, 2007).

Whilst some studies have demonstrated that mothers of premature children can be less sensitive and more controlling than mothers of full-term children, and have children with increased problematic behaviour, some studies have not. This highlights an insufficient amount

of knowledge in this area of research. One possible explanation for these inconsistent findings could be the common inclusion of infants in preterm study samples, these being participants with unstable behaviours (Arpi & Ferrari, 2013). The majority of studies examining the association between parenting styles and preterm child behaviour also included a wide array of gestational ages, and thus study findings could be heterogeneous as a result of the differing risks which different gestational ages portray (Behrman & Butler, 2007). Therefore, further investigation into the relationship between parenting styles and the behaviour of preterm children with restricted gestational ages, and exclusive of infants, is required.

1.7 Bidirectional Relationship Between Parenting Styles and Preterm Child Behaviour

In light of the relationship between parenting styles and problematic child behaviours, it is often not known whether the type of parenting causes a child to behave in a particular way or if the child's behaviour causes a caregiver to parent in a particular way. Many studies demonstrate that early parenting behaviours exacerbate risk for later child behaviours in preterm children (Sarwar, 2016), but this might not always be the case. Wittig and Rodriguez (2019) examined the bidirectional effects between maternal parenting styles and full-term infant temperament. They found that authoritative, authoritarian, and permissive parenting styles and infants' temperaments at 6 months predicted children's externalising and internalising behaviour problems at 18 months (Wittig & Rodriguez, 2019). However, they also found that increased orientation/regulation competencies in the infants predicted later maternal permissive parenting styles (Wittig & Rodriguez, 2019). These findings suggest that maternal parenting styles can predict infant temperament, but infant temperament can also affect parenting (Wittig & Rodriguez, 2019). Therefore, future research must interpret this relationship with caution.

1.8 Parenting Interventions and Improved Preterm Child Behaviour

Despite this, interventions have demonstrated that when parents of preterm children are taught skills early on, there have been later benefits to child developmental outcomes. A study on 182 preterm infants found that those with mothers who received an intervention enabling the mothers to read and interpret their infant's behavioural cues had grown more rapidly than preterm infant controls; they weighed more, were longer in length, and had increased head circumferences, which is an indicator of brain growth (Msall, 2015). Similarly, the Baby Triple P intervention which taught parents coping skills, partner support, and parenting strategies revealed cognitive and motor skill advancements in *very preterm* children at 2 years of age (Colditz et al., 2015). However, it did not impact child behaviour (Colditz et al., 2015). Nevertheless, these findings demonstrate the potential for interventions to promote positive parenting behaviours within a preterm population, which can in turn influence positive developmental outcomes. Investigating the role of parenting in relation to preterm child behaviours would offer valuable insight for a future program aimed at reducing problematic functioning within this population.

1.9 The Current Study

Despite a large amount of published research investigating relationships between PTB and poor behavioural outcomes, and parenting styles and poor behavioural outcomes in full-term children, there is inconsistent and insufficient research regarding the association between parenting styles and child behaviours within a preterm population. This represents a significant gap in the literature, as it remains unclear as to whether parenting styles are associated with problematic behaviours in preterm children. Where there has been research in this area, the author has not found any studies that have examined preterm children at a stable age that is

exclusive of infants, and few studies have examined children with very early gestational ages, who are most at risk (Arpi & Ferrari, 2013). As PTB is often associated with negative parental wellbeing that can adversely affect parent-child interactions (Muller-Nix et al., 2004), and as dysfunctional parenting styles (henceforth DPSs) are associated with poor behaviours in full-term children (Maccoby & Martin, 1983), it is plausible that preterm children with parents who have DPSs will have poor behavioural functioning. Given that parental intervention has the ability to improve outcomes in preterm children (Colditz et al., 2015; Msall, 2015), the identification of potential risk factors, such as DPSs, in a sample with stable and established behaviours, is important to inform future programs that aim to improve and prevent long-term behavioural difficulties.

The current study will contribute to the literature by examining parenting styles and the behaviour of children at 5 years corrected-age who were born <29 weeks gestation. The primary aim is to examine whether children born preterm with parents who have DPSs have poorer behavioural functioning at 5 years corrected-age, compared to preterm children whose parents do not have DPSs. The secondary aim is to examine whether *clinically-significant* behavioural problems have a greater probability of occurring in children born preterm with parents who have DPSs, compared to those with parents who do not have DPSs. Based on these aims, it is hypothesised that after controlling for covariates:

1) Parents of children born preterm with dysfunctional parenting styles will report more symptoms of poor behavioural functioning in their child, compared to parents of children born preterm without dysfunctional parenting styles. This will be reflected through significant group differences in mean scores on behavioural assessment scales.

2) Parents of children born preterm with dysfunctional parenting styles will report more clinically-significant behavioural problems in their child, compared to parents of children born preterm without dysfunctional parenting styles. This will be reflected by children subjected to dysfunctional parenting styles having greater odds of presenting with clinically-significant scores on behavioural assessment scales.

CHAPTER 2

Method

2.1 Participants

The sample comprised a follow-up of participants from the N-3 (omega-3) Fatty Acids for Improvement in Respiratory Outcomes (N3RO) multicentre double-blind randomised controlled trial. Participants and methods of the N3RO have been described in a previous publication (see Collins et al., 2017). In brief, the N3RO trial recruited 1273 infants born <29 weeks' completed gestation between June 2012 and September 2015 from 13 centres in Australia, New Zealand, and Singapore. Inclusion criteria specified participants were to be enrolled within three days of commencing their first enteral feeds of supplementation, and they were to have a legal representative capable of providing consent on the infant's behalf. Infants were excluded if they had a major congenital or chromosomal abnormality, were participating in another fatty-acid study, were receiving intravenous lipid emulsions containing fish oil, or if their breast-feeding mother was taking supplements providing >250mg docosahexaenoic acid (DHA) per day. Enrolled infants were randomised to receive either a high concentration of DHA or a placebo soy emulsion until 36 weeks' postmenstrual age. The primary outcome of the N3RO trial was the assessment of physiological bronchopulmonary dysplasia at 36 weeks postmenstrual age or upon discharge for home.

Infants from both the DHA treatment and placebo group who had not died, were from a singleton birth, were still enrolled in the N3RO trial, and were born at one of the 10 Australian locations were eligible to participate in follow-up assessments conducted at 5 years corrected-age (See Appendix A for study locations). The assessments included parenting style and behavioural measures, both of which will be reported on in the current study. Follow-up participants were

recruited between 2018 and 2020, and they comprised a convenience sample of 440 preterm participants and their relative caregivers. As this follow-up study is ongoing, it is noted that there are still participants yet to complete the assessments, and so current analyses are based on the data available at present. Participant characteristics are displayed in Table 1.

2.2 Measures

Infant characteristics were collected upon entry into the N3RO trial. These included infant gestational age, birthweight, sex, and ethnicity. Characteristics of caregivers were also collected at this time, obtaining data such as maternal birth-age and highest level of parental education. At the 5 years corrected-age (CA) follow up, a general questionnaire collected information regarding respondents' relationship to the child, and structure of the child's household (e.g. whether the child was living in a household with a sole-parent, separated parents, parents living together, or other circumstances).

2.2.1 Strengths and Difficulties Questionnaire.

At the 5 years CA follow-up, caregivers reported child behaviour by completing the *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997). The SDQ is a brief 25-item screening tool often used to detect behavioural and emotional problems in children. It rates items on a 3-point likert scale, where 0= 'not true', 1= 'somewhat true', and 2= 'certainly true'. Items of the scale are divided between five subscales, and each subscale has five items. The subscales are: *Emotional Problems* (e.g. unhappiness, fearfulness), *Conduct Problems* (e.g. aggressiveness, disobedience), *Hyperactivity Problems* (e.g. restlessness, easily distracted), *Peer Problems* (e.g. few friends, not liked), and *Prosocial Behaviour* (e.g. kindness, helpfulness). However, for the purpose of the current study, the *Prosocial Behaviour* subscale was not used. Scores for each of

the 'problem' focused subscales are calculated by summing the results of its five items. This score is then ranged from 0-10, with higher scores indicative of increased problematic behaviour.

The primary outcome of the SDQ is the *Total Difficulties* score. This is generated by summing the scores of the four 'problem' focused subscales. The overall sum ranges from 0-40, with higher scores indicative of increased behavioural problems. Scores are categorised based on the following bandings: *normal*, *borderline*, and *abnormal*. Thus, there are two possible cut-off points for classifying scores as clinically-significant, with the lower bound providing a borderline result with increased sensitivity (Goodman, 1997). The borderline cut-off was used in the current study to minimise the chance of under-detecting behaviours which were indicative of problems. Refer to Appendix C for all parent-reported cut-offs for SDQ clinically-significant scores.

The SDQ is a widely used measure that demonstrates good reliability and validity in preschool-aged and Australian children (Croft et al., 2015; Hawes & Dadds, 2004). It has convergent validity against longer comparable measures (Goodman, 2001; Goodman & Scott, 1999), and its five-factor structure has been repeatedly reproduced (Kersten et al., 2016). The SDQ accurately measures psychopathology in preterm children (Johnson et al., 2014), and it generally yields moderate-strong Cronbach's alpha values for its outcome scales (Goodman, 2001; Hawes & Dadds, 2004).

2.2.2 Parenting Scale.

The *Parenting Scale* (PS) developed by Arnold et al. (1993) measured caregivers' parenting styles at the 5 years CA follow up (see Appendix B). It is a 30-item questionnaire that assesses three dimensions of dysfunctional parenting, as well as items not on a factor, which all combine a *Total Dysfunctional Discipline* score. The dimensions it measures are as follows:

Laxness (e.g. permissive, inconsistent discipline), *Over-Reactivity* (e.g. harsh, emotional, authoritarian discipline and irritability), *Hostility* (e.g. use of verbal or physical force), and *No Factor* (items not on a factor) (Rhoades & O'Leary, 2007). Respondents indicate the probability of using specific discipline strategies in response to child misbehaviors. Ratings are made on 7-point likert scales that are anchored by one effective and one ineffective discipline strategy. After reverse coding some of the items, a score of 1 indicates effective parenting, and a score of 7 indicates ineffective parenting. Items include examples such as *"When my child misbehaves I do something right away"* and its counter part *" I do something about it later"*. Scores for each subscale are achieved by summing the results of its items and dividing this sum by the subscale's number of items. To yield the *Total Dysfunctional Discipline* score, overall scores for each subscale are summed and divided by 30. *Total Dysfunctional Discipline* scores below the 3.2 clinical cut-off point are indicative of good parenting styles, whereas scores above this point are indicative of DPSs (Rhoades & O'Leary, 2007).

The PS has recently been validated for use among Australian mothers with preschool-aged children (Arney et al., 2008). It has high predictive validity for child behaviour (Salari et al., 2012), and its three factors of dysfunctional parenting demonstrate good construct validity with corresponding observed parental disciplines (Arnold et al., 1993). The scale has good internal reliability for mothers and fathers, with Cronbach's alpha coefficients corrected for scale length as follows, respectively: Laxness (α= .85 and α= .82), Over-reactivity (α= .80 and α= .80), and Hostility (α= .78 and α= .83) (Rhoades & O'Leary, 2007). Test-retest reliability of the scale has also been evidenced (Yoshizumi et al., 2006).

2.3 Procedure

From 2018 to 2020, participants enrolled in the N3RO study underwent a follow-up behavioural assessment at 5 years CA. Parenting styles of caregivers of these participants were also assessed at this time. Prior to data collection, ethical approval was granted by the *University of Adelaide Human Research Ethics Subcommittee* and the *Women's and Children's Health Network Human Research Ethics Committee*. Subsequently, caregivers of all eligible children were contacted two months before their child reached 5 years CA via email or mail with an invitation to participate in the study. This included information about the research, an address link to the online survey, and contact details of study investigators. Participants who had not completed the online survey three weeks after the follow-up study invitation was sent were contacted via telephone to ascertain whether they had received the study material and had any questions. They were also given the option to complete a hard copy of the questionnaires, complete them over the phone, or decline participation. Participants who wished to complete the survey over the phone or via hard copy were posted a reply-paid return envelope with the consent form to complete.

2.4 Statistical Analysis

Results were analysed using the Statistical Package for the Social Sciences (SPSS; version 26.0). All tests were two-sided, with an alpha level of $p < .05$ adopted to indicate statistical significance. No adjustments were made for multiple pre-planned comparisons. Descriptive statistics summarised baseline demographic data of infants and caregivers, and baseline neonatal data of the infants.

To investigate the first research aim, differences between preterm children with and without parents who had DPSs were examined using analysis of variance (ANOVA) analyses, with effect sizes presented using eta-squared (η^2). In accordance with Cohen's (1988) guidelines, effects were interpreted as follows: small (η^2=0.01), medium (η^2=0.06), and large (η^2=0.14). After ANOVA analyses, analysis of covariance (ANCOVA) was employed to control for the variance explained by potential confounders. Confounding variables in the model were selected *a priori,* and based on previous findings that indicated their affect on parenting and outcomes in preterm children (Poehlmann et al., 2011). These consisted of maternal birth-age, a single-parent household, and maternal education less than high-school graduate level. Increased lengths of hospital stay (Poehlmann et al., 2011) were not controlled for in the current study due to the *very preterm* nature of all participants. The controlling of participants from multiple births (Poehlmann et al., 2011) was also not required due to the inclusion of children from only singleton births. Further to these, gestational age and birthweight (Poehlmann et al., 2011) were not significantly correlated with behavioural functioning in the current study, thus they were removed as potential covariates (Stevens, 1996). Factors were studied for collinearity; maternal education less than high-school graduate level and secondary parent education less than high-school graduate level were perfectly correlated with each other, $r(439) = 1.00$, $p < .001$, and so secondary parent education was removed (Stevens, 1996).

The second research aim utilised logistic regression to assess whether parents of children born preterm with DPSs would report more behavioural problems in their child which were clinically-significant, compared to parents of preterm children without DPSs. Simple logistic regression obtained unadjusted odds ratios, and multiple logistic regression obtained odds ratios

adjusted for the abovementioned characteristics. The overall effect of parents with DPSs in the models was also reported using chi-square and *p* values.

Though the literature in relation to parenting styles and child behaviour commonly focuses solely on mothers, Poehlmann et al. (2011) discovered no significant difference between mothers' and fathers' parenting styles and child behavioural outcomes. Therefore, analyses in the current study examined both parents. It also examined non-biological caregivers, as they have an equivalent influence on child developmental outcomes to biological parents (Ashdown & Faherty, 2020).

CHAPTER 3

Results

3.1 Preliminary Analyses

3.1.1 Statistical power.

A sensitivity power analysis was conducted using G*Power 3.1. The results indicated that with a predetermined sample size of 160 children born preterm with parents who had DPSs and 280 preterm children with parents who did not have DPSs, a difference of 0.13 standard deviations could be detected between the two groups in mean SDQ scores (Faul et al., 2007). This was with a power level of 0.80, and when adopting a significance level of $\alpha = 0.05$. Therefore, the study had the sensitivity to detect small effects for all statistical analyses that were conducted.

3.1.2 Data Screening and Assumption Testing.

Prior to analysis, data were screened for missing values. This process revealed intact data for all clinical and demographic characteristics, except for ethnicity, child corrected-age (CA) at testing, completed high-school education of the child's mother, and structure of the child's household. There were three cases (0.7%) with missing values for ethnicity, one case (0.2%) with a missing value for completed maternal secondary education, and one participant (0.2%) with a missing value for structure of the child's household. For child's CA at the time of survey completion, there were 125 participants (28.4%) with missing values due to the method of data collection. However, all follow-up assessments were completed when children were between 4 and 7 years CA. Data from 42 participants (8.7%) were removed from the initial 482 responses as part of the preliminary screening process due to participant failure to respond to both the SDQ and the PS. Therefore, the final data set consisted of 440 participants.

Using Tukey's (1977) outlier labeling rule, all scales were examined for outliers. This identified 20 participants (4.5%) with one or more very high outlier scores across the SDQ data, and four participants (0.9%) with very high outlier scores across the PS data. However, these values were regarded neither random nor arbitrary, and so were retained in the data set. Sensitivity analyses were also conducted to assess the potential influence of these outliers in the models, which reported no substantial change to overall patterns of significance, confirming the inclusion of all cases in the models.

Skewness and kurtosis values were used to evaluate the assumption of a normal distribution for each outcome measure. For the group with caregivers who had DPSs, the values produced were acceptable (within ±2; George & Mallery, 2006) for the PS outcome and for all SDQ outcomes. For the group with parents who did not have DPSs, the *Peer Problems* scale demonstrated substantial positive kurtosis (see Appendix D for outcome values). However, statistical tests used in the current study are robust to violations of assumptions, even in the case of unequal sample sizes (Pallant, 2001; Tabachnick & Fidell, 2013). According to Gravetter & Wallnau (2000), violations of kurtosis are also unlikely to cause problems with sample sizes greater than 30. Therefore, non-parametric alternatives were not required.

Preliminary tests for ANCOVA and logistic regression analyses revealed no further violations to assumptions of normality, linearity, homoscedasticity, homogeneity of variances, and homogeneity of regression slopes, where these assumptions were required.

3.2 Descriptive Statistics

Baseline clinical and demographic information of infants and parents within the sample are displayed in Table 1. For the total cohort, infant gestational age was, on average, 26.3 weeks

[*extremely preterm*; standard deviation (*SD*)= 1.4], and mean birthweight was 929.3g (*SD*= 227.3). Approximately half of the participants were male, and about one quarter were of non-Caucasian decent. Mean maternal birth-age was 30.7 years (*SD*= 5.7), and the mean CA of children at the time of follow-up assessments, for the available values, was 5.1 years (*SD*= 0.5).

Within the total sample, 36.4% of preterm children (*n*= 160) had parents with DPSs. When compared to preterm children with parents who did not have DPSs (*n*= 280), this group on average had very slightly decreased gestational age and birthweight. They also had lower mean scores on all other baseline characteristics, including the preselected covariates of maternal birth-age, maternal completed high-school education, and sole-parent household structure. This was with the exception of mean child CA at testing, where there was no difference between the groups on this variable (see Table 1).

Table 1

Baseline Infant and Parental Characteristics of the Sample

Characteristic	Total (*n*=440)	Children with Parents who had Dysfunctional Parenting Styles (*n*=160)	Children with Parents who did not have Dysfunctional Parenting Styles (*n*=280)
Gestational age (weeks), mean (*SD*, range)	26.3 (1.4, 23-28)	26.2 (1.4)	26.4 (1.4)
Birth weight (g), mean (*SD*, range)	929.3 (227.3, 460-1638)	914.6 (226.4)	937.7 (227.7)
Maternal birth-age (years), mean (*SD*, range)	30.7 (5.7, 13-48)	30.7 (5.9)	30.8 (5.6)
Child's corrected age at testing (years), mean (*SD*, range)[a]	5.1 (0.5, 4-6)	5.1 (0.4)	5.1 (0.5)
Sex (male), *n* (%)	238 (54.1)	78 (48.8)	160 (57.1)
Ethnicity (Caucasian), *n* (%)[b]	343 (78.0)	107 (66.9)	236 (84.3)
Mother completed high-school education, *n* (%)[c]	293 (66.7)	114 (71.7)	179 (63.9)
Primary caregiver type, *n* (%)			
Mother	381 (86.6)	135 (84.4)	246 (87.9)
Father	49 (11.1)	22 (13.8)	27 (9.6)
Other	10 (2.3)	3 (1.9)	7 (2.5)
Structure of child's household, *n* (%)[d]			
Sole parent	44 (10.0)	11 (6.9)	33 (11.8)
Separated parents (divided care)	35 (8.0)	8 (5.0)	27 (9.7)
Parents living together	345 (78.6)	135 (84.4)	210 (75.3)
Other	15 (3.4)	6 (3.8)	9 (3.2)

Note. *SD*= standard deviation.
[a]125 cases had missing values; [b]Three cases had missing values; [c]One case had missing values; [d]One case had missing values.

Outcomes of the SDQ and PS assessments for the total sample are displayed in Table 2. All mean scores for the SDQ outcomes were in the normal range. The PS total dysfunctional parenting outcome also had a mean score that was not clinically-significant. Just over one quarter (27.5%) of the sample displayed clinically-significant *Emotional Symptoms*, almost half (40.9%) presented with clinically-significant *Conduct Problems*, and over one third (39.5%) demonstrated *Hyperactivity* in the clinical range. Clinically-significant *Peer Problems* were evidenced in 29.1% of the total sample, and approximately one third (32.3%) had clinically-significant *Total Difficulties* scores (see Table 2).

Table 2

Outcomes of SDQ and PS assessments for the Total Sample

		Mean (*SD*)	Behaviours within Clinical Range, *n* (%)[d]
SDQ Symptom Scale[a]			
	Emotional Symptoms	2.48 (2.14)	121 (27.5)
	Conduct Problems	2.40 (2.07)	180 (40.9)
	Hyperactivity	5.00 (2.18)	174 (39.5)
	Peer Problems	1.81 (1.90)	128 (29.1)
SDQ Total Difficulties[b]		11.70 (5.88)	142 (32.3)
PS Total Score[c]		2.94 (0.55)	n/a[e]

Note. SDQ= Strengths and Difficulties Questionnaire; PS= Parenting Scale; *SD*= standard deviation.
[a]Scale range: 0-10; [b]Scale range: 0-40; [c]Scale range: 1-7.
[d]See Appendix C for parent-reported SDQ clinically-significant score ranges. Clinical-range includes borderline-abnormal scores.
[e]Behaviours within clinical-range not applicable.

3.3 Analysis of Research Objectives

3.3.1 Symptoms of poor behavioural functioning.

Hypothesis 1 stated parents of children born preterm with DPSs would report more symptoms of poor behavioural functioning in their child, compared to parents of children born preterm without DPSs. ANOVA analyses were used to determine whether there were any statistically significant differences between the means of the two groups. Results from these unadjusted analyses discovered a small effect for a higher *Conduct Problems* score for children with than without parents who had DPSs, F (1, 438) = 4.13, p = .04, η^2 = .01. No significant differences were found between the groups on *Emotional Symptoms, Hyperactivity,* or *Peer Problems* scale scores, nor on the *Total Difficulties* score.

As also displayed in Table 3, ANCOVA analyses allowed for the adjustment of potential confounders in the models (see Appendix E for SPSS output). When holding maternal birth-age, maternal education less than completed high-school education, and single-parent household constant, the group with parents who had DPSs still displayed more *Conduct Problems* with a small effect size, F (1, 438) = 4.95, p = .03, η^2 = .01. There also remained no statistically significant difference between the groups on the *Emotional Symptoms, Hyperactivity,* and *Peer Problems* scales. After confounder adjustment, the magnitude of the effect between the groups on the *Total Difficulties* score increased to a small effect size (η^2 = .01), though this remained not statistically significant, F (1, 438) = 2.23, p = .14.

Table 3

Differences in SDQ Scale and Total Difficulties Scores between Children with and without Parents who had Dysfunctional Parenting Styles

	Unadjusted						Adjusted[c]					
	Children with Parents who had Dysfunctional Parenting Styles (*n*=160) Mean (*SD*)	Children with Parents who did not have Dysfunctional Parenting Styles (*n*=280) Mean (*SD*)	*df*	*F*	*p*	Partial eta squared (η^2)	Children with Parents who had Dysfunctional Parenting Styles (*n*=160) Mean (*SD*)	Children with Parents who did not have Dysfunctional Parenting Styles (*n*=280) Mean (*SD*)	*df*	*F*	*p*	Partial eta squared (η^2)
SDQ Symptoms Scale[a]												
Emotional Symptoms	2.56 (2.03)	2.44 (2.20)	1	0.38	.55	.00	2.58 (0.17)	2.43 (0.13)	1	0.47	.49	.00
Conduct Problems	2.67 (1.86)	2.25 (2.17)	1	4.13	.04*	.01	2.70 (0.16)	2.24 (0.12)	1	4.95	.03*	.01
Hyperactivity	5.09 (2.14)	4.96 (2.20)	1	0.37	.55	.00	5.11 (0.17)	4.94 (0.13)	1	0.61	.43	.00
Peer Problems	1.86 (1.95)	1.78 (1.87)	1	0.17	.68	.00	1.87 (0.15)	1.77 (0.11)	1	0.27	.60	.00
SDQ Total Difficulties[b]	12.18 (5.88)	11.43 (5.87)	1	1.66	.19	.00	12.25 (0.46)	11.38 (0.35)	1	2.23	.14	.01

Note. SDQ= Strengths and Difficulties Questionnaire; *SD*= standard deviation.
[a]Scale range: 0-10; [b]Scale range 0-40.
[c]Adjusted for maternal birth-age, maternal education less than completed high-school education and sole-parent household.
* p <.05.

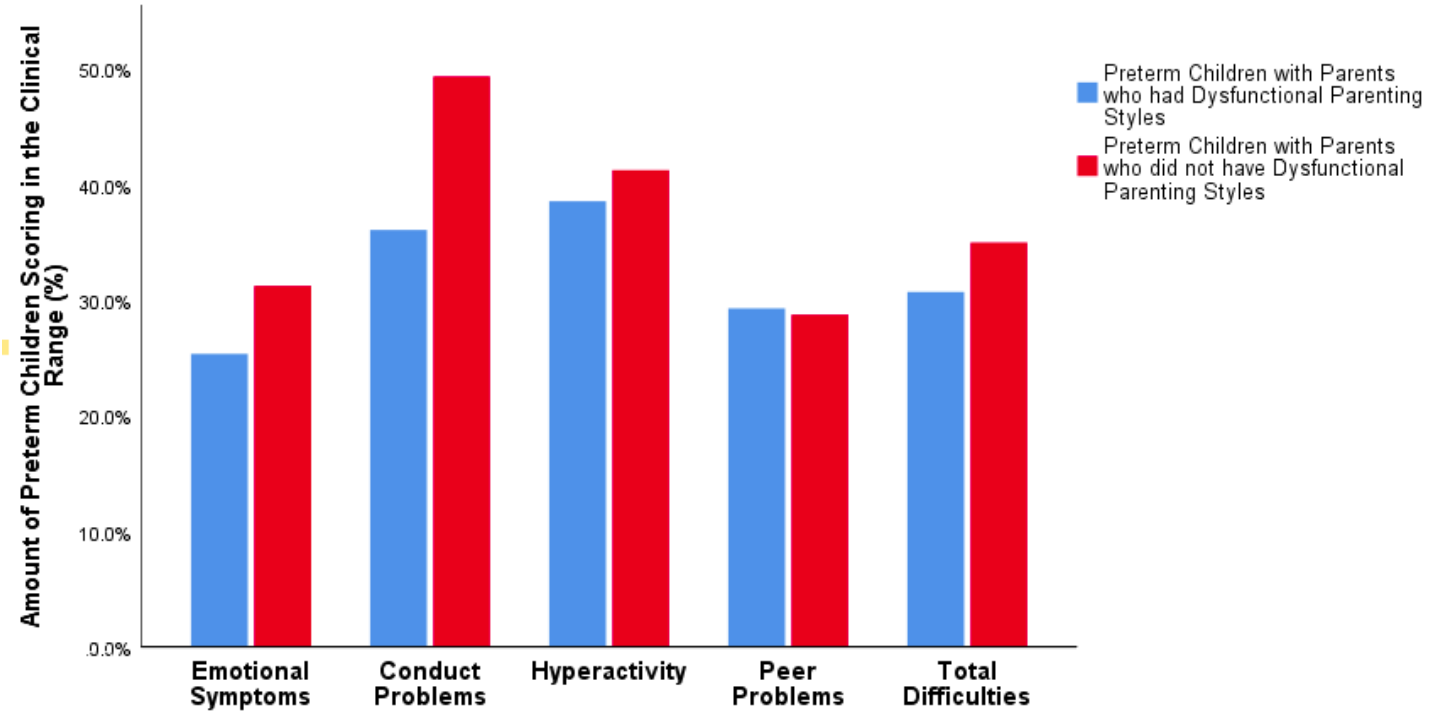
3.3.2 Clinically-significant behavioural problems.

Hypothesis 2 stated parents of children born preterm with DPSs would report more behavioural problems in their child which were clinically-significant, compared to parents of children born preterm without DPSs. Depicted in Figure 1 are the observed percentages of scores for preterm children that were in the clinically-significant (abnormal-borderline) range for each SDQ scale, and for the SDQ total difficulties outcome (see Appendix F for table of frequencies). For *Total Difficulties* scores, 35.0% of preterm children with parents who had DPSs had scores that were clinically-significant (vs. 30.7% for preterm children with parents who did not have DPSs). Children with parents who had DPSs also displayed more clinically-significant problems on each of the SDQ scales, with the exception of *Peer Problems*, where children with parents who did not have DPSs scored slightly higher (29.3% vs. 28.7%).

To obtain unadjusted odds ratios (ORs) for preterm children with parents who had dysfunctional parenting scoring within the clinical range, simple logistic regression was used. This was with the reference category being the group of preterm children with parents who did not have DPSs. As shown in Table 4, outcomes from these analyses discovered that children with parents who had DPSs had a 73% greater probability of clinically-significant *Conduct Problems*, OR= 1.73, 95% confidence interval (CI) [1.17, 2.36]. Unadjusted analyses also revealed no significant differences between the groups on all other outcome measures; that is, no significant greater probability of clinically-significant *Emotional Symptoms, Hyperactivity, Peer Problems,* and *Total Difficulties* for preterm children with parents who had DPSs.

Figure 1

SDQ Scale / SDQ Total Score Outcomes



Note. Comparison of SDQ clinically-significant scores between children with and without parents who had dysfunctional parenting styles. SDQ= Strengths and Difficulties Questionnaire. See Appendix C for parent-reported SDQ clinically-significant score ranges. Clinical range includes borderline-abnormal scores. See Appendix F for table of frequencies.

Results from multiple logistic regression analyses adjusted for the potential confounders of maternal birth-age, maternal education less than completed high-school education, and single-parent household are also displayed in Table 4 (See Appendix G for SPSS output). These analyses revealed that after controlling for the abovementioned variables, ORs for preterm children with parents who had DPSs attaining clinically-significant SDQ scores increased slightly for *Conduct Problems,* $_{\text{adjusted}}$OR= 1.77, 95% CI [1.19, 2.64]. In this case, DPSs were associated with almost two times the odds of presenting with clinically-significant scores, thus supporting Hypothesis 2. The probability of displaying clinically-significant *Emotional Symptoms, Hyperactivity, Peer Problems,* and *Total Difficulties* for preterm children with parents who had DPSs increased slightly after adjusted analyses, however remained not statistically significant. Therefore, Hypothesis 2 was only partially supported.

Table 4

Odds Ratios for Parent-Reported SDQ Clinically-Significant Behaviours for Preterm Children with Parents who had Dysfunctional Parenting Styles

Clinically-Significant Behaviours for Preterm Children with Parents who had Dysfunctional Parenting Styles	Unadjusted				Adjusted[a]			
	Odds Ratio	95% CI	χ^2	*p*	Odds Ratio	95% CI	χ^2	*p*
SDQ Symptom Scale								
Emotional Symptoms	1.34	[0.87, 2.06]	1.76	.19	1.36	[0.88, 2.10]	1.90	.17
Conduct Problems	1.73	[1.17, 2.36]	7.42	.01**	1.77	[1.19, 2.64]	7.95	.01**
Hyperactivity	1.12	[0.75, 1.66]	0.31	.58	1.16	[0.77, 1.74]	0.50	.48
Peer Problems	0.97	[0.64, 1.49]	0.01	.91	0.99	[0.64, 1.52]	0.00	.95
SDQ Total Difficulties	1.22	[0.80, 1.84]	0.85	.36	1.27	[0.83, 1.93]	1.21	.27

Note. SDQ= Strengths and Difficulties Questionnaire; CI= confidence interval.
See Appendix C for parent-reported SDQ clinically-significant score ranges. Clinical range includes borderline-abnormal scores.
[a]Adjusted for maternal birth-age, maternal education less than completed high-school education and single-parent household.
* $p < .05$. ** $p < .01$.

CHAPTER 4

Discussion

4.1 Overview

The current study investigated the behavioural outcomes of 440 children born <29 weeks gestation when they reached 5 years corrected-age (CA). Specifically, the purpose of this research was to determine whether children born preterm with parents who had DPSs would display more symptoms of poor behavioural functioning, compared to those with parents who did not have DPSs. Additionally, the investigation aimed to establish whether DPSs would be associated with a greater probability of preterm children presenting with clinically-significant behavioural problems. To achieve these aims, the cohort was assessed using the parent-reported Strengths and Difficulties Questionnaire (SDQ) and the Parenting Scale (PS) at 5 years corrected-age. Behavioural outcomes were compared between preterm children with and without parents who had DPSs, while controlling for potential confounding socio-economic factors. The findings indicated that children with parents who had DPSs presented with poorer conduct behaviours, and had greater odds of presenting with these in a clinical range. However, contrary to predictions, they did not exhibit poorer functioning in areas of emotional, hyperactive, social, and total functioning. Results, implications, limitations, and future directions are discussed in this chapter.

4.2 Current Findings

4.2.1 Symptoms of poor behavioural functioning.

The data revealed partial support for Hypothesis 1, that children born preterm with parents who had DPSs would present with more symptoms of poor behavioural functioning,

compared to those with parents who did not have DPSs. After controlling for potential confounders, small significant group differences emerged in mean scores for symptoms of conduct problems. Thus, DPSs were associated with aggressive and disobedient behaviours in preterm children, independent of maternal birth-age, maternal education less than high-school graduate level, and sole-parent households. This result supports the current hypothesis, and it is consistent with Poehlmann et al.'s (2012) report of a significant association between parenting that was angry, hostile, critical, disapproving, and frustrated towards temperamentally reactive preterm children and aggressive/disobedient child behaviour. It is also consistent with Schappin et al.'s (2018) investigation which found a small relationship between hostile parenting and aggressive/rule breaking behaviours in preterm children. Though the effect size in the current study was small, the relationship between DPSs and conduct problems must be considered in context of the wide range of factors that can influence child behaviour in addition to parenting, such as child temperament and personality (Hudziak, 2008). It must also be considered that the association could be due to very slightly decreased gestational age and birthweight in the group with parents who had dysfunctional parenting, thus placing them at heightened risk of problematic behaviour (Arpi & Ferrari, 2013). Nevertheless, it could also be attributable to the nature of conduct problems and possible response of parents to manage these behaviours in an aggressive/hostile manner, or vice versa. However, this is only speculation, and does not accord with Treyvaud et al.'s (2009) opposed findings of no significant differences in symptoms of aggression/defiance and peer aggression between preterm children with and without parents who were intrusive/overcontrolling, disapproving, and angry. A possible explanation for inconsistent findings in this area of research is the age of participants included in study samples. Unlike Poehlmann et al., Schappin et al., and the present study, Treyvaud et al. examined children at

infancy, when behaviours are argued to be unstable and unreliable for examination (Arpi & Ferrari, 2013). Thus, it may be the case that results from Treyvaud et al. are due to inconsistent and varied behaviours, and so no significant group differences emerged. Whilst the current study examined children at a later age when behaviours are more stable, replication of this research is needed to consolidate the significant association found between DPSs and problematic conduct, due to contradictory and limited results in this area.

Additionally, the current study found no significant findings indicating that preterm children with parents who had DPSs displayed more symptoms of emotional difficulties and peer problems, after adjusted analyses. This did not support the hypothesis, but again accords with Poehlmann et al.'s (2012) research in which temperamentally reactive preterm children with parents who had angry, hostile, critical, disapproving, and frustrated styles of parenting did not have significantly more anxious, depressed, and withdrawn behaviours, and were not more likely to display social difficulties. However, inconsistent with the current study, Forcada-Guex et al. (2006) discovered increased withdrawn, fearful, and anxious child behaviours in mother-preterm infant dyads that had presented with increased levels of maternal control, maternal unresponsiveness, and lower levels of sensitivity. Treyvaud et al.'s (2009) investigation also indicated that parents who displayed higher levels of disapproving/angry parenting were significantly more likely to rate their premature-born child as anxious and withdrawn. Though, they were not more likely to report child emotional difficulties if they presented with increased intrusive/controlling parenting (Treyvaud et al., 2009). A possible explanation for the discrepancies in findings is the different measures of child behaviour employed. The majority of the studies that reported no significant findings between dysfunctional styles of parenting and child emotional and peer difficulties, inclusive of the current study, used parent-reported

behavioural measures. On the other hand, the studies indicating a significant relationship between these variables employed observational measures of behaviour (Forcada-Guex et al., 2006; Treyvaud et al., 2009). Therefore, conflicting findings could be a result of different perceptions of child behaviour, such as parental perceptions vs. observers' perceptions. This highlights the need for further research in this area using a combination of parent-reported and observational measures to validate findings.

The result that preterm children with parents who had DPSs did not display more symptoms of hyperactivity problems, after confounder adjustment, is largely consistent with previous findings. Poehlmann et al. (2012) similarly found no significant group differences in attention problems between preterm children with and without parents that presented with angry, hostile, critical, disapproving, and frustrated parenting styles. Treyvaud et al. (2009) also reported no significant increase in activity/impulsivity difficulties for preterm children who had parents that were intrusive/controlling, disapproving, and angry. Therefore, the present finding adds to the limited amount of existing literature, strengthening the understanding that DPSs are not associated with hyperactivity problems in children born preterm.

More broadly, the overall result that children with parents who had DPSs did not display increased symptoms of poor total behavioural functioning, persistent after confounder adjustment, aligns with the limited previous literature, to some extent. Neel et al. (2018) similarly found no significant group differences in total behavioural difficulties between preterm children with and without parents who had coercive parenting styles. However, they revealed significantly more total difficulties in children with parents who had hostile/critical parenting styles (Neel et al., 2018). This effect was large and not consistent with the current study (Neel et al., 2018). Though the current study did indicate a small effect between groups after confounder

adjustment for global behavioural symptoms, results remained not statistically significant. This was unexpected due to the *very preterm* nature of the current study's sample. As described in Section 1.4.1, children born at early gestational ages are at greatest risk of poor behavioural functioning (Behrman & Butler, 2007). Thus, it was expected that with participants born <29 weeks gestation, total behavioural problems would prevail. However, it is possible that child behavioural difficulties were mediated by the wellbeing of mothers in the current study. Research has highlighted that the way a mother parents her child is dependent on her levels of stress, anxiety, and depression (Muller-Nix et al., 2004; Zelkowitz et al., 2009). Korja et al. (2014) also emphasised the dependency of child behaviour on parents' wellbeing. Thus, it is possible that mothers in the current sample were experiencing lower levels of negative mental wellbeing, when compared to the levels of maternal mental wellbeing in Neel et al.'s study, and so children had reduced scores in overall behavioural symptoms. Therefore, whilst DPSs appear to have no significant association with global behavioural difficulties in the current study, consolidation of this finding is required with maternal mental well-being controlled for.

4.2.2 Clinically-significant behavioural problems.

Furthermore, after confounder adjustment, logistic regression revealed partial support for Hypothesis 2, that preterm children with parents who had DPSs would have more behavioural problems that were indicative of clinical significance. Supporting the hypothesis, odds ratios (ORs) revealed DPSs were associated with almost two times greater probability of preterm children presenting with clinically-significant conduct problems. This is consistent with the elevated symptoms of conduct difficulties discussed in Section 4.2.1, and highlights an excess of these problems in children with caregivers who had dysfunctional parenting. Though Neel et al.'s (2019) study focused on the probability of poor behavioural functioning more generally,

rather than the probability of poor functioning in a clinical range, they similarly discovered a three times greater probability of preterm children displaying aggressive and rule-breaking behaviour when they had parents with permissive parenting styles. Thus, the finding of increased odds of clinically-significant conduct problems in preterm children with parents who had DPSs is a consistent finding across research studies.

Consistent with the findings of no significant association between DPSs and increased symptoms of emotional, hyperactivity, peer, and total behavioural difficulties in children born preterm as discussed in Section 4.2.1, children with parents who had DPSs did not have a greater probability of presenting with clinical scores in these domains. This did not support the current hypothesis. Consideration of whether there are increased odds of being within the clinical range is novel to this area of research, and as such, there are limited studies available for comparison. However, Neel et al.'s (2019) study using logistic regression reported similar results for emotional symptoms; there was no greater probability of preterm children with parents who had permissive parenting styles displaying anxious, withdrawn, and depressed behaviours. Authoritarian parenting, also, was not associated with greater odds for emotional symptoms (Neel et al., 2019). However, as previously mentioned, Neel et al. examined the probability of presenting with increased symptoms more generally rather than in a clinical range. Though there was no significant association between dysfunctional parenting and clinically-significant emotional, hyperactivity, and total behavioural difficulties in the current study, the proportion of children exhibiting clinically-significant scores in these domains, for those with parents who had DPSs, exceeded the proportions for those with parents who did not have DPSs (Refer to Figure 1 for comparison of SDQ clinically-significant scores). Therefore, whilst current analyses

produced no significant findings in these domains, DPSs must not be disregarded as factor associated with clinically-significant behavioural problems in children born preterm.

4.3 Implications

Findings from this study provide important implications to a largely overlooked area of literature. With over one third of the preterm cohort having caregivers with DPSs, it is apparent that lax, over-reactive, and hostile parenting styles are quite common in parents with premature-born children. Thus, it is important that professionals understand the differential effects that parenting styles of caregivers can/may have for preterm children. Due to the significant association found between DPSs and poor conduct, it is crucial that parents of preterm children are routinely assessed for their styles of parenting, in addition to routine child assessments already administered. This will enable clinicians to identify preterm children with parents who have dysfunctional discipline, and to intervene with strategies aimed at promoting calm/cooperative child behaviours, and positive parenting.

Also important to the association found between dysfunctional parenting and conduct problems is the ability for it to be identified as early as 5 years of age. This highlights the potential to alleviate conduct problems before they endure into later life. If parental assessments are included in existing routine follow-up assessments for preterm children, professionals may be able to detect clinically concerning functioning in this area early and intervene early. This could significantly reduce the amount of such children exhibiting clinically-significant conduct problems at school-age.

4.4 Strengths and Limitations

The current study expands the limited amount of existing literature regarding the psychological development of preterm children with parents who have negative parenting styles. It is the first investigation, to the author's knowledge, that examines the association between parenting styles and behavioural outcomes in a cohort of preterm children that is exclusive of infants. The findings are important because they indicate that significant associations between DPSs and poor conduct functioning can be detected in a large sample including only those with stable and established behaviours, and as early as 5 years corrected-age. The findings also affirm some of the existing literature where trends between negative parenting styles and the behavioural difficulties of preterm children in emotional, hyperactive, social, and total functioning domains have not reached significance. Therefore, findings from the current study are valuable to clinicians in supporting caregivers with negative parenting styles to improve the development of children born preterm.

Another strength lies in the study sample's inclusion of participants born as early as 23 weeks gestation, and its restriction to children born <29 weeks gestation. Previous research in this area has not involved children born prior to 26 weeks gestation, this mostly being due to the rare survival of infants delivered prior to this age. However, advancements in perinatal care have enabled the current study's investigation of those born *very preterm* and *extremely preterm*, who are now surviving (Arpi & Ferrari, 2013). When infants born below 29 weeks gestation have been previously included in samples, the samples have also included participants born at later gestational ages. Thus, the current study has also enabled investigation of only those at greatest risk of developmental deficits (Arpi & Ferrari, 2013).

A further strength of this study is the use of the SDQ and PS measures; both of which are well-validated and have demonstrated sound psychometric properties (Arney et al., 2008; Croft et al., 2015). Additionally, analyses allowed for adjustment of potential confounders that have been known to affect parenting and preterm child behaviours (Poehlmann et al., 2011). Inclusion of participants from multiple hospitals across Australia is also of strength to this study as this comes with the inclusion of families from varied socioeconomic backgrounds, thus enhancing the representativeness of the current sample and generalisability of findings to the wider Australian population.

Limitations should also be considered when interpreting the findings of this study. Firstly, there was no comparison group of children who were born full-term to conclude preterm children as more at risk of poor conduct, or more at risk of having caregivers with DPSs. The study was also unable to control for all potential confounding variables. It did not have access to measures of maternal mental wellbeing and socio-demographic information in relation to family income, parental employment, and caregivers' number of dependent children; variables that have been known to affect parenting and preterm child behaviour (Poehlmann et al., 2011). Moreover, inability to conclude a directional relationship between DPSs and preterm child behaviour is another limitation, as it remains unknown as to whether dysfunctional parenting influenced poor child conduct or whether poor child conduct influenced dysfunctional parenting.

In addition, while the SDQ and PS have sound psychometric properties, they are subject to potential biases. As the SDQ assesses child behaviour based on single-informant responses, it is possible that rater bias could have influenced results. Some parents may have under-reported problematic child behaviours with aims for their child to be viewed as having 'normal' behaviour (Arpi & Ferrari, 2013). They could have also over-reported problems for their child to be

perceived as vulnerable (Månsson et al., 2014). It is also possible that responses were influenced by the emotional state of parents at the time of questionnaire completion (Lagattuta et al., 2012; Peralta-Carcelen et al., 2013). Moreover, social desirability bias on the PS, such as parents untruthfully answering the PS to be perceived as a 'non-aggressive' parent, could have weakened the reliability of results. However, given that parents wanted to engage in the study to benefit the future preterm population, it may be that most parental responses on the questionnaires were honest.

Another constraint of the SDQ is that it can only be used as a screening tool for detection of behavioural deficits, rather than provide diagnosis as would be permitted if children were assessed by clinicians through observation or interview. Its cut-off points, which indicate scores of clinical significance, are also based on normative data for preschool-age children in the United Kingdom (Goodman, 1997). Therefore, the relevance of these cut-off points to an Australian sample may be questionable and needs to be validated.

4.5 Future Research Directions

In line with this study's findings and limitations, there are a number of suggestions for future research. Firstly, replication of the current findings is important to establish a larger body of evidence surrounding DPSs and child behaviours within a preterm population. Examination of findings by cultural background or socio-economic factors in the current sample would also increase the generalisability of results to the broader preterm population. Moreover, replication with a comparison group of children born full-term would investigate whether children born preterm with parents who have dysfunctional parenting are more at risk of conduct problems. Continued research with new preterm cohorts is also necessary due to continuing advancements

in neonatal care and the increasing survival rate of those born at very early gestational ages (Arpi & Ferrari, 2013).

Future research should additionally aim to use more than just a single informant on the SDQ for a more comprehensive and valid assessment of child behaviour, such as by acquiring both parental and teacher reports (Nelson & Harwood, 2011). Combining the SDQ with behavioural assessments, such as observational measures or interviews, is another suggestion which future research should endeavor. In relation to the PS, anonymity would increase motivation for truthful responses, and thus a future study should ensure this.

Finally, the association between DPSs and child behaviour in a preterm population will need to be examined longitudinally, with all socio-economic and relational factors controlled for, to assess the stability of these findings over time. Longitudinal examination would also enable exploration of a potential predictive relationship between the two variables, and it would assess any long-term implications that child behaviour may have on styles of parenting, or that styles of parenting may have on child behaviour, within a preterm population. It might be that a future study re-examines the cohort being studied at present, when the children reach a later age.

4.6 Conclusion

The present study makes an important contribution to the literature by examining behavioural functioning in children born at very early gestational ages, who have now reached 5 years of age, with and without parents who had DPSs. The main findings of the study indicated that those with parents who had DPSs displayed more symptoms of poor conduct functioning and had almost two times greater probability of presenting with difficulties of clinical concern in this domain. These findings suggest that DPSs are associated with deficits in child conduct domains, beyond

the effects of PTB alone. This highlights the importance of routine parental assessments, in addition to existing child behavioural assessments, to detect dysfunctional styles of parenting and enable targeted intervention before poor child conduct progresses into adolescence.

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Appendices

Appendix A – The 10 Australian Study Locations Eligible for Participation in Follow-up Assessments

Study Locations:

Flinders Medical Centre Flinders Drive BEDFORD PARK, SA 5042	**King Edward Memorial Hospital** 374 Bagot Road SUBIACO, WA 6008
Monash Children's Hospital 246 CLAYTON Road CLAYTON, VIC 3168	**John Hunter Children's Hospital** Locked Bag 1, Hunter Region Mail Centre, NSW 2310
Royal Hospital for Women Barker Street RANDWICK, NSW 2031	**The Royal Women's Hospital** 20 Flemington Road PARKVILLE, VIC 3052
Liverpool Hospital Elizabeth Street LIVERPOOL, NSW 2170	**Mater Mother's Hospital** Raymond Terrace SOUTH BRISBANE, QLD 4101
Mercy Hospital for Women 163 Studley Road HEIDELBERG, VIC 3084	**Women's and Children's Hospital** 72 King William Road NORTH ADELAIDE, SA 5006

Appendix B- Parenting Scale (PS)

At one time or another, all children misbehave or do things that could be harmful, that are "wrong", or that parents don't like. Examples include: hitting someone, whining or complaining, damaging things, forgetting homework, leaving things lying around, lying, being over-emotional, refusing to follow requests, breaking family rules, swearing, taking other people's things, staying out late.

Parents have many different ways or styles of dealing with these types of problems. Below are items that describe some styles of parenting. For each item, circle the number that best describes your style of parenting during the past 2 months with your child.

Sample Item

At meal time...

I let my child decide what to eat.	1	(2)	3	4	5	6	7	I decide what my child eats.

1. When my child misbehaves...

I do something right away	1	2	3	4	5	6	7	I do something about it later

2. Before I do something about a problem...

I give my child several reminders or warnings	1	2	3	4	5	6	7	I use only one reminder or warning

3. When I'm upset or under stress...

I am picky and on my child's back	1	2	3	4	5	6	7	I am no more picky than usual

4. When I tell my child not to do something...

I say very little	1	2	3	4	5	6	7	I say a lot

5. When my child pesters me...

I can ignore the pestering	1	2	3	4	5	6	7	I can't ignore the pestering

6. When my child misbehaves...

I usually get into a long argument with my child	1	2	3	4	5	6	7	I don't get into an argument

7. I threaten to do things that…

I am sure I can carry out	1	2	3	4	5	6	7	I know I won't actually do

8. I am the kind of parent that...

sets limits on what child is allowed to do	1	2	3	4	5	6	7	lets my child do whatever he or she wants

9. When my child misbehaves...

I give my child a long lecture	1	2	3	4	5	6	7	I keep my talks short and to the point

10. When my child misbehaves...								
I raise my voice or yell	1	2	3	4	5	6	7	I speak to my child calmly
11. If saying no doesn't work right away...								
I take some other kind of action	1	2	3	4	5	6	7	I keep talking and trying to get through to my child
12. When I want my child to stop doing something...								
I firmly tell my child to stop	1	2	3	4	5	6	7	I coax or beg my child to stop
13. When my child is out of my sight...								
I often don't know what my child is doing.	1	2	3	4	5	6	7	I always have a good idea of what my child is doing
14. After there's been a problem with my child...								
I often hold a grudge	1	2	3	4	5	6	7	things get back to normal quickly
15. When we're not at home...								
I handle my child the way I do at home	1	2	3	4	5	6	7	I let my child get away with a lot more
16. When my child does something I don't like...								
I do something about it every time it happens	1	2	3	4	5	6	7	I often let it go
17. When there's a problem with my child...								
things build up and I do things I don't mean to do	1	2	3	4	5	6	7	things don't get out of hand
18. When my child misbehaves, I spank, slap, grab, or hit my child ...								
never or rarely	1	2	3	4	5	6	7	most of the time
19. When my child doesn't do what I ask...								
I often let it go or end up doing it myself	1	2	3	4	5	6	7	I take some other action
20. When I give a fair threat or warning...								
I often don't carry it out	1	2	3	4	5	6	7	I always do what I said
21. If saying "No" doesn't work...								
I take some other kind of action	1	2	3	4	5	6	7	I offer my child something nice so he/she will behave
22. When my child misbehaves...								
I handle it without getting upset	1	2	3	4	5	6	7	I get so frustrated or angry that my child can I'm upset

23. When my child misbehaves…

I make my child tell me why he/she did it	1	2	3	4	5	6	7	I say "No" or take some other action

24. When my child misbehaves and then acts sorry…

I handle the problem like I usually would	1	2	3	4	5	6	7	I let it go that time

25. When my child misbehaves…

I rarely use bad language or curse	1	2	3	4	5	6	7	I almost always use bad language

26. When I say my child can't do something…

I let my child do it anyway	1	2	3	4	5	6	7	I stick to what I said

27. When I have to handle a problem…

I tell my child I am sorry about it	1	2	3	4	5	6	7	I don't say I am sorry

28. When my child does something I don't like, I insult my child, say mean things, or call my child names…

never or rarely	1	2	3	4	5	6	7	most of the time

29. If my child talks back or complains when I handle a problem…

I ignore the complaining and stick to what I said	1	2	3	4	5	6	7	I give my child a talk about not complaining

30. If my child gets upset when I say "No"…

I back down and give in to my child	1	2	3	4	5	6	7	I stick to what I said

Appendix C- Parent-Reported SDQ Clinically-Significant Score Ranges (Goodman, 1997)

	Clinically-Significant Score Range
SDQ Symptom Scale[a]	
Emotional Symptoms	4-10
Conduct Problems	3-10
Hyperactivity	6-10
Peer Problems	3-10
SDQ Total Difficulties[b]	14-40

Note. SDQ= Strengths and Difficulties Questionnaire.
[a]Scale range: 0-10; [b]Scale range: 0-40.
Clinical range includes borderline-abnormal scores.

Appendix D- Skewness and Kurtosis Values for Outcomes Measures

D.1 Children with parents who did not have dysfunctional parenting styles – Skewness and kurtosis for SDQ scales and PS total score

	N	Skewness		Kurtosis	
	Statistic	Statistic	St. Error	Statistic	St. Error
Emotional Symptoms	280	1.021	.146	.606	.290
Conduct Problems	280	1.013	.146	.459	.290
Hyperactivity	280	.143	.146	-.922	.290
Peer Problems	280	1.395	.146	2.349	.290
SDQ Total Difficulties	280	.764	.146	.144	.290
PS Total Score	280	-.299	.146	-.941	.290

a. Dysfunctional parenting styles = No
Note. SDQ= Strengths and Difficulties Questionnaire; PS= Parenting Scale.

D.2 Children with parents who had dysfunctional parenting styles – Skewness and kurtosis for SDQ scales and PS total score

	N	Skewness		Kurtosis	
	Statistic	Statistic	St. Error	Statistic	St. Error
Emotional Symptoms	160	.713	.192	-.059	.381
Conduct Problems	160	.625	.192	.189	.381
Hyperactivity	160	.032	.192	-.576	.381
Peer Problems	160	1.325	.192	1.828	.381
SDQ Total Difficulties	160	.746	.192	.060	.381
PS Total Score	160	1.018	.192	.486	.381

a. Dysfunctional parenting styles = Yes
Note. SDQ= Strengths and Difficulties Questionnaire; PS= Parenting Scale.

Appendix E- SPSS Output: One-way Analysis of Covariance (ANCOVA) Analyses to Adjust Mean SDQ Scale and Total Scores for Confounding Variables

Note. In all cases, ANCOVA analyses are adjusted for maternal birth-age, maternal education less than completed high-school education, and sole-parent household. Bolded output is referred to in the thesis. SDQ= Strengths and Difficulties Questionnaire; PS_Parentalgroup= parental group with or without dysfunctional parenting styles.

E.1 One-way ANCOVA output for SDQ Emotional Symptoms

Tests of Between-Subjects Effects

Dependent Variable: SDQ_Emotional

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	23.283[a]	4	5.821	1.280	.277	.012	5.119	.401
Intercept	137.361	1	137.361	30.199	.000	.065	30.199	1.000
Maternal_Birthage	8.740	1	8.740	1.922	.166	.004	1.922	.282
Maternaledu_lessthanhighschool	.823	1	.823	.181	.671	.000	.181	.071
Singleparent_household	10.522	1	10.522	2.313	.129	.005	2.313	.329
PS_Parentalgroup	2.143	1	2.143	**.471**	**.493**	**.001**	.471	.105
Error	1978.572	435	4.548					
Total	4712.000	440						
Corrected Total	2001.855	439						

a. R Squared = .012 (Adjusted R Squared = .003)

b. Computed using alpha = .05

E.2 One-way ANCOVA output for SDQ Conduct Problems

Tests of Between-Subjects Effects

Dependent Variable: SDQ_Conduct

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	72.476[a]	4	18.119	4.361	.002	.039	17.442	.933
Intercept	168.243	1	168.243	40.490	.000	.085	40.490	1.000
Maternal_Birthage	22.339	1	22.339	5.376	.021	.012	5.376	.638
Maternaledu_lessthanhighschool	2.290	1	2.290	.551	.458	.001	.551	.115
Singleparent_household	16.439	1	16.439	3.956	.047	.009	3.956	.510
PS_Parentalgroup	20.554	1	20.554	**4.946**	**.027**	**.011**	4.946	.602
Error	1807.515	435	4.155					
Total	4424.000	440						
Corrected Total	1879.991	439						

a. R Squared = .039 (Adjusted R Squared = .030)

b. Computed using alpha = .05

E.3 One-way ANCOVA output for SDQ Hyperactivity

Tests of Between-Subjects Effects

Dependent Variable: SDQ_Hyperactivity

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	67.151[a]	4	16.788	3.628	.006	.032	14.512	.876
Intercept	461.903	1	461.903	99.823	.000	.187	99.823	1.000
Maternal_Birthage	18.115	1	18.115	3.915	.048	.009	3.915	.506
Maternaledu_lessthanhighschool	23.447	1	23.447	5.067	.025	.012	5.067	.613
Singleparent_household	4.431	1	4.431	.958	.328	.002	.958	.164
PS_Parentalgroup	2.842	1	2.842	**.614**	**.434**	**.001**	.614	.122
Error	2012.840	435	4.627					
Total	13100.000	440						
Corrected Total	2079.991	439						

a. R Squared = .032 (Adjusted R Squared = .023)

b. Computed using alpha = .05

E.4 One-way ANCOVA output for SDQ Peer Problems

Tests of Between-Subjects Effects

Dependent Variable: SDQ_Peer

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	8.645[a]	4	2.161	.600	.663	.005	2.398	.198
Intercept	45.288	1	45.288	12.564	.000	.028	12.564	.943
Maternal_Birthage	.245	1	.245	.068	.794	.000	.068	.058
Maternaledu_lessthanhighschool	3.662	1	3.662	1.016	.314	.002	1.016	.172
Singleparent_household	1.986	1	1.986	.551	.458	.001	.551	.115
PS_Parentalgroup	.972	1	.972	**.270**	**.604**	**.001**	.270	.081
Error	1567.935	435	3.604					
Total	3013.000	440						
Corrected Total	1576.580	439						

a. R Squared = .005 (Adjusted R Squared = -.004)

b. Computed using alpha = .05

E.6 One-way ANCOVA output for SDQ Total Difficulties

Tests of Between-Subjects Effects

Dependent Variable: SDQ_Total_Difficulties

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	516.965[a]	4	129.241	3.838	.004	.034	15.352	.895
Intercept	2799.731	1	2799.731	83.144	.000	.160	83.144	1.000
Maternal_Birthage	154.603	1	154.603	4.591	.033	.010	4.591	.571
Maternaledu_lessthanhighschool	54.200	1	54.200	1.610	.205	.004	1.610	.244
Singleparent_household	116.913	1	116.913	3.472	.063	.008	3.472	.460
PS_Parentalgroup	75.159	1	75.159	**2.232**	**.136**	**.005**	2.232	.320
Error	14647.833	435	33.673					
Total	75373.000	440						
Corrected Total	15164.798	439						

a. R Squared = .034 (Adjusted R Squared = .025)

b. Computed using alpha = .05

Appendix F- Frequencies of Clinically-Significant SDQ Behavioural Problems in Preterm Children with and without Parents who had Dysfunctional Parenting Styles

Behaviours in the Clinical Range, *n* (%)	Children with Parents who had Dysfunctional Parenting Styles (*n*= 160)	Children with Parents who did not have Dysfunctional Parenting Styles (*n*= 280)
SDQ Symptom Scale[a]		
Emotional Symptoms	50 (31.3)	71 (25.4)
Conduct Problems	79 (49.4)	101 (36.1)
Hyperactivity	66 (41.3)	108 (38.6)
Peer Problems	46 (28.7)	82 (29.3)
SDQ Total Difficulties[b]	56 (35.0)	86 (30.7)

Note. SDQ= Strengths and Difficulties Questionnaire.
Refer to Appendix C for all parent-reported SDQ clinically-significant score ranges.
[a]Scale range 0-10; [b]Scale range 0-40.

Appendix G- SPSS Output: Adjusted Analyses for the Odds of Clinically-Significant SDQ Behavioural Problems in Children who had Parents with Dysfunctional Parenting Styles

Note. In all cases, multiple logistic regression is adjusted for maternal birth-age, maternal education less than completed high-school education, and sole parent household. These were entered at Block 1 simultaneously. PS_parentalgroup was entered at Block 2. Selected Block 2 output is presented below. Bolded output is referred to in the thesis. SDQ= Strengths and Difficulties Questionnaire; PS_Parentalgroup= Parental group with or without dysfunctional parenting styles.

G.1 Multiple logistic regression output for SDQ Emotional Symptoms

Block 2: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	1.902	1	.168
	Block	**1.902**	1	**.168**
	Model	6.823	4	.146

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Maternal_birthage	-.029	.019	2.298	1	.130	.971	.935	1.009
	Maternaledu_lessthanhighschool(1)	-.267	.258	1.067	1	.302	.766	.462	1.270
	Singleparent_household(1)	.503	.347	2.098	1	.147	1.653	.837	3.262
	PS_Parentalgroup(1)	.306	.221	1.915	1	.166	**1.359**	**.880**	**2.097**
	Constant	-.175	.626	.078	1	.780	.839		

a. Variable(s) entered on step 1: PS_Parentalgroup.

G.2 Multiple logistic regression output for SDQ Conduct Problems

Block 2: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	7.946	1	.005
	Block	**7.946**	1	**.005**
	Model	11.702	4	.020

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Maternal_birthage	-.024	.018	1.866	1	.172	.976	.943	1.011
	Maternaledu_lessthanhighschool(1)	.013	.230	.003	1	.956	1.013	.645	1.591
	Singleparent_household(1)	.423	.331	1.636	1	.201	1.527	.798	2.921
	PS_Parentalgroup(1)	.572	.203	7.912	1	.005	**1.772**	**1.189**	**2.639**
	Constant	.117	.579	.041	1	.840	1.124		

a. Variable(s) entered on step 1: PS_Parentalgroup.

G.3 Multiple logistic regression output for SDQ Hyperactivity

Block 2: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	.500	1	.480
	Block	**.500**	1	**.480**
	Model	15.429	4	.004

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Maternal_birthage	-.044	.018	6.004	1	.014	.957	.923	.991
	Maternaledu_lessthanhighschool(1)	.473	.228	4.309	1	.038	1.604	1.027	2.507
	Singleparent_household (1)	.248	.334	.552	1	.458	1.282	.666	2.466
	PS_Parentalgroup(1)	.146	.207	.500	1	.479	**1.157**	**.772**	**1.735**
	Constant	.724	.586	1.529	1	.216	2.063		

a. Variable(s) entered on step 1: PS_Parentalgroup.

G.4 Multiple logistic regression output for SDQ Peer Problems

Block 2: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	.004	1	.953
	Block	**.004**	1	**.953**
	Model	.948	4	.918

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Maternal_birthage	-.002	.019	.013	1	.911	.998	.961	1.036
	Maternaledu_lessthanhighschool(1)	.202	.243	.696	1	.404	1.224	.761	1.970
	Singleparent_household (1)	.078	.352	.049	1	.825	1.081	.542	2.157
	PS_Parentalgroup(1)	-.013	.220	.004	1	.953	**.987**	**.642**	**1.518**
	Constant	-.885	.622	2.025	1	.155	.413		

a. Variable(s) entered on step 1: PS_Parentalgroup.

G.5 Multiple logistic regression output for SDQ Total Difficulties

Block 2: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	1.206	1	.272
	Block	**1.206**	1	**.272**
	Model	12.432	4	.014

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Maternal_birthage	-.042	.019	4.950	1	.026	.959	.924	.995
	Maternaledu_lessthanhighschool(1)	.144	.238	.366	1	.545	1.155	.724	1.842
	Singleparent_household(1)	.618	.334	3.433	1	.064	1.856	.965	3.570
	PS_Parentalgroup(1)	.236	.214	1.211	1	.271	**1.266**	**.832**	**1.927**
	Constant	.338	.606	.312	1	.576	1.403		

a. Variable(s) entered on step 1: PS_Parentalgroup.

Note Regarding Data Submission

Please note that the data used in this study from the N-3 (omega-3) Fatty Acids for Improvement in Respiratory Outcomes (N3RO) study remains property of the Women's and Children's Health Research Institute of South Australia. Therefore, it cannot be supplied in accordance with the Psychology Honours thesis submission requirements.