Universidade do Minho
Escola de Psicologia

Carolina Antunes Toscano

Self-regulation in children born preterm: The role of fathers' and mothers' perceptions and behaviors

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Self-regulation in children born preterm: The role of fathers' and mothers' perceptions and behaviors

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e da
Professora Doutora Judi Mesman

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

Auto-regulação em crianças nascidas prematuras: O papel das percepções e comportamentos dos pais e das mães

RESUMO

A prematuridade impõe desafios enormes para as crianças e para os pais. Uma área do desenvolvimento na qual as crianças nascidas prematuras poderão estar em risco é a auto-regulação. O desenvolvimento da auto-regulação depende da socialização parental, embora poucos estudos tenham examinado os processos parentais envolvidos na auto-regulação de crianças prematuras. O objetivo desta dissertação foi examinar a inter-relação entre a prematuridade, as percepções dos pais e das mães acerca da vulnerabilidade da criança, comportamentos parentais de superproteção e sensibilidade, e as competências de auto-regulação das crianças aos 3 anos e meio de idade. Foram realizados quatro estudos. O primeiro estudo produziu uma meta-análise que examinou a relação entre a prematuridade e o controlo parental, incluindo a superproteção. Os resultados sugeriram que os pais de crianças prematuras se envolveram mais em comportamentos de controlo parental do que os pais de crianças nascidas de termo. O segundo estudo examinou os fatores parentais e da criança associados com a superproteção parental em pais de crianças prematuras. Os resultados apontaram para o baixo nível de desenvolvimento da criança e a desvantagem socioeconómica da família como preditores significativos de superproteção, e não as percepções acerca da vulnerabilidade da criança. O terceiro estudo examinou as relações entre a prematuridade, superproteção parental, e as competências autorregulatórias de controlo por esforço da criança. Os pais de crianças muito prematuras exibiram mais comportamentos de superproteção do que os pais de crianças de termo, mas estas diferenças foram explicadas pelo nível socioeconómico da família. As crianças prematuras exibiram menor controlo por esforço do que os seus pares nascidos de termo, o qual foi predito não só pela idade gestacional mas também pela superproteção parental dos pais e das mães. Finalmente, o quarto estudo examinou as relações entre a prematuridade, sensibilidade parental, e cooperação e negatividade da criança na interação com os pais, considerando o papel do género parental e da criança. Não se verificou associação entre a prematuridade com a sensibilidade parental e a cooperação e negatividade das crianças. Os rapazes prematuros exibiram menor cooperação e maior negatividade do que as raparigas prematuras. Os resultados da dissertação são discutidos em termos de implicações para a investigação e prática clínica com famílias de crianças nascidas prematuras, afunilados no contexto dos serviços de saúde portugueses.

Palavras-chave: auto-regulação, mães, pais, parentalidade, prematuridade

Self-regulation in children born preterm: The role of fathers' and mothers' perceptions and behaviors

ABSTRACT

Prematurity imposes enormous challenges for children and parents. One area of development in which children born preterm may be at risk is self-regulation. The development of self-regulation is dependent on parental socialization, although few studies have examined the parental processes involved in the self-regulation outcomes of children born preterm. The goal of this doctoral dissertation was to examine the interplay between prematurity, fathers' and mothers' perceptions of child vulnerability, parenting behaviors in terms of overprotection and sensitivity, and children's self-regulation skills at age 3½ years old. Four studies were conducted. The first study provided a meta-analysis examining the relation between prematurity and controlling, overprotective parenting. Results suggested that parents of preterm-born children engaged in more controlling parenting behaviors than parents of full-term-born children. The second study examined the child and parental factors associated with overprotective parenting in preterms' parents. Results pointed to lower child developmental level and family's socioeconomic disadvantage as significant predictors of overprotection, while parents' perceptions of child vulnerability were not a significant predictor. The third study examined the relations between prematurity, overprotective parenting, and children's self-regulatory effortful control skills. Results showed that parents of very preterm children exhibited more overprotective behavior than parents of full-term children, but differences were accounted for by the family's socioeconomic status. Preterm children exhibited poorer effortful control than their full-term peers, which was predicted not only by children's gestational age but also by higher overprotective parenting of fathers and mothers. Finally, the fourth study examined the relations between prematurity, sensitive parenting, and children's self-regulated compliance and non-negativity in interaction with parents, considering the role of parental and child gender. Results revealed no relation of prematurity with sensitive parenting and with children's compliance and negativity. Preterm boys exhibited less compliance and more negativity than preterm girls. The findings of this dissertation are discussed in terms of implications for research and clinical practice with families of preterm-born children, narrowed to the context of the Portuguese healthcare services.

Keywords: self-regulation, mothers, fathers, parenting, prematurity

INDEX

LIST OF ABBREVIATIONS

ANCOVA – Analysis of Covariance

ANOVA - Analysis of Variance

BSI - Brief Symptom Inventory

CFI - Comparative Fit Index

CSMCI - Coding System for Mother-Child Interactions

CVS - Child Vulnerability Scale

EFCNI - European Foundation for the Care of Newborn Infants

ICC – Intraclass Correlation

IQ - Intelligence Quotient

ML - Maximum Likelihood

MLM - Multilevel Linear Modeling

NICU – Neonatal Intensive Care Unit

NIDCAP - Newborn Individualized Developmental Care and Assessment Program

PCA - Principal Component Analysis

PPS - Parent Protection Scale

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

RMSEA - Root Mean Square Error of Approximation

SES – Socioeconomic Status

SNS - National Health System

SRMR - Standardized Root Mean Square Residual

VIPP-SD - Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline

WHO - World Health Organization

WPPSI - Wechsler Preschool and Primary Scales of Intelligence

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CHAPTER 1

GENERAL INTRODUCTION

A human embryo takes 37 weeks of gestation to grow and develop enough to be ready to start exploring life in the outside world. Preterm birth occurs when a baby is born before the completion of those 37 weeks, facing the risk of disability or, at worst, death, because their physiological function is not fully matured (World Health Organization [WHO], 1977). Preterm birth is a health and social challenge growing globally (March of Dimes et al., 2012), and imposes enormous physical, psychological, and emotional challenges for the child and for the parents that may continue beyond hospital discharge (Goldberg & DiVitto, 2002; Wolke et al., 2019). In light of this, in the last years, there has been a growing interest from the research community and policy agendas in assessing and understanding the long-term implications of prematurity. Although the journey to such knowledge is still long. One area of development in which children born preterm may be at risk is self-regulation (Voigt et al., 2012; Witt et al., 2014; Woodward et al., 2017). However, little is known about the factors and mechanisms that may lead to such problems. The examination of the role of parenting is crucial - however scarce - given that the development of self-regulation is dependent on parental socialization (Kochanska et al., 2000; Kopp, 1982; Sroufe, 1995), and preterm birth may have a significant impact on parents' perceptions and behaviors towards their child (Clark & Woodward, 2015; Potharst et al., 2015). A better understanding of the long-term implications of prematurity on the parents and child outcomes is crucial for the improvement of the quality of care and quality of life of these families. In a recent report from the European Foundation for the Care of Newborn Infants ([EFCNI], 2011), parents around Europe, including Portugal, stressed the need for better information about the developmental effects of prematurity and guidance around the care of their babies. In an attempt to give voice to those parents, this dissertation sought to examine the interplay between prematurity, parents' perceptions and behaviors, and children's self-regulation skills.

1. Prematurity as a Rising Global Problem

Every year, about 15 million babies are born prematurely around the world, with numbers rising over the last two decades in almost all countries where data is available (Chawanpaiboon et al., 2019; Euro-Peristat, 2018). Preterm birth represents a high health, social, and economic burden for

both high- and low-income countries, although it is more prevalent in the poorest countries. About 80% of preterm births occur in Asia and sub-Saharan Africa (Chawanpaiboon et al., 2019). In Europe, about 1 in 10 babies are born preterm, comprising Europe's largest child patient group, and disproportionately affecting families with lower socioeconomic status (SES) (March of Dimes et al., 2012). Prevalence rates vary widely between European countries, from 5% to 12% (Euro-Peristat, 2018). In Portugal, a high-income country, the prevalence of preterm birth has increased from 5.6% in 2001 to 7.4% in 2011 and 8.0% in 2019 (Instituto Nacional de Estatística, 2020). According to the last report comparing preterm rates within Europe, in 2015, Portugal held the 7th highest rate (Euro-Peristat, 2018). Based on the gestational age, preterm birth can be classified as extremely preterm (<28 weeks of gestation), very preterm (28 to <32 weeks of gestation), and moderate-to-late preterm (32 to <37 weeks of gestation) (WHO, 1977). In Portugal, in 2015, moderately-to-late preterm births accounted for 87.5% of all preterm births, followed by very preterm (10%), and extremely preterm births (2.5%), in line with Europe's average rates (Chawanpaiboon et al., 2019; Euro-Peristat, 2018). For the purpose of this study, we will refer to very preterm children to all of those born before 32 weeks of gestation, thus including both extremely and very preterms.

Most often, the specific cause of a preterm birth is not possible to establish (March of Dimes et al., 2012). Nevertheless, multiple biological, clinical, social, and behavioral factors have been identified as increasing the risk of preterm labor (Behrman et al., 2007). These include young or advanced maternal age, short interpregnancy intervals, multiple pregnancies, underweight or obesity, micronutrient deficiencies, maternal chronic conditions such as diabetes, anemia, and high blood pressure, infectious diseases such as HIV and other sexually transmitted diseases, smoking and substance use, and psychosocial stressors such as depression, socioeconomic disadvantage, intimate partner violence, and high stress levels (Behrman et al., 2007; March of Dimes et al., 2012). Recent evidence also pointed to a possible genetic influence (Plunkett & Muglia, 2008). The role of socioeconomic disadvantage is particularly important, underlying the co-occurrence of many other risk factors (Behrman et al., 2007), and explaining the higher rates in the lower-income countries, where there is more poverty and less educational opportunities for women (Blencowe et al., 2012). Education and empowerment of women reduce adolescent pregnancy, promotes family planning and healthy lifestyles, and reduces smoking, substance use, and sexual risky behaviors that might lead to unintended pregnancies and sexually transmitted diseases (Kramer et al., 2000; Zuilkowiski & Jukes, 2012). Better socioeconomic circumstances also promote better antenatal care, better maternal nutrition, and better monitoring of pregnancy (Larrañaga et al., 2013).

The continuous rise of preterm rates in European countries and, in particular, in Portugal, may be mainly explained by increasing maternal age and underlying chronic health problems, and by increasing multiple pregnancies due to greater access to assisted reproductive technology and delayed childbearing (EFCNI, 2011; Euro-Peristat, 2018; Fuster & Santos, 2016). It may also be related to the difficult economic situation that the country has been facing in the last years, following a major financial crisis that started in 2008 and increased people's exposure to psychosocial stressors such as socioeconomic disadvantage, stress, and depression (Kana et al., 2017; Legido-Quigley et al., 2016). However, it is important to note that some of the increase in rates may also be accounted for by improved measurement and registration of preterm deliveries (Blencowe et al., 2012; March of Dimes et al., 2012).

Facing increasing rates of preterm birth globally, it is thus crucial to understand the impact that prematurity can have on the child and on parents.

2. The Impact of Prematurity on the Child

Prematurity is one of the leading causes of infant mortality and morbidity in both low- and high-income countries (Liu et al., 2015). Born too soon, preterm babies' physiological function is not fully matured for the extrauterine life. They may have several life-threatening neonatal medical complications and need support to survive. Typical complications include breathing problems that require intubation, such as apnoea, respiratory distress, and bronchopulmonary dysplasia, severe infections, hypothermia, hypoglycemia, jaundice, retinopathy of prematurity, anemia of prematurity, brain lesions such as intraventricular hemorrhage and periventricular leukomalacia, gastroesophageal reflux, and/or feeding difficulties that require tube feeding (Behrman et al., 2007; March of Dimes, 2012). In general, the sooner the baby is born, the more immature they are, and the greater is the risk for complications and need for life support (Manuck et al., 2016).

The invention of the incubator in the late 19th century marked the beginning of a growing effort in extending the limits of the viability of preterm birth. Since then, significant advances in medical technology and neonatal care have been made. The improvement of medical facilities including the setup of neonatal intensive care units (NICUs), interventions such as antenatal corticosteroids, Kangaroo care[1], individualized newborn care, and the improvement of staff training resulted in decreasing mortality and morbidity of preterm babies in most of the European countries (March of

[1] Kangaroo care is a method of care of infants born preterm that involves infants being carried, usually by the mother, with skin-to-skin contact.

Dimes et al., 2012). Portugal has one of the lowest neonatal mortality rates in Europe due to a high-quality preterm care system, with a survival rate of babies born before 32 weeks of gestation of approximately 90% (EFCNI, 2011). In 1991, Portugal was one of the first countries in Europe developing targeted policies for neonatal health by implementing a national Programme for Maternal and Infant Health that resulted in significant improvements in neonatal care and decrease in mortality rates. The programme introduced a system of centralized neonatal care, rationally distributed specialized equipment, improved qualified training for staff in neonatal services, and established a worldwide leading specialized transport system for pregnant women and newborn babies. In the neonatal units, the Kangaroo care is a standard technique, breastfeeding is promoted due to its perceived health benefits for the baby, and the Newborn Individualized Developmental Care and Assessment Program (NIDCAP)[2] has recently started being implemented (EFCNI, 2011). However, the survival chances of preterm babies vary greatly between low- and high-income countries due to dramatic differences in coverage and quality of care. The progress in reducing neonatal mortality in the lower-income countries has been much slower. In South Asia and sub-Saharan Africa, half of the babies born at 32 weeks still die because of a lack of simple and essential newborn care such as warmth, breastfeeding support, and basic care for infections and breathing difficulties, without even needing intensive care such as ventilation (March of Dimes et al., 2012).

The threats imposed by preterm birth go beyond mortality, and survivors face the risk for a variety of short- and long-term health and neurological disabilities. The disruption of the typical developmental progression of the brain and other organ systems and exposure to neonatal complications might result in disabilities such as cerebral palsy, mental retardation, visual and hearing impairments, motor impairments, respiratory illnesses (e.g., asthma), and/or feeding problems (Aylward, 2005; Berhrman et al., 2007; Hack et al., 2000). Furthermore, in the first few years of life, infants born preterm may require re-hospitalizations and frequent medical visits (Boyle et al., 219; Pinto et al., 2019), and experience more surgical procedures than infants born full-term (Hack et al., 1993).

Nevertheless, research has shown that even in the absence of major health and neurological disabilities, children born preterm are at increased risk for behavior, attention, social, and emotional problems (Arpi & Ferrari, 2013; Bhutta et al., 2002; Ritchie et al., 2015), and exhibit lower intelligence quotients (IQ), poorer language performance, more learning difficulties, and poorer academic performance than children born full-term (Aarnoudse-Moens et al., 2009; Aylward, 2005; Wolke et al.,

[2] The NIDCAP is an integrated and holistic form of family-centered developmental care that involves an individualized and nurturing approach to the care of infants in NICUs.

2019). Although most studies on the developmental outcomes of prematurity have focused on the first years of life, there is evidence that these problems might persist across the lifespan (Johnson & Marlow, 2014; Linsell et al., 2019). Adverse outcomes seem to be higher with decreasing gestational age, hence research has focused mainly on children born very preterm. However, emerging evidence has suggested that children born moderately-to-late preterm are also at higher risk for health disabilities, behavioral maladjustment, and academic problems compared with children born full-term (Boyle et al., 2012; Chyi et al., 2008; Talge et al., 2010). Therefore, the current dissertation covers a broad range of prematurity and focuses on children born very and moderately-to-late preterm.

3. The Impact of Prematurity on Parents

Preterm birth does not only affect the child. The delivery and care of a preterm-born infant is more stressful and challenging than those of a full-term infant and can have a significant impact on parents' psychological and emotional well-being and parenting behavior (i.e., parents' everyday behavior in interaction with their child) (Goldberg & DiVitto, 2002).

Pregnancy is an important adjustment period for parents' transition to parenthood. During its expected 37 weeks, parents prepare for their future role and build representations of the baby and themselves as parents (Rossi, 1968). The unexpected early time of a preterm birth disrupts parents' pregnancy developmental processes, interrupting parents' preparation for the parental role (for example, they may have not finished childbirth preparation classes or preparing the baby's room), and violating their representations of the birth, the baby, and the care that they were expected to provide (Pederson et al., 1987). The joy that usually surrounds a full-term birth gives way to suffering. Subsequently, parents may face their baby's hospitalization in the NICU during an unknown length, populated by machines that constantly signal noises of death, and numerous staff going in and out and performing multiple interventions on their tiny, fragile baby. They watch their baby fighting to survive, without being able of taking care of them on their own, and with limited opportunity to interact with them (Goldberg & DiVitto, 2002). The experience of preterm delivery and hospitalization may produce intense emotional responses in parents such as feelings of helplessness, loss of control, guilt, failure (especially for mothers, that often question the competence of their bodies), and high fear, uncertainty, and worry about their baby's survival and future (Goldberg & DiVitto, 2002; Miles & Holditch-Davis, 1997; Pederson et al., 1987). Several studies have found high levels of posttraumatic stress, anxiety, and depression in parents following preterm birth (Davis et al., 2003; Feeley et al., 2017), which may

even persist for months (Voegtline & Stifter, 2010) and years after birth (Treyvaud et al., 2014; Yaari et al., 2019).

The challenge that prematurity imposes on parents continues beyond delivery and hospitalization. Preterm babies differ from full-term babies in special needs and growth patterns and parents might, once again, have to readjust their expectations of their baby (Goldberg & DiVitto, 2002). Preterm babies continue to need close medical supervision due to their high risk for health and neurodevelopmental problems (Aylward, 2005; Berhrman et al., 2007). Because of their biological and neurological immaturity, they often accomplish developmental milestones later than full-term babies, which can provoke frustration and worry in parents (Goldberg & DiVitto, 2002); they are also less capable of modulating physiological and behavioral responses to the environment (DiPietro et al., 1992), which can impose difficulties for parents to interact with them. Some studies showed that the cries of preterm babies are more physiologically arousing to adults than the cries of full-term babies (Frodi et al., 1978) and that they tend to be more passive, less communicative and responsive (Field, 1981), and to provide less clear behavioral cues towards their parents (Singer et al., 2003). Furthermore, they usually have particular physical features that distinguish them from full-term babies (e.g., smaller size and less body fat) and stamp their preterm status and fragility (Hack et al., 1993).

The many challenges of delivering and caring for a preterm baby might interfere with the parents' perceptions of their child and the quality of parenting behavior. As the child grows and the danger has passed, parents may continue feeling high worry and fear for the child's health and safety (McCain, 1990), and continue to perceive their child as weak and vulnerable to illness or accidents, even when the child's current functioning does not justify that perception (Allen et al., 2004; Potharst et al., 2015). Parents' excessive worry and perception of child vulnerability can lead to difficulty with separation from the child (Thomasgard & Metz, 1999) and controlling parenting behaviors (i.e., behaviors that provide that child with excessive external control) such as overprotection, which is a level of parental protection that is excessive considering the developmental level and abilities of the child (Samra et al., 2010; Thomasgard et al., 1995). Indeed, some studies have suggested that mothers of children born preterm are more prone to engage in controlling parenting behaviors than mothers of children born full-term (Clark & Woodward, 2015; Wightman et al., 2007), although few have specifically focused on overprotection. Some authors have argued that controlling behavioral patterns in parents of preterm-born children might serve an overstimulating compensatory function for the child's neonatal experiences and developmental needs (Miles & Holditch-Davis, 1995). However, while there has been substantial research showing that overprotective behavior has a negative impact on full-term

children's adjustment outcomes (Cooklin et al., 2013; Laurin et al., 2015), little is known about the impact of overprotection on children born preterm and whether it might serve a beneficial compensatory function or not. The current dissertation addresses such gaps by examining overprotection levels of parents of children born preterm and its impact on child outcomes regarding self-regulation.

Besides, although notably, in the last years, research has increasingly focused on understanding the experiences and needs of parents of preterm children, two important gaps remain, which will also be addressed by this dissertation. First, studies on parenting of preterm-born children have mostly focused on mothers, and fathers have been left in the shadow. Evidence in the general population leaves no doubts about the important and unique role that fathers' behaviors play in the child's development (Lamb & Lewis, 2010). Therefore, if we wish to better understand the development of children born preterm, it is essential that we take into account both mother's and father's parenting experiences. Second, most studies on parenting of preterm-born children have focused on the NICU hospitalization period and the two years following birth. To date, little is known about the impact of prematurity on parenting in later stages of the child development, including the preschool period (i.e., ages 3-6). The focus on this period is particularly important because this is a period of multiple important developmental achievements for the child, including sociocognitive understanding, conception of the self, autonomy, self-reliance, and self-regulation, and for which the quality of parenting behaviors plays a crucial influential role (Marvin & Britner, 2008). Furthermore, the substantial physical, cognitive, and language development that characterizes this period brings dramatic changes for parents' roles and parent-child interactions (Lamb & Lewis, 2010).

4. Self-Regulation and the Role of Parents

Self-regulation is broadly defined as the ability to monitor and modulate emotions, cognition, and behaviors in order to accomplish goals in the context of environmental demands (Berger et al., 2007). Self-regulation is a complex multidimensional concept and has been studied in relation to a variety of interrelated (and somehow overlapping) constructs, depending on different frameworks. This has made it difficult to clearly specify self-regulation dimensions and measurement (Feng et al., 2017). For example, some studies have focused on emotional regulation, defined as the ability to initiate, inhibit, maintain, and modify emotional reactions in order to achieve individual goals (Thomas et al., 2017; Thompson, 1994, 2015). Other studies have focused on executive functions as the cognitive

aspect of self-regulation (Ursache et al., 2012). Others have focused on behavioral regulation, defined as the ability to comply with other's requests and environmental demands and to inhibit impulsive behavior (Calkins et al., 1998). And yet others have focused on effortful control, conceived as the self-regulatory aspect of temperament and defined by the ability to inhibit a dominant response in order to express a subdominant, contextually-appropriate response (Choe et al., 2013; Kochanska et al., 2009; Rothbart & Bates, 2006). Some studies have also considered individual behaviors that are encompassed by self-regulation constructs, such as compliance (i.e., the ability of the child to cooperate to requirements and accept behavioral standards imposed by the caregiver) or ability to delay gratification (Feng et al., 2017; Grolnick et al., 2019).

Despite different approaches to the study of self-regulation, all agree that this is a fundamental hallmark of child development, underpinning adaptive functioning across multiple domains such as learning, socialization, and emotional and behavioral performance (Berger et al., 2007; Kochanska et al., 2000; Kopp, 1982; Rothbart & Bates, 2006). In fact, most of our daily life activity is dependent on self-regulation skills, as these are fundamental to follow rules, inhibit inappropriate behavior, function in group, modulate emotions, ignore distractions, complete tasks, among others (Grolnick et al., 2019). A large body of research has shown the association between self-regulation impairments across the various constructs described above with children's behavioral, emotional, and school problems (Berger et al., 2007; Choe et al., 2013).

The development of self-regulation is dependent, one the one hand, on the child neurobiological maturation and intrinsically related to the development of higher cognitive capacities such as attention and language acquisition (Berger et al., 2007; Posner & Rothbart, 1998, 2000). A substantial body of research suggests that self-regulation skills develop correspondingly to the maturation of frontal areas of the brain, in particular the prefrontal cortex (Berger, 2007). Several neuroimaging studies showed the involvement of prefrontal cortex areas in children's performance of self-regulatory tasks (Bush et al., 2000; Posner & Rothbart, 1998) and lesion studies showed that brain damages in these areas were associated with self-regulation deficits (Robison et al., 2014). While the development of the prefrontal cortex extends throughout infancy and adolescence and is influenced by environmental factors (Giedd et al., 1999), the development of self-regulation is also heavily dependent on parental socialization (Kochanska et al., 2000; Kopp, 1982; Sroufe, 1995). Several developmental theorists have addressed the influence of parents on the development of child self-regulation skills.

Kopp (1982) conceptualized the development of self-regulation in five phases progressing from behavior that is externally regulated by the parental figure into internally regulated behavior, further

supported by other theorists and several studies (Berger et al., 2007; Grolnick et al., 2019; Sroufe, 1995). At 2-3-months old (neurophysiological phase) the infant becomes capable of activating neurophysiological mechanisms to modulate arousal states, supported by parents' external soothing. From 3 to 9-12 months (sensorimotor phase), the infant becomes able to engage in voluntary motor acts in response to the parents' external control, due to increasing mobility and motor abilities. Up until this point, the infant's responses are modulated following immediately perceived environmental stimuli, without consciousness, intention, or awareness of the meaning of the situation. From 9-12 to 18+ months (control phase), the infant then begins to exhibit awareness of the social and task demands and to act accordingly, by initiating, maintaining, or ceasing behavior under parental monitoring, and is able to comply with the parents. During toddlerhood, the child develops a sense of autonomy and begins to develop self-awareness and self-conscience (Sroufe, 1995). This growing sense of the self as an agent, together with achievements in cognitive abilities such as ability to plan and mental representation, allows the child to carry out their own intentions and, around 24 months, occurs a change from an externally to an internally generated monitoring system (self-control phase) (Berger, 2007; Kopp, 1982). The child becomes able to act accordingly to parents' expectations even in their absence, by self-initiating modification of behavior as a result of remembered information. Still, at this phase, although the child is sometimes able to regulate behavior without the parents' intervention, their capacity to adapt behavior is limited and they still depend heavily on the parents' guidance to help them maintain control, especially under stressful and frustrating situations (Kopp, 1982; Sroufe, 1995). It is around 36 months that a more flexible control of behavior is possible, greatly due to increasing representation and symbolic functioning abilities, and the child enters the phase of self-regulation, becoming able to use rules, strategies, and plans to guide behavior. At this period, children's self-regulation skills are already expected to be developed enough to allow for interindividual variation and become moderately stable (Feldman, 2009; Kochanska et al., 2000; Kopp, 1982; Posner & Rothbart, 2000), but continue to develop throughout childhood and adolescent (Davidson et al., 2006).

In line, Sroufe (1995) postulated that one of the major developmental tasks in the preschool period is the achievement of self-regulation, emerging through the movement from a dyadic regulation. This author also argued that self-regulation develops from the early parent-child relationship, by postulating that infant's regulation is firstly externally orchestrated by the parents, moving during infancy to a dyadic regulation where regulation is supported and guided by the parents, and which progressively gives place to self-regulation as the infant becomes able to regulate outside the parent-child relationship context (Sroufe, 1995). Sroufe's (1995) conceptualization is embedded in the

attachment theory (Bowlby, 1969), which has also covered the regulatory influence of parents. The attachment theory proposes that the parent-child attachment relationship is the foundation of the child's developmental outcomes and that one of the functions of this relationship is to promote child's secure exploration of the world, which is crucial for the development of self-regulation. While exploring, the child learns about the physical and social environment, becoming progressively skilled, self-reliant, and autonomously integrated into the environment, and less dependent on parents' protection (Cassidy, 2016; Marvin et al., 2016). Furthermore, the attachment relationship assists the child's regulation through its influence on the child's social representations (Thompson, 2015, 2016). The child learns about relationships and social demands within parent-child interactions, translating the interaction patterns into mental representations of the self and the others (i.e., internal working models) that will further guide the child's social behavior (Bowlby, 1969; Thompson, 2015, 2016). Such representations cover the prediction of others' behaviors and motivations, knowledge on implicit rules, social obligations, and problem-solving, and other ways of social awareness that guides self-regulation development (Thompson, 2015). By the end of infancy, the child increases representational abilities and becomes more autonomous and self-reliant in exploring the environment, decreasing in the amount of care and protection needed and increasing distance from the attachment figure, opening the preschool period as the main stage for the emergence of self-regulation (Marvin et al., 2016; Thompson, 2014).

In relation to the function of child-parent interactions as a base for the emergence of self-regulation, self-determination theory (Deci & Ryan, 1985, 2000) provides a framework for understanding how variations in the quality of parenting behavior may affect the (un)successful development of children's self-regulation. The theory emphasizes autonomy as a fundamental need for the child's optimal development and well-being. Furthermore, the fulfillment of autonomy implies moving from externally regulated behavior (i.e., behavior that is endorsed around contingencies) towards autonomous self-regulated behavior (i.e., behavior that a person willingly endorses) by means of internalization - the externally regulated behavior becomes increasingly taken by the child and made part of the self. Although internalization is a natural and spontaneous process of child development, it is subject to the facilitating or undermining effects of the environmental context. Therefore, parenting behaviors that support the child's satisfaction of autonomy facilitate the internalization of autonomous regulation. Sensitive parenting behavior, which is the parent's ability to accurately perceive the child's signals and to respond to them promptly, contingently, and appropriately (Ainsworth et al., 1974), is one construct that has received significant attention from research in this regard. Sensitive parenting

provides the child with support and structure that are appropriate to the child's capacities and wishes, acknowledges the child's perspective, supports the child's initiations, and thus provides the child with the environment she needs to develop autonomy and facilitates children's ability to regulate their own behavior (Deci & Ryan, 1985, 2000; Grolnick et al., 1997, 2019). Several studies have linked sensitive parenting behavior to better child self-regulation skills (Kochanska et al., 2000; Spinrad et al., 2012; Thomas et al., 2017). On the other hand, parenting behaviors that interfere with the child's need for autonomy undermine the child's development of autonomous self-regulation (Deci & Ryan, 1985, 2000). Controlling parenting behaviors, such as overprotection, are behavioral patterns that provide the child with an excessive amount of external control, directing and forcing the child to meet demands, solving problems for the child, intruding on the child's ongoing activities and exploration, and imposing rules on the child, and thus do not provide the child with opportunities for autonomy and undermine self-regulation (Grolnick, 2013; Grolnick et al., 1997; Grolnick & Pomerantz, 2009). Consistently, research has shown that controlling parenting is associated with poorer self-regulation skills in children (Bridget et al., 2018; Taylor et al., 2013).

In sum, substantial theoretical and empirical evidence have pointed to the crucial role of parents in the development of child self-regulation. Parents are expected to provide external regulation that organizes, protects, guides, and supports the child's developing behavioral systems, which are progressively replaced by growing self-regulatory capacities, allowing the child to become competently autonomous. Therefore, the quality of parenting behavior in interaction with the child influences the degree of success of the child's self-regulation development.

5. Self-Regulation in Children Born Preterm

Recent studies have suggested that the high prevalence of behavioral, emotional, and school problems in children born preterm might be related to self-regulation impairments (Clark & Woodward, 2015; Dilworth-Bart et al., 2018; Woodward et al., 2017), as some have reported poorer levels of self-regulation in children born very preterm in comparison to children born full-term (Clark et al., 2008; Voigt et al., 2012; Witt et al., 2014). However, little is known about the factors and mechanisms that might lead to self-regulation problems in preterm children.

The neurobiological immaturity associated with prematurity may partly account for self-regulation problems. The premature birth can have a significant impact on the baby's brain development given its maturation disruption. The increase in brain volume and myelination that typically

occurs in utero during the last month of a full-term gestation occurs outside the uterus (Ball et al., 2012; Kinney, 2006) and is potentially exposed to the NICU's stress environment and neonatal complications such as brain lesions (Smith et al., 2011). Several studies have shown brain alterations in preterms extending until adulthood (Meng et al., 2016). Studies have inclusively shown different brain structures between children born preterm and full-term regarding frontal areas, such as smaller regional cortical volume (Peterson et al., 2000) and reduced frontal white matter volume (Soria-Pastor et al., 2008) in those born preterm, and have shown that such frontal alterations were associated with deficits in self-regulation performance in very preterm-born toddlers (Woodward et al., 2005), adolescents (Nosarti et al., 2008) and even adults (Allin et al., 2004). Furthermore, studies have shown that preterm-born children exposed to more neonatal complications and with higher prematurity degree exhibited poorer self-regulation competences (Feldman, 2009; Poehlmann et al., 2010).

Few studies have examined the potential role of parenting on the development of self-regulation problems in preterm-born children, although such examination is imperative considering the challenges that prematurity imposes on parenting. The understanding of the factors that place preterm children at risk for self-regulation problems is crucial to identify at-risk infants and provide better support along their development, especially during preschool years, preventing later associated behavioral, emotional, and school problems. The target of environmental factors such as parenting behavior is of particular relevance, given the potential role of family-based interventions in promoting self-regulation.

6. The Current Dissertation

The evidence summarized here suggests that prematurity might impact parents' perceptions of child vulnerability and parenting behaviors, which might play a critical role in the development of children's self-regulation skills. In light of this, the goal of the present doctoral dissertation is to examine the interplay between prematurity, parents' perceptions of child vulnerability, parenting behaviors in terms of overprotection and sensitivity, and children's self-regulation skills at age 3½ years old. Considering the two striking gaps in the literature about the outcomes of prematurity that are caused by a major focus on mothers and on children born very preterm, this dissertation proposes an inclusive approach to both fathers and mothers, as well as to children born very and moderately-to-late preterm.

The doctoral project followed a longitudinal sample of 150 children born preterm and their parents, assessed when children were 12 months of age corrected for prematurity (i.e., the age the child would be if they had been born at term; Time 1), 24 months of corrected age (Time 2), and 42

months of chronological age (Time 3). In order to offset potential dropouts, an additional cross-sectional sub-sample of 22 42-month-olds born preterm was assessed. Families were recruited from two hospitals in Northern Portugal. Furthermore, a comparison sample of 45 children born full-term was assessed at age 42 months old, which was recruited in the broader community from a participant pool of a previous study coordinated by the University of Minho. At children's 12 months of age, children's development and family's SES were assessed. At children's 24 months of age, parents' perceptions of child vulnerability were assessed. At children's 42 months of age, parents' psychological distress, perceptions of their protective behavior, observed overprotective behavior, and observed sensitive behavior, family's SES, children's IQ, effortful control skills, and observed compliance and negativity toward parents were assessed. Neonatal data was also collected through access to children's NICU medical records.

The goal of the dissertation was addressed by conducting four studies, each presented in the following four chapters of the dissertation. **Chapter 2** examines the relation between prematurity and controlling, overprotective parenting, by providing a meta-analysis that tested whether parents of children born preterm differ from parents of children born full-term regarding controlling behaviors. **Chapter 3** examines the child and parental factors that might be associated with overprotective parenting in parents of preterm-born children, including child neonatal risk, child development, parental gender, parents' perceptions of child vulnerability, parents' psychological distress, and family's socioeconomic disadvantage. **Chapter 4** examines the relations between prematurity, overprotective parenting, and children's self-regulation skills regarding effortful control. **Chapter 5** examines the relations between prematurity, sensitive parenting, and children's self-regulated compliance and non-negativity toward parents, considering the role of child and parental gender. Finally, the dissertation is concluded in **Chapter 6** with a summary of the main findings of the dissertation, discussion of relevant implications for research and clinical practice, main limitations and strengths, and future research directions.

7. References

Aarnoudse-Moens, C. S. H., Weisglas-Kuperus, N., van Goudoever, J. B., & Oosterlaan, J. (2009). Meta-analysis of neurobehavioral outcomes in very preterm and/or very low birth weight children. *Pediatrics, 124*(2), 717–728. https://doi.org/10.1542/peds.2008-2816

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M. P. Richards (Ed.), *The integration of a child into a social world* (pp. 99–135). Cambridge University Press.

Allen, E. C., Manuel, J. C., Legault, C., Naughton, M. J., Pivor, C., & O'Shea, T. M. (2004). Perception of child vulnerability among mothers of former premature infants. *Pediatrics, 113*(2), 267-273. https://doi.org/10.1542/peds.113.2.267

Allin, M., Henderson, M., Suckling, J., Nosarti, C., Rushe, T., Fearon, P., Stewart, A. L., Bullmore, E. T., Rifkin, L., & Murray, R. (2004). Effects of very low birthweight on brain structure in adulthood. *Developmental Medicine & Child Neurology*, *47*(1), 46-53. http://doi.org/10.1017/s0012162204000088

Arpi, E., & Ferrari, F. (2013). Preterm birth and behaviour problems in infants and preschool-age children: A review of the recent literature. *Developmental Medicine & Child Neurology, 55*(9), 788-796. https://doi.org/10.1111/dmcn.12142

Aylward, G. P. (2005). Neurodevelopmental outcomes of infants born prematurely. *Journal of Developmental & Behavioral Pediatrics, 26*, 427-440. https://doi.org/10.1097/00004703-200512000-00008

Ball, G., Boardman, J. P., Rueckert, D., Aljabar, P., Arichi, T., Merchant, N., Gousias, I. S., Edwards, A. D., & Counsell, S. J. (2012). The effect of preterm birth on thalamic and cortical development. *Cerebral Cortex*, *22*(5), 1016–1024. https://doi.org/10.1093/cercor/bhr176

Behrman, R. E., Butler, A. S., & Committee on Understanding Premature Birth and Assuring Healthy Outcomes (2007). *Preterm birth: Causes, consequences, and prevention.* National Academies Press.

Berger, A., Kofman, O., Livneh, U., & Henik, A. (2007). Multidisciplinary perspectives on attention and the development of self-regulation. *Progress in Neurobiology, 82*(5), 256-286. https://doi.org/10.1016/j.pneurobio.2007.06.004

Bhutta, A. T., Cleves, M. A., Casey, P. H., Cradock, M. M., & Anand, K. J. S. (2002). Cognitive and behavioral outcomes of school-aged children who were born preterm: A meta-analysis. *Journal of the American Medical Association, 288*(6), 728-737. https://doi.org/10.1001/jama.288.6.728

Blencowe, H., Cousens, S., Oestergaard, M. Z., Chou, D., Moller, A. B., Narwal, R., Adler, A., Garcia, C. V., Rohde, S., Say, L., & Lawn, J. E. (2012). National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: A systematic analysis and implications. *Lancet, 379*(9832), 2162–2172. https://doi.org/10.1016/S0140-6736(12)60820-4

Boyle, E. M., Poulsen, G., Field, D. J., Kurinczuk, J. J., Wolke, D., Alfirevic, Z., & Quigley, M. A. (2012). Effects of gestational age at birth on health outcomes at 3 and 5 years of age: Population based cohort study. *BMJ, 344*(e896). https://doi.org/10.1136/bmj.e896

Bowlby, J. (1969). *Attachment and loss.* Basic Books.

Bridgett, D. J., Ganiban, J. M., Neiderhiser, J. M., Natsuaki, M. N., Shaw, D. S., Reiss, D., & Leve, L. D. (2018). Contributions of mothers' and fathers' parenting to children's self- regulation: Evidence from an adoption study. *Developmental Science, 21*(6), 1-11. https://doi.org/10.1111/desc.12692

Bush, G., Luu, P., & Posner, M. I. (2000). Cognitive and emotional influences in anterior cingulate cortex. *Trends in Cognitive Sciences, 4*(6), 215–222. https://doi.org/10.1016/s1364-6613(00)01483-2

Calkins, S. D., Smith, C. L., Gill, K. & Johnson, M. C. (1998). Maternal interactive style across contexts: Relations to emotional, behavioral and physiological regulation during toddlerhood. *Social Development, 7*(3), 350-369. https://doi.org/10.1111/1467-9507.00072

Cassidy, J. (2016). The nature of the child's ties. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical implications* (3rd ed., pp. 3-24). The Guilford Press.

Chawanpaiboon, S., Vogel, J. P., Moller, A. B., Lumbiganon, P., Petzold, M., Hogan, D., Landoulsi, S., Jampathong, N., Kongwattanakul, K., Laopaiboon, M., Lewis, C., Rattanakanokchai, S., Teng, D. N., Thinkhamrop, J., Watananirun, K., Zhang, J., Zhou, W., & Gülmezoglu, A. M. (2019). Global, regional, and national estimates of levels of preterm birth in 2014: A systematic review and modelling analysis. *Lancet Global Health, 7*(1), e37-e46. https://doi.org/10.1016/S2214-109X(18)30451-0

Choe, D. E., Olson, S. L., & Samerroff, A. J. (2013). Effects of early maternal distress and parenting on the development of children's self-regulation and externalizing behavior. *Development and Psychopathology, 25*(2), 437-453. https://doi.org/10.1017/S0954579412001162

Chyi, L. J., Lee, H. C., Hintz, S. R., Gould, J. B., & Sutcliffe, T. L. (2008). School outcomes of late preterm infants: Special needs and challenges for infants born at 32 to 36 weeks gestation. *The Journal of Pediatrics, 153*(1), 25-31. https://doi.org/10.1016/j.jpeds.2008.01.027

Clark, C. A. C., & Woodward, L. J. (2015). Relation of perinatal risk and early parenting to executive control at the transition to school. *Developmental Science, 18*(4), 525–542. https://doi.org/10.1111/desc.12232

Clark, C. A. C., Woodward, L. J., Horwood, L. J., & Moor, S. (2008). Development of emotional and behavioral regulation in children born extremely preterm and very preterm: Biological and social influences. *Child Development, 79*(5), 1444-1462. https://doi.org/10.1111/j.1467-8624.2008.01198.x

Cooklin, A. R., Giallo, R., D'Esposito, F., Crawford, S., & Nicholson, J. M. (2013). Postpartum maternal separation anxiety, overprotective parenting, and children's social-emotional well-being: Longitudinal evidence from an Australian cohort. *Journal of Family Psychology, 27*(4), 618-628. https://doi.org/10.1037/a0033332

Davidson, M. C., Amso, D., Anderson, L. C., & Diamond, A. (2006). Development of cognitive control and executive functions from 4 to 13 years: Evidence from manipulations of memory, inhibition, and task switching. *Neuropsychologia, 44*(11), 2037–2078. https://doi.org/10.1016/j.neuropsychologia.2006.02.006

Davis, L., Edwards, H., Mohay, H., & Wollin, J. (2003). The impact of very premature birth on the psychological health of mothers. *Early Human Development, 73*(1-2), 61-70. https://doi.org/10.1016/s0378-3782(03)00073-2

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 319-338. https://doi.org/10.1207/S15327965PLI1104_01

Dilworth-Bart, J. E., Poehlmann-Tynan, J. A., Taub, A., Liesen, C. A., & Bolt, D. (2018). Longitudinal associations between self-regulation and the academic and behavioral adjustment of young

children born preterm. *Early Childhood Research Quarterly, 42*, 193-204. https://doi.org/10.1016/j.ecresq.2017.09.007

DiPietro, J. A., Porges, S., & Uhly, B. (1992). Reactivity and developmental competence in preterm and full-term infants. *Developmental Psychology, 28*(5), 831–841. https://doi.org/10.1037/0012-1649.28.5.831

Euro-Peristat Project (2018). *European perinatal health report: Core indicators of the health and care of pregnant woman and babies in Europe in 2015*. www.europeristat.com

European Foundation for the Care of Newborn Infants (2011). *EU benchmarking report 2009/2010: Too little, too late? Why Europe should do more for preterm infants.* https://www.efcni.org/downloads/efcnipolicypublications/#1

Feeley, N., Hayton, B., Gold, I., & Zelkowitz, P. (2017). A comparative prospective cohort study of women following childbirth: Mothers of low birthweight infants at risk for elevated PTSD symptoms. *Journal of Psychosomatic Research, 101*, 24–30. https://doi.org/10.1016/j.jpsychores.2017.07.014

Feldman, R. (2009). The development of regulatory functions from birth to 5 years: Insights from premature infants. *Child Development, 80*(2), 544–561. https://doi.org/10.1111/j.1467-8624.2009.01278.x

Feng, X., Hooper, E. G., & Jia, R. (2017). From compliance to self-regulation: Development during early childhood. *Social Development, 26*(4), 981-995. https://doi.org/10.1111/sode.12245

Field, T. (1981). Fathers' interactions with their high-risk infants. *Infant Mental Health Journal, 2*(4), 249-256. https://doi.org/10.1002/1097-0355(198124)2:4<249::AID-IMHJ2280020407>3.0.CO;2-I

Frodi, A., Lamb, M., Leavitt, L., Donovan, W., Neff, C., & Sherry, D. (1978). Fathers' and mothers' response to the faces and cries of normal and premature infants. *Developmental Psychology, 14*(5), 490–498. https://doi.org/10.1037/0012-1649.14.5.490

Fuster, V., & Santos, C. (2016). Determinants of birth weight in Portugal: 1988 to 2011. *Anthropologischer Anzeiger, 73*(1), 33–43. https://doi.org/10.1127/anthranz/2015/0541

Giedd, J. N., Blumenthal, J., Jeffries, N. O., Castellanos, F. X., Liu, H., Zijdenbos, A., Paus, T., Evans, A. C., & Rapoport, J. L. (1999). Brain development during childhood and adolescence: A longitudinal MRI study. *Nature Neuroscience, 2*(10), 861–863. https://doi.org/10.1038/13158

Goldberg, S., & DiVitto, B. (2002). Parenting children born preterm. In M. H. Bornstein (Ed.), *Handbook of parenting* (pp. 329-354). Erlbaum.

Grolnick, W. S. (2013). *The psychology of parental control: How well-meant parenting backfires*. Psychology Press.

Grolnick, W. S., Caruso, A. J., & Levitt, M. R. (2019). Parenting and children's self-regulation. In M. H. Bornstein (Ed.), *Handbook of parenting: Vol. 5, the practice of parenting (*3rd ed., pp. 34-64). Routledge.

Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The self-determination theory perspective. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting and children's internalization of values: A handbook of contemporary theory* (pp. 135-161). John Wiley & Sons Inc.

Grolnick W., S., & Pomerantz, E. M. (2009). Issues and challenges in studying parental control: Toward a new conceptualization. *Child Development Perspectives, 23*(3), 165-170. https://doi.org/10.1111/j.1750-8606.2009.00099.x

Hack, M., Weissman, B., Breslau, N., Klein, N., Borawski-Clark, E., & Fanaroff, A. (1993). Health of very low birth weight children during their first eight years. *The Journal of Pediatrics, 122*(6), 887-892. https://doi.org/10.1016/s0022-3476(09)90012-9

Hack, M., Wilson-Costello, D., Friedman, H., Taylor, G. H., Schluchter, M., & Fanaroff, A. A. (2000). Neurodevelopment and predictors of oucomes of children with birth weights of less than 1000g: 1992-1995. *Archives of Pediatrics & Adolescent Medicine, 154*(7), 725-731. https://doi.org/10.1001/archpedi.154.7.725

Instituto Nacional de Estatística (2020). *Estatísticas demográficas – 2019*. https://www.ine.pt/xurl/pub/71882686

Johnson, S., & Marlow, N. (2014). Growing up after extremely preterm birth: Lifespan mental health outcomes. *Seminars in Fetal & Neonatal Medicine, 19*(2), 97-104. https://doi.org/10.1016/j.siny.2013.11.004

Kana, M. A., Correia, S., Peleteiro, B., Severo, M., & Barros, H. (2017). Impact of the global financial crisis on low birth weight in Portugal: A time-trend analysis. *BMJ Global Health, 2*(e000147). https://doi.org/10.1136/bmjgh-2016-000147

Kinney, H. C. (2006). The near-term (late preterm) human brain and risk for periventricular leukomalacia: A review. *Seminars in Perinatology, 30*(2), 81–88. https://doi.org/10.1053/j.semperi.2006.02.006

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36*(2), 220-232. https://doi.org/10.1037/0012-1649.36.2.220

Kochanska, G., Philibert, R. A., & Barry, R. A. (2009). Interplay of genes and early mother–child relationship in the development of self-regulation from toddler to preschool age. *Journal of Child Psychology and Psychiatry, 50*(11), 1331-1338. https://doi.org/10.1111/j.1469-7610.2008.02050.x

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199–214. https://doi.org/10.1037/0012-1649.18.2.199

Kramer, M. S., Séguin, L., Lydon, J., & Goulet, L. (2000). Socio-economic disparities in pregnancy outcome: Why do the poor fare so poorly?. *Paediatric and Perinatal Epidemiology, 14*(3), 194–210. https://doi.org/10.1046/j.1365-3016.2000.00266.x

Lamb, M. E., & Lewis, C. (2010). The development and significance of father-child relationships in two-parent families. In M. E. Lamb (Ed.), *The role of the father in child development* (5th ed., pp. 94–153). John Wiley.

Larrañaga, I., Santa-Marina, L., Begiristain, H., Machón, M., Vrijheid, M., Casas, M., Tardón, A., Fernández-Somoano, A., Llop, S., Rodriguez-Bernal, C. L., & Fernandez, M. F. (2013). Socio-economic inequalities in health, habits and self-care during pregnancy in Spain. *Maternal and Child Health Journal, 17*(7), 1315-1324. https://doi.org/10.1007/s10995-012-1134-4

Laurin, J. C., Joussemet, M., Tremblay, R. E., & Boivin, M. (2015). Early forms of controlling parenting and the development of childhood anxiety. *Journal of Child and Family Studies, 24*(11), 3279-3292. https://doi.org/10.1007/s10826-015-0131-9

Legido-Quigley, H., Karanikolos, M., Hernandes-Plaza, S., Freitas, C., Bernardo, L., Padilla, B., Machado, R. S., Diaz-Ordaz, K., Stuckler, D., & McKee, M. (2016). Effects of the financial crisis and Troika austerity measures on health and health care access in Portugal. *Health Policy, 120*(7), 833-839. https://doi.org/10.1016/j.healthpol.2016.04.009

Linsell, L., Johnson, S., Wolke, D., Morris, J., Kurinczuk, J. J., & Marlow, N. (2018). Trajectories of behavior, attention, social and emotional problems from childhood to early adulthood following extremely preterm birth: A prospective cohort study. *European Child & Adolescent Psychiatry, 28*(4), 531-542. https://doi.org/10.1007/s00787-018-1219-8

Liu, L., Oza, S., Hogan, D., Perin, J., Rudan, I., Lawn, J. E., Cousens, S., Mathers, C., & Black, R. E. (2015). Global, regional, and national causes of child mortality in 2000–13, with projections to

inform post-2015 priorities: An updated systematic analysis. *Lancet, 385*(9966), 430-440. https://doi.org/10.1016/S0140-6736(12)61698-6

Manuck, T. A., Rice, M. M., Bailit, J. L., Grobman, W. A., Reddy, U. M., Wapner, R. J., Thorp, J. M., Caritis, S. N., Prasad, M., Tita, A. T. N., Saade, G. R., Sorokin, Y., Rouse, D. J., Blackwell, S. C., & Tolosa, J. E. (2016). Preterm neonatal morbidity and mortality by gestational age: A contemporary cohort. *American Journal of Obstretics & Gynecology, 215*(1), 103.e1-101.e14. https://doi.org/10.1016/j.ajog.2016.01.004

March of Dimes, The Partnership for Maternal Newborn & Child Health, Save the Children, & World Health Organization (2012). *Born too soon: The global action report on preterm birth.* https://www.who.int/maternal_child_adolescent/documents/born_too_soon/en/

Marvin, R., & Britner, P. (2008). Normative development: The ontogeny of attachment. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research and clinical applications* (pp. 269–294). The Guilford Press.

Marvin, R. S., Britner, P. A., & Russel, B. S. (2016). Normative development: The ontogeny of attachment in childhood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical implications* (3rd ed., pp. 273-290). The Guilford Press.

McCain, G. C. (1990). Parenting growing preterm infants. *Pediatric Nursing, 16(*5), 467-470.

Meng, C., Bäuml, J. G., Daamen, M., Jaekel, J., Neitzel, J., Scheel, L., Busch, B., Baumann, N., Boecker, H., Zimmer, C., Bartmann, P., Wolke, D., Wohlschlager, A. M., & Sorg, C. (2016). Extensive and interrelated subcortical white and gray matter alterations in preterm-born adults. *Brain Structure & Function, 221*, 2109–2121. https://doi.org/10.1007/s00429-015-1032-9

Miles, M. S., & Holditch-Davis, D. (1995). Compensatory parenting: How mothers describe parenting their 3-year-old, prematurely born children. *Journal of Pediatric Nursing, 10*(4), 243-253. https://doi.org/10.1016/S0882-5963(05)80021-1

Nosarti, C., Giouroukou, E., Healy, E., Rifkin, L., Walshe, M., Reichenberg, A., Chitnis, X., Williams, S. C. R., & Murray, R. M. (2008). Grey and white matter distribution in very preterm adolescents mediates neurodevelopmental outcome. *Brain, 131*(1), 205–217. https://doi.org/10.1093/brain/awm282

Pederson, D. R., Bento, S., Chance, G. W., Evans, B., & Fox, A. M. (1987). Maternal responses to preterm birth. *American Journal of Orthopsychiatry, 57*(1), 15–21. https://doi.org/10.1111/j.1939-0025.1987.tb03504.x

Peterson, B. S., Vohr, B., Staib, L. H., Cannistraci, C. J., Dolberg, A., Scheider, K. C., Katz, K. H., Westerveld, M., Sparrow, S., Anderson, A. W., Duncan, C. C., Makuch, R. W., Gore, J. C., & Ment, L. R. (2000). Regional brain volume abnormalities and long-term cognitive outcome in preterm infants. *JAMA, 284*(15), 1939-1947. https://doi.org/10.1001/jama.284.15.1939

Pinto, F., Fernandes, E., Virella, D., Abrantes, A., & Neto, M. T. (2019). Born preterm: A public health issue. *Portuguese Journal of Public Health, 37*(1), 38-49. https://doi.org/10.1159/000497249

Plunkett, J., & Muglia, L. J. (2008). Genetic contributions to preterm birth: Implications from epidemiological and genetic association studies. *Annals of Medicine, 40*(3), 167-195. https://doi.org/10.1080/07853890701806181

Poehlmann, J., Schwichtenberg, A. J. M., Shah, P. E., Shlafer, R. J., Hahn, E., & Maleck, S. (2010). The development of effortful control in children born preterm. *Journal of Clinical Child & Adolescent Psychology, 39*(4), 522-536. https://doi.org/10.1080/15374416.2010.486319

Posner, M. I., & Rothbart, M. K. (1998). Attention, self-regulation and consciousness. *Philosophical Transactions of the Royal Society B Biological Sciences, 353*(1377), 1915–1927. https://doi.org/10.1098/rstb.1998.0344

Posner, M. I., & Rothbart, M. K. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology, 12*(3), 427–441. https://doi.org/10.1017/s0954579400003096

Potharst, E. S., Houtzager, B. A., van Wassenaer-Leemhuis, A. G., Kok, J. H., Koot, H. M., & Last, B. F. (2015). Maternal and paternal perceptions of child vulnerability and behavior problems in very preterm born children. *Infant and Child Development, 24(*5), 489-505. https://doi.org/10.1002/icd.1898

Ritchie, K., Bora, S., & Woodward, L. J. (2015). Social development of children born very preterm: A systematic review. *Developmental Medicine & Child Neurology*, *57*(10), 899–918. https://doi.org/10.1111/dmcn.12783

Robinson, H., Calamia, M., Gläscher, J., Bruss, J., & Tranel, D. (2014). Neuroanatomical correlates of executive functions: A neuropsychological approach using the EXAMINER battery. *Journal of the International Neuropsychology Society*, *20*(1), 52-63. https://doi.org/10.1017/S135561771300060X

Rossi, A. S. (1968). Transition to parenthood. *Journal of Marriage and Family, 30*(1), 26-39. https://doi.org/10.2307/350219

Rothbart, M., & Bates, J. (2006). Temperament. In N. Eisenberg, W. Damon, & L. M. Richard (Eds.), *Handbook of child psychology: Vol. 3, social, emotional, and personality development* (6th ed., pp. 99–166). Wiley.

Samra, H. A., McGrath, J. M., & Wey, H. (2010). Are former late-preterm children at risk for child vulnerability and overprotection? *Early Human Development, 86*(9), 557–562. https://doi.org/10.1016/j.earlhumdev.2010.07.005

Singer, L. T., Fulton, S., Davillier, M., Koshy, D., Salvator, A., & Baley, J. E. (2003). Effects of infant risk status and maternal psychological distress on maternal–infant interactions during the first year of life. *Journal of Development & Behavioral Pediatrics, 24*(4), 233-241. https://doi.org/10.1097/00004703-200308000-00003

Smith, G. C., Gutovich, J., Smyser, C., Pineda, R., Newnham, C., Tjoeng, T. H., Vavasseur, C., Wallendorf, M., Neil, J., & Inder, T. (2011). Neonatal intensive care unit stress is associated with brain development in preterm infants. *Annals of Neurology, 70*(4), 541–549. https://doi.org/10.1002/ana.22545

Soria-Pastor, S., Gimenez, M., Narberhaus, A., Falcon, C., Botet, F., Bargallo, N., Mercader, J. M., & Junque, C. (2008). Patterns of cerebral white matter damage and cognitive impairment in adolescents born very preterm. *International Journal of Developmental Neuroscience, 26*(7), 647–654. https://doi.org/10.1016/j.ijdevneu.2008.08.001

Spinrad, T. L., Eisenberg, N., Silva, K. M., Eggum, N. D., Reiser, M., Edwards, A., Iyer, R., Kupfer, A. S., Hofer, C., Smith, C. L., Hayashi, A., & Gaertner, B. M. (2012). Longitudinal relations among maternal behaviors, effortful control and young children's committed compliance. *Developmental Psychology, 48*(2), 552–566. https://doi.org/10.1037/a0025898

Sroufe, L. A. (1995). *Emotional development: The organization of emotional life in the early years*. Cambridge University Press.

Talge, N. M., Holzman, C., Wang, J., Lucia, V., Gardiner, J., & Breslau, N. (2010). Late-preterm birth and its association with cognitive and socioemotional outcomes at 6 years of age. *Pediatrics, 126*(6), 1124-1131. https://doi.org/10.1542/peds.2010-1536

Taylor, Z. E., Eisenberg, N., Spinrad, T. L., & Widaman, K. F. (2013). Longitudinal relations of intrusive parenting and effortful control to ego-resiliency during early childhood. *Child Development, 84*(4), 1145–1151. https://doi.org/10.1111/cdev.12054

Thomas, J. C., Letourneau, N., Campbell, T. S., Tomfohr-Madson, L., Giesbrecht, G. F., & APrON Study Team (2017). Developmental origins of infant emotion regulation: Mediation by temperamental

negativity and moderation by maternal sensitivity. *Developmental Psychology, 53*(4), 611-628. https://doi.org/10.1037/dev0000279

Thomasgard, M., & Metz, W. P. (1999). Parent-child relationship disorders: What do the Child Vulnerability Scale and the Parent Protection Scale measure?. *Clinical Pediatrics, 38*(6), 347-356. https://doi.org/10.1177/000992289903800605

Thomasgard, M., Metz, W. P., Edelbrock, C., & Shonkoff, J. P. (1995). Parent-child relationship disorders. Part I. Parental overprotection and the development of the parent protection scale. *Journal of Development & Behavioral Pediatrics, 16*(4), 244-250. https://doi.org/10.1097/00004703-199508000-00006

Thompson, R. A. (1994). Emotion regulation: A theme in search of a definition. *Monographs of the Society for Research in Child Development, 59*(2-3), 25–52. https://doi.org/10.1111/j.1540-5834.1994.tb01276.x

Thompson, R. A. (2015). Relationships, regulation, and early development. In R. M. Lerner (Series Ed.) & M. E. Lamb (Vol. Ed.), *Handbook of child psychology and developmental science: Vol. 3, social and emotional development* (7th ed., pp. 201-246). Wiley.

Thompson, R. A. (2016). Early attachment and later development: Reframing the questions. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical implications* (3rd ed., pp. 330-348). The Guilford Press.

Treyvaud, K., Lee, K. J., Doyle, L. W., & Anderson, P. J. (2014). Very preterm birth influences parental mental health and family outcomes seven years after birth. *The Journal of Pediatrics, 164*(3), 515–521. https://doi.org/10.1016/j.jpeds.2013.11.001

Ursache, A., Blair, C., & Raver, C. C. (2012). The promotion of self-regulation as a means of enhancing school readiness and early achievement in children at risk for school failure. *Child Development Perspectives, 6*(2), 122–128. https://doi.org/10.1111/j.1750-8606.2011.00209.x

Voegtline, K. M., & Stifter, C. A. (2010). Late-preterm birth, maternal symptomatology, and infant negativity. *Infant Behavior and Development, 33*(4), 545–554. https://doi.org/10.1016/j.infbeh.2010.07.006

Voigt, B., Pietz, J., Pauen, S., Kliegel, M., & Reuner, G. (2012). Cognitive development in very vs. moderately to late preterm and full-term children: Can effortful control account for group differences in toddlerhood? *Early Human Development, 88*(5), 307-313. https://doi.org/10.1016/j.earlhumdev.2011.09.001

Wightman, A., Schluchter, M., Drotar, D., Andreias, L., Taylor, H. G., Klein, N., Wilson-Costello, D., & Hack, M. (2007). Parental protection of extremely low birth weight children at age 8 years. *Journal of Developmental & Behavioral Pediatrics, 28*(4), 317-326. https://doi.org/10.1097/DBP.0b013e3180330915

Witt, A., Theurel, A., Tolsa, C. B., Lejeune, F., Fernandes, L., de Jonge, L. H., Monnier, M., Graz, M. B., Barisnikov, K., Gentaz, E., & Hüppi, P. S. (2014). Emotional and effortful control abilities in 42-month-old very preterm and full-term children. *Early Human Development, 90*(10), 565-569. https://doi.org/10.1016/j.earlhumdev.2014.07.008

Wolke, D., Johnson, S., & Mendonça, M. (2019). The life course consequences of very preterm birth. *Annual Review of Developmental Psychology, 1*, 69-92. https://doi.org/10.1146/annurev-devpsych-121318-084804

Woodward, L. J., Edgin, J. O., Thompson, D., & Inder, T. E. (2005). Object working memory deficits predicted by early brain injury and development in the preterm infant. *Brain, 128*(11), 2578-2587. https://doi.org/10.1093/brain/awh618

Woodward, L. J., Lu, Z., Morris, A. R., & Healey, D. M. (2017). Preschool self-regulation predicts later mental health and educational achievement in very preterm and typically developing children. *The Clinical Neuropsychologist, 31*(2), 404-422. https://doi.org/10.1080/13854046.2016.1251614

World Health Organization (1977). WHO: Recommended definitions, terminology and format for statistical tables related to the perinatal period and use of a new certificate for cause of perinatal deaths. *Acta Obstetricia et Gynecologica Scandinavica, 56*(3), 247–253. https://doi.org/10.3109/00016347709162009

Yaari, M., Treyvaud, K., Lee, K. J., Doyle, L. W., & Anderson, P. J. (2019). Preterm birth and maternal mental health: Longitudinal trajectories and predictors. *Journal of Pediatric Psychology, 44*(6), 736-747. https://doi.org/10.1093/jpepsy/jsz019

Zuilkowski, S. S., & Jukes, M. C. (2012). The impact of education on sexual behavior in sub-Saharan Africa: A review of the evidence. *AIDS Care, 24*(5), 562–576. https://doi.org/10.1080/09540121.2011.630351

CHAPTER 2

CONTROLLING PARENTING BEHAVIORS IN PARENTS OF CHILDREN BORN PRETERM: A META-ANALYSIS[3]

1. Introduction

Premature birth (i.e., birth before 37 weeks of pregnancy) may negatively affect the quality of parenting. This can be due to its impact on parents' psychological and emotional well-being (Forcada-Guex et al., 2011) and the child's characteristics such as lower sociability caused by biological immaturity (Goldberg & DiVitto, 2002). One area in which parents of preterm children may be particularly vulnerable is control, given there is evidence that these parents are more worried and overprotective than other parents (Potharst et al., 2015; Wightman et al., 2007). Parental use of controlling strategies impairs children's capacity for self-regulation and can lead to social, emotional, and behavioral problems (Perry et al., 2018). Results so far have been inconsistent as to whether parents of preterm children are more controlling than parents of full-term children. The current study aimed to address this issue by conducting a meta-analysis to test whether parents of preterm-born children differ from parents of full-term-born children regarding controlling parenting.

Premature birth is a challenging and stressful event for parents and may affect their emotional and psychological availability to engage in high-quality parental behaviors. Facing adverse birth conditions, hospitalization, neonatal complications, and uncertainty about their baby's survival and future can leave a significant mark on parents (Goldberg & DiVitto, 2002). This has been demonstrated by several studies that found high levels of parental posttraumatic stress, anxiety, and depression in the first 6 months after a preterm birth (Feeley et al., 2017; Forcada-Guex et al., 2011; Voegtline & Stifler, 2010) and even 5 and 7 years after birth (Barkmann et al., 2018; Treyvaud et al., 2014). It is well known that parental psychological distress represents a risk factor for the mother's inability to interact with her baby in a positive way, with the mother often engaging in an intrusive, overstimulating behavioral pattern (Field, 2010; Forcada-Guex et al., 2011).

Furthermore, because of their biological and neurological immaturity, preterm infants are less able to organize and modulate physiological and behavioral responses to the environment (Als et al.,

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2005; DiPietro et al., 1992), are more passive and less communicative in their interactions, and exhibit lower levels of social competence (Feldman, 2007; Goldberg & DiVitto, 2002). They also display higher levels of negativity and difficult temperament and poorer self-regulation skills (Chapieski & Evankovich, 1997; Davis & Burns, 2001; Malatesta et al., 1986). This pattern of behaviors may also represent a challenge for parents to engage in positive interactions and may negatively affect the quality of the parent-child relationship. Indeed, Field (1977, 1979) found that early interactions between preterm-born infant-mother dyads were frequently disturbed, characterized by a passive, gaze-avoidant, and fussy infant and an extremely active and controlling mother. Controlling parenting is characterized by providing the child with an excessive amount of external control, adopting strategies that attempt to alter, change, or influence the child's behavior, thoughts, or feelings, such as forcing the child to meet demands, solving problems for the child, directing the child, and intruding on the child's ongoing activities (Grolnick, 2013; Grolnick et al., 1997; Grolnick & Pomerantz, 2009; Rapee, 1997). This type of behavior undermines the child's development of autonomy and is linked to negative outcomes such as poor self-regulation, behavioral problems, anxiety, depression, poor social skills, and poor academic productivity (Landry et al., 2000; Perry et al., 2018; Rubin et al., 2003; Wagner et al., 2015). Field (1979) suggested that mothers of premature infants engaged in an overly active/controlling pattern of behavior as a counterproductive attempt to engage the infant in the interaction and overcome the infant's difficultness. The use of excessive parental control may also be explained by the fact that mothers of children born prematurely often persist in perceiving their child as vulnerable to illness or accidents after their health has improved (Horwitz et al., 2015; Potharst et al., 2015), which may lead to limitation of age-appropriate exploration (Thomasgard, 1998).

A recent meta-analysis (Bilgin & Wolke, 2015) on 34 studies revealed no differences between mothers of preterm children and mothers of full-term children regarding supportive parenting behaviors, including sensitivity, responsiveness, and facilitation. Research has also addressed controlling parenting in parents of premature children, but results have been inconsistent. Although some studies reported that mothers of preterm children show higher levels of parental control than mothers of full-term children (such as higher intrusiveness [Clark & Woodward, 2015] and more overprotection [Wightman et al., 2007]), others found no differences between the two groups (Faure et al., 2017; Rahkonen et al., 2014). Inconsistencies in results may be because of methodological factors, such as the type of assessment method, the parenting dimension (attitudes versus behavior) that was measured, the specific type of controlling parenting under study, or the longitudinal or cross-sectional nature of the study. Social desirability and the fact that parenting occurs mostly on an unconscious level makes it

more difficult to reliably capture actual parenting patterns through self-report than through observational measures (Culp et al., 1983). Similarly, it is more difficult to capture these patterns through the measurement of attitudes rather than behaviors, given that the correlation between parental attitudes and behaviors is generally low (Johnston et al., 2018).

The heterogeneity of samples regarding characteristics such as gestational age, birth weight, child age range reached, and/or socioeconomic status (SES) may also account for differences in findings. The percentage of girls/boys included in the sample may also be relevant, considering meta-analytic evidence showing that parents are somewhat more controlling with boys than with girls (Endendijk et al., 2016). Other factors that might explain different results across studies are the year of publication and geographical variation because neonatal intensive care unit practices and psychological support given to the parents during and after discharge may differ across time and continents.

Considering the inconsistency of findings mentioned above, the main aim of this meta-analysis was to test whether parents of preterm-born children differ from parents of full-term-born children regarding controlling parenting. In addition, the following factors were tested as potential moderators: Gestational age, birth weight, child age, child gender, SES, type of parenting assessment method (observational or self-report), parenting dimension measured (behaviors or attitudes), type of controlling parenting under study, study design (cross-sectional or longitudinal), year of publication, and geographical setting of the studies.

2. Method

Search Strategy

This meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Moher et al., 2009), with no review protocol. We conducted a literature search for cross-sectional and longitudinal studies of controlling parenting in preterm-born children. The article search was completed in October 2018 and was not limited to a particular time period. The following electronic databases were searched: PubMed, Scopus, and Web of Science. In addition, Open Access Theses and Dissertations and Elton B. Stephens Company were searched for dissertations. The following search terms were used: (prematur* OR preterm OR “low birth weight”) AND (“control* behavi?r” OR “control* parent*” OR “parent* control” OR intrusive* OR authoritarian OR disciplin* OR parenting OR “interactive behavi?r” OR “maternal behavi?r”) AND

(mother* OR father* OR maternal OR paternal). In addition, reference lists of identified relevant reviews and included studies were manually searched for other appropriate articles.

Study Inclusion And Exclusion Criteria

To be included in the meta-analysis, the study had to meet five criteria: (1) to report at least one measure of controlling parenting toward children born preterm (gestational age < 37) or with very low birth weight (<1500 g) - controlling parenting was defined as parents' behaviors or attitudes with intent to control the child, characterized by intrusiveness, pressure and dominance, attempting to force the child to meet demands, solving problems for the child, directing the child, and imposing rules on the child (Grolnick & Pomerantz, 2009; Rapee, 1997); (2) to measure controlling parenting through self-report of children/parents or through observational coding of parenting behavior; (3) to include a comparison sample of children born full-term; (4) to test statistically the difference between the preterm and full-term groups regarding controlling parenting or report sufficient information to allow computation of effect sizes (sample size and at least one of the following: means and *SD*s, Cohen's *d*, differences in means and common *SD*, and *p* or *t* values); and (5) to be written in English. Retrospective studies were excluded. Studies were also excluded if parental control was reported for abuse/maltreatment/physical punishment. Studies focused on the positive pole of controlling parenting (e.g., "respect for the child's autonomy") were included only if lower scores of the measurement instrument reflected controlling behavior (and not just the absence of respect for the child's autonomy, which could also reflect passivity).

If a study statistically tested the difference between the two groups and reported nonsignificant differences without providing sufficient information to allow computation of effect sizes, the article was retained using the reported *p* value of the significance level. When more than one study was published using the same data set, studies were excluded if they did not report sufficient information or otherwise retained to calculate combined effect sizes. As recommended by Rosenthal (1991), to maintain the independence of samples, combined effects size were also calculated when a publication (1) separately reported controlling parenting for more than one sample (e.g., moderate preterm and very preterm [Hoffenkamp et al., 2015]), (2) reported different controlling parenting outcomes for the same sample (e.g., intrusive behavioral directives and intrusive attentional directives [Imgrund, 2013]), and (3) reported controlling parenting for more than one time of assessment (e.g., 2 and 4 years of the child's age [Clark & Woodward, 2015]).

Final Study Sample

The overall systematic literature search yielded 2998 articles, of which 845 duplicate articles were excluded. The final literature search included 2153 articles (see Figure 1). Titles and abstracts were reviewed, and 2020 were excluded, resulting in 133 full-text articles for additional review. From these, 95 were excluded because they did not meet the inclusion criteria. If articles were considered eligible but did not provide adequate information for coding the outcome and moderator variables, we asked the authors for information. We contacted authors regarding 17 articles and received the required information for nine of these. For six of the remaining studies, the missing information was not crucial to the main analyses, so these were retained for the meta-analysis.

Thirty-four studies were included in the meta-analysis (see Table 1). Ten of these studies were published using the same data sets and therefore were aggregated, resulting in 27 independent data sets for the final analyses. Two of the studies were dissertations (Imgrund, 2013; Orchinik, 2015), and the remaining were published articles.

The first author carried out the entire process of screening, consulting the last author in case of any doubt. For the full-text screening, a random 15% subset of studies was also coded by a second coder (not one of the authors). The overall agreement between both coders was very good (kappas between .86 and 1.00, average .94). Disagreements were discussed to obtain a consensus.

Figure 1.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram of the Literature Search Process

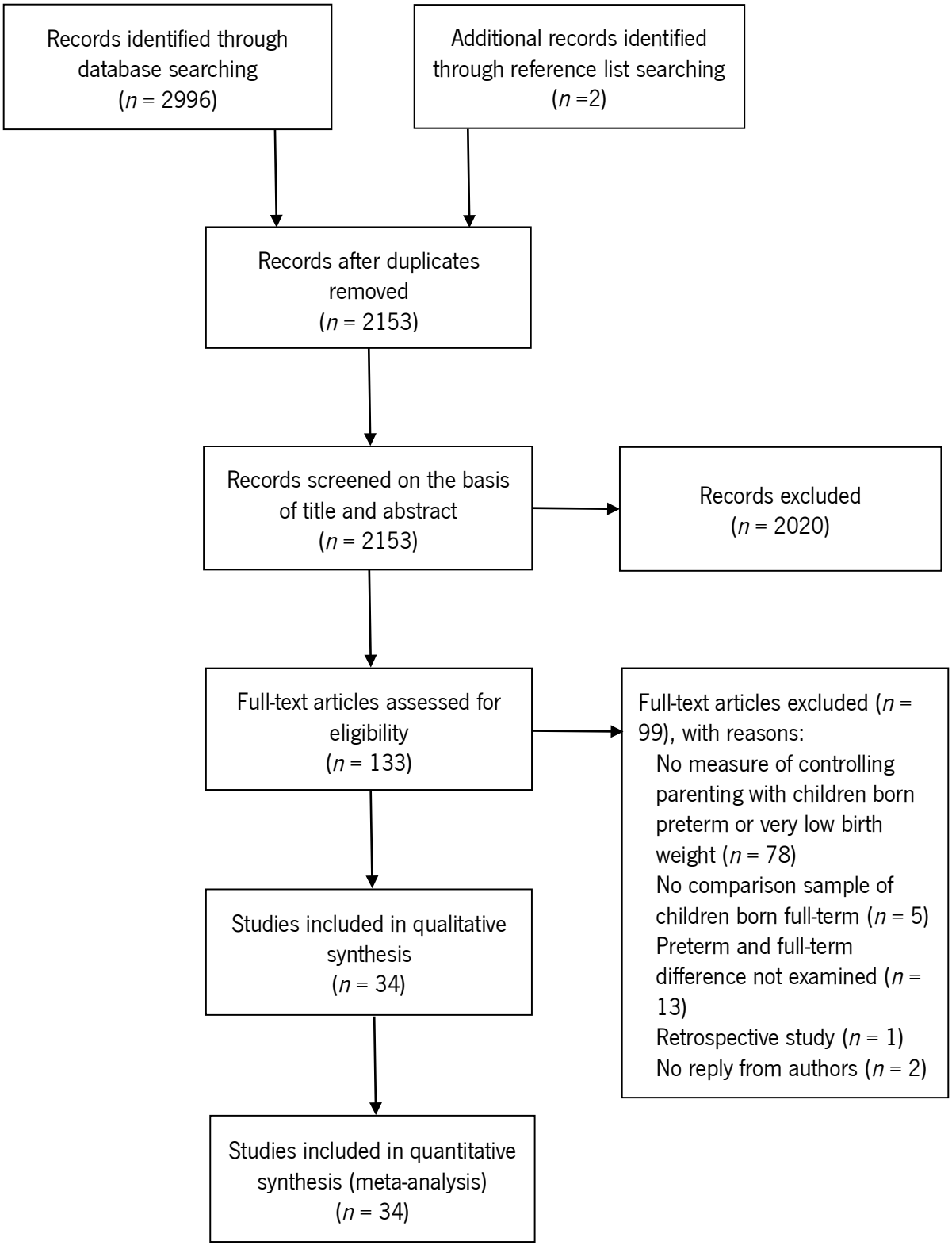


Table 1

Studies Included in the Meta-Analysis

Study	N	Child age	Gestational age, Mean (SD)	Birth weight, Mean (SD)	% girls	Parenting assessment method	Parenting dimension	Type of control	Study design	Geographical setting
Agostini et al., 2014[a]	P: 69 F: 80	3	P: 28.5 (1.7) F: 39.9 (1.1)	P: 1040.7 (127.5) F: 3410.2 (462.8)	P: 35 F: 48	Obs	B	Intrusiveness	CS	Eu
Barrat et al., 1996	P: 21 F: 21	12, 20	P: 34 F: 40	P: 2125 F: 3505	P: 62 F: 62	Obs	B	Control	L	Am
Clark et al., 2015	P: 102 F: 108	24, 48	P: 27.9 (2.3) F: 39.5 (1.2)	P: 1071.1 (314.5) F: 3574.6 (409.8)	P: 49 F: 45	Obs	B	Intrusiveness	L	Au
DeWitt et al., 1997	P: 113 F: 105	6, 12	P: 29.2 F: 39.7	P: 1072.5 F: 3111	P: 55 F: 50	Obs	B	Punitiveness	L	Am
Faure et al., 2017[b]	P: 36 F: 22	18	P: 30.5 (2.1) F: 40 (1.3)	P: 1452.1 (387.8) F: 3334.6 (512.8)	P: 56 F: 64	Obs	B	Control	CS	Eu
Feldman, 2007	P: 55 F: 38	4	P: 32.4 (1.8)	P: 1295.8 (340.6)	P: 47 F: 47	Obs	B	Intrusiveness	CS	Asia
Halpern et al., 2001	P: 23 F: 33	9		P: <1500 F: >2500	P: 65 F: 64	SR	A	Strictness	CS	Am
Hoffenkamp et al., 2015	P: 142 F: 76	6	P: 32 (1.6) F: 39.5 (1.4)	P: 1808.5 (475) F: 3441 (497)	P: 46 F: 53	Obs	B	Intrusiveness	CS	Eu
Imgrund, 2013	P: 5 F: 5	13		P: 1664 (344.6)	P: 60 F: 60	Obs	B	Intrusive behavioral & attentional directives	CS	Am
Ionio et al., 2017	P: 45 F: 36	3	P: 30.3 (3) F: 39.9 (1.4)	P: 1288 (488.8) F: 3156.4 (493.8)	P: 53 F: 64	Obs	B	Intrusiveness	CS	Eu
Jaekel et al., 2012	P: 267 F: 298	75, 101	P: 30.4 (2.3) F: 39.6 (1.2)	P: 1296 (308) F: 3388 (450)	P: 46 F: 49	Obs	B	Verbal control	L	Eu

Study	N	Child age	Gestational age, Mean (SD)	Birth weight, Mean (SD)	% girls	Parenting assessment method	Parenting dimension	Type of control	Study design	Geographical setting
Karabekiroglu et al., 2015	P: 18 F: 20	17	P: 32 (2.1) F: 38.5 (1.8)	P: 1832 (498) F: 3384 (323)	P: 56 F: 45	SR	A	Authoritarian control	CS	Eu
Landry et al., 1990	P: 48 F: 21	36	P: 30.4 (2.1) F: 41 (2.1)	P: 1258.5 (283) F: 3200 (760)	P: 48 F: 43	Obs	B	Directiveness & restrictiveness	CS	Am
Landry et al., 1997[c]	P: 187 F: 112	6, 12	P: 29.5 (2.1) F: 40 (0.4)	P: 1089 (211.5) F: 3229 (677)	P: 56 F: 48	Obs	B	Directiveness & restrictiveness	L	Am
Landry et al., 2000[c]	P: 185 F: 104	24, 42	P: 29.6 (2.6)	P: 1114 (271) F: 3238 (704)	P: 53 F: 53	Obs	B	Directiveness	L	Am
Landry et al., 2002[c]	P: 226 F: 134	6, 12, 24	P: 29.4 (2.2) F: 39.1 (0.4)	P: 1085 (213) F: 3224 (733)	P: 54 F: 50	Obs	B	Directiveness	L	Am
Lawson et al., 1992	P: 59 F: 90	12	P: 31.3 (2.1)	P: 1278.6 (315)	P: 54 F: 46	Obs	B	Intrusiveness	CS	Am
Loi et al., 2017	P: 39 F: 39	22	P: 29.7 (1.9) F: 40 (1.0)	P: 1263 (308) F: 3522 (462)	P: 44 F: 44	Obs	B	Intrusiveness	CS	Am
Maupin et al., 2014	P: 1050 F: 2950	24	P: 32.3 (3.6) F: 39.3 (1.7)	P: 1983 (853.6) F: 3289.7 (553.8)	50	Obs	B	Intrusiveness	CS	Am
Miljkovitch et al., 2013[b]	P: 48 F: 23	6, 18	P: 30.3 (2.1) F: 39.9 (1.1)	P: 1400 (390.7) F: 3340.4 (521.1)	P: 52 F: 57	Obs	B	Control	L	Eu
Muller-Nix et al., 2004[b]	P: 47 F: 25	6, 18	P: 30.5 (1.5) F: 40 (1.0)		P: 53 F: 60	Obs	B	Control	L	Eu
Neri et al., 2015[a]	P: 77 F: 120	3	P: 28.6 (1.7) F: 39.9 (1.1)	P: 1041.7 (129.7) F: 3476.6 (428.4)	P: 39 F: 50	Obs	B	Intrusiveness	CS	Eu
O'Mara et al., 1989	P: 47 F: 47	36	P: 30 F: 40.1	P: 1411 F: 3463	P: 47 F: 53	SR	A	Overprotection	CS	Eu
Orchinick, 2015	P: 20 F: 21	36	P: 26.2 (2.2)	P: 902.4 (267.9)	P: 47 F: 38	Obs	B	Intrusiveness	CS	Am

Study	N	Child age	Gestational age, Mean (SD)	Birth weight, Mean (SD)	% girls	Parenting assessment method	Parenting dimension	Type of control	Study design	Geographical setting
Potharst et al., 2012	P: 94 F: 83	60	P: 28.8 F: 39.9	P: 1050.6 (258.6) F: 3420.3 (484.6)	P: 55 F: 59	Obs	B	Respect for child's authonomy	CS	Eu
Rahkonen et al., 2014	P: 48 F: 16	24	P: 26.3 (1.2) F: 40.2 (0.9)	P: 876 (194) F: 3613 (354)	P: 35 F: 31	Obs	B	Intrusiveness	CS	Am
Salvatori et al., 2016[a]	P: 40 F: 25	18,24,30	P: 29.1 (1.7) F: 39.6 (1.2)	P: 1039.4 (137.5) F: 3405 (483.7)	P: 58 F: 40	Obs	B	Non-intrusiveness	L	Eu
Samra et al., 2010	P: 13 F: 41	P: 62 F: 57	P: 34-36 F: ≥37		P: 26 F: 23	SR	B	Overprotection	CS	Am
Schermann-Eizirik et al., 2008	P: 142 F: 70	2,4,6	P: 31.4 (1.7) F: 39.7 (1.1)	P: 1829.5 (440) F: 3558 (409)	P: 59 F: 59	Obs	B	Intrusiveness	L	Eu
Smith et al., 1996[c]	P: 212 F: 128	6, 12	P: 29.5 (2.1) F: 39.1 (5.9)	P: 1096.5 (217.5) F: 3187 (767)	P: 49 F: 50	Obs	B	Directiveness	L	Am
Sommerfelt et al., 1995	P: 144 F: 163	60	P: 32 (3.0)	P: 1555 (368)	P: 49 F: 45	SR	A	Restrictiveness	CS	Eu
Treyvaud et al., 2014	P: 148 F: 64	84	P: 27.5 (1.9) F: 39.1 (1.3)	P: 969 (221) F: 3318 (510)	P: 47 F: 51	SR	B	Behavioral control	CS	Au
Vinall et al., 2013	P: 96 F: 49	18	P: 29.4 F: 40	P: 1222 F: 3475	P: 51 F: 57	Obs	B	Non-intrusiveness	CS	Am
Wightman et al., 2007	P: 217 F: 176	P: 96 F: 108	P: 26.4 (2.0)	P: 811 (124) F: 3300 (513)	P: 59 F: 63	SR	B	Overprotection	CS	Am

Note. Data reported if available. Child age is reported in months. Gestational age is reported in weeks. Birth weight is reported in grams. A = attitudes; Am = America; Au = Australia/New Zealand; B = behaviors; CS = cross-sectional; Eu = Europe; F = full-term group; L = longitudinal; Obs = observational; P = preterm group; SR = parental self-report.

[a] These three studies were published using the same data sets and were aggregated. [b] These three studies were published using the same data sets and were aggregated. [c] These four studies were published using the same data sets and were aggregated.

Coding of the Studies

Eligible studies were coded to extract data on the outcome and moderator variables. For the comparison of controlling parenting between children born preterm and children born full-term, we extracted information regarding sample sizes of both groups and at least one of the following: Means and *SD*s, Cohen's *d*, differences in means and common *SD*, and *p* or *t* values.

For moderator data, the following variables were coded as continuous variables: Year of publication of the study, mean gestational age, mean birth weight, percentage of girls included, and child's age in months regarding the preterm group. Because the assessment method of SES was very heterogeneous across studies, we considered the most consistent SES indicator across studies – mean years of parental education. When controlling parenting was reported for more than one sample (e.g., moderate preterm and very preterm [Hoffenkamp et al., 2015]), the average of both samples regarding gestational age, birth weight, percentage of girls, and years of parental education was used. The following were coded as categorical variables: Type of parenting assessment method (observational, parental self-report, or child self-report), parenting dimension (behaviors or attitudes), type of controlling parenting, study design regarding the assessment of controlling parenting (cross-sectional or longitudinal), and geographical setting (Europe, America, Asia or Australia/New Zealand).

The first author carried out the entire process of coding under the supervision of the last author. To assess interrater reliability, a randomly selected 15% subset of studies was also coded by a second coder (not one of the authors). The agreement between the coders for both the outcome and moderators variables was satisfactory (intraclass correlations for continuous variables between .87 and 1.00, average .99; kappa for categorical variables 1.00).

Data Analysis

Analyses were conducted using the Comprehensive Meta-Analysis software (Biostat, Englewood, NJ; Borenstein et al., 2005). For each study, an effect size (Hedges' *g*) was calculated. Positive effect sizes indicate that the effect reflects more controlling parenting with preterm than with full-term children, whereas negative effect sizes indicate effects in the opposite direction. The effect size can be interpreted using Cohen's (1988) convention of small (.20), medium (.50), and large (.80) effects.

The combined estimate of the effects (Hedges' *g*) was computed using a random effects model with 95% confidence interval, assuming that the true effect can vary between studies, depending on the characteristics of the specific sample, procedures, measures, and settings (Lipsey & Wilson, 2001).

Heterogeneity of studies was assessed with *Q*-test statistics. Significant heterogeneity indicates that differences across effect sizes are likely due to factors other than sampling error, such as different studies' characteristics (Borenstein et al., 2009).

Moderator analyses were conducted to explain variability in effect sizes across studies. Continuous moderators were analyzed using meta-regressions with random effects models. Regarding child age, we conducted the moderator analyses with the cross-sectional studies only because age does not remain constant in longitudinal studies. Categorical moderators were analyzed using between-group heterogeneity analyses, computing *Q*-statistics and *p* values to assess differences between combined effect sizes for specific subsets of studies, grouped by moderators. Contrasts were only tested when the subsets consisted of at least four studies (Bakermans-Kranenburg et al., 2003). Consequently, the parenting assessment method was tested contrasting only observational versus parental self-report, geographical setting of the studies was tested contrasting only America versus Europe, and type of controlling parenting was tested contrasting intrusiveness versus other types (e.g., verbal control [Jaekel et al., 2012] and overprotection [Wightman et al., 2007]).

Considering a tendency of journals to accept studies that only report strong significant associations over studies with nonsignificant or small effects (the file-drawer problem; Rosenthal, 1991), publication bias was assessed to check for the potential influence of unpublished papers on the overall effect. The Rosenthal's fail-safe number test was used to produce the number of unpublished studies needed to bring the combined effect size to a statistically nonsignificant level. No publication bias is indicated when the Rosenthal's fail-safe number exceeds 5 times the number of effect sizes (*k*) plus 10 ($5k+10$) (Rosenthal, 1979). In addition, the funnel plot was examined. The funnel plot is a plot of each study's effect size against its standard error, in which studies with larger samples appear toward the top of the graph and studies with smaller samples appear toward the bottom. It is expected to have the shape of a funnel because studies with smaller sample sizes have larger variations of sampling error in effect sizes and therefore tend to be spread across a broad range of values, whereas studies with larger sample sizes have smaller variation in effect sizes and tend to be more concentrated. In the absence of publication bias, the studies will be dispersed symmetrically because sampling error is random. A funnel plot with an asymmetric base indicates that smaller studies with nonsignificant results or with low effect sizes are missing (Borenstein et al., 2009; Duval & Tweedie, 2000). The trim and fill procedure of Duval and Tweedies (2000) was used to trim the asymmetric studies from one side and fill the plot by reinserting the trimmed studies and their imputed counterparts, determining an estimate of the effect size after accounting for publication bias.

3. Results

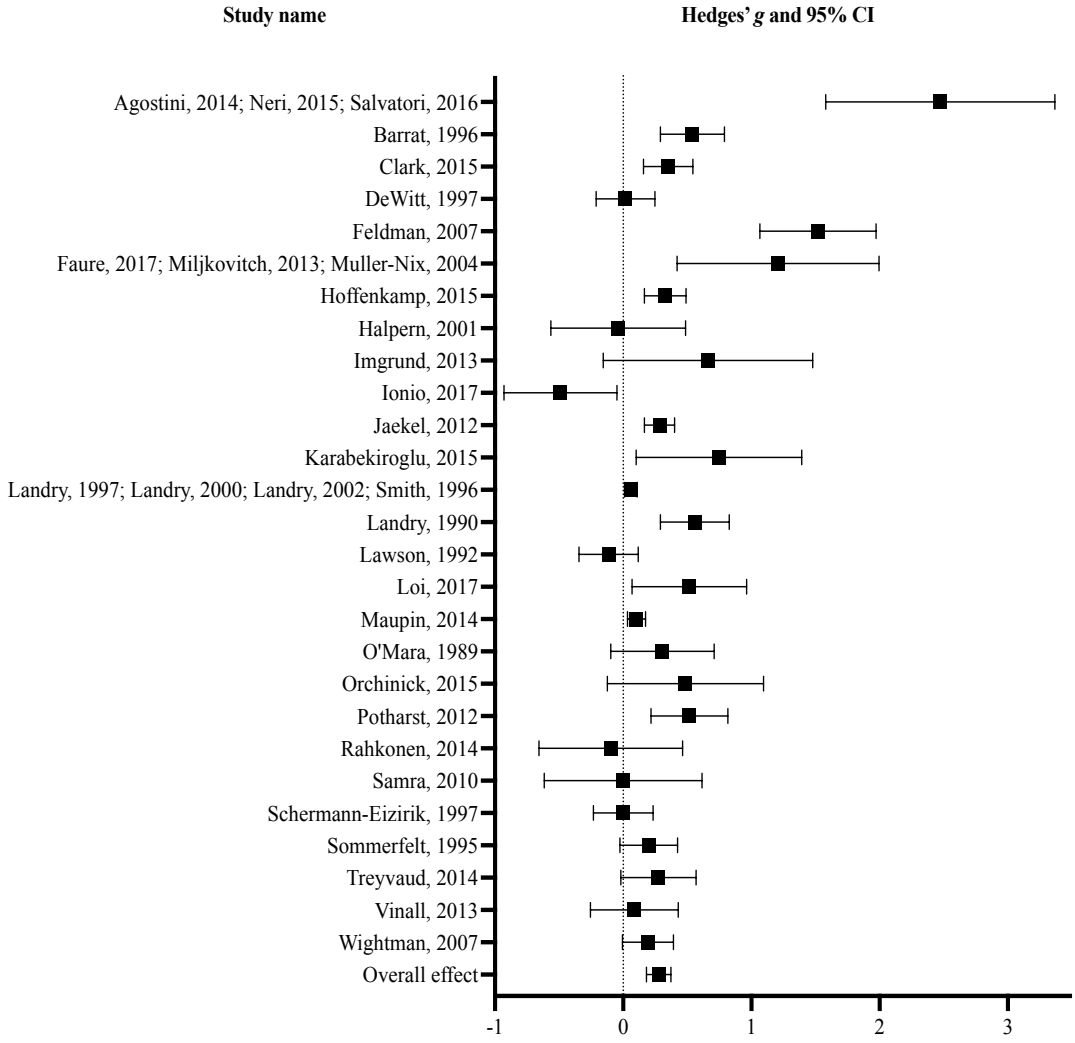
The final set of 27 independent samples included a total of 8053 participants – 3265 preterm and 4788 full-term children. The sample sizes of the preterm group ranged from 5 to 1050 (median = 59, *SD* = 197.68), and the sample sizes of the full-term group ranged from 5 to 2950 (median = 49, *SD* = 557.69). The preterm group had a mean gestational age of 29.94 weeks (*SD* = 2.08; missing information for 3 studies) and a mean birth weight of 1337.01 g (*SD* = 361.25; missing information for 2 studies). The full-term group had a mean gestational age of 39.74 weeks (*SD* = 0.51; missing information for 8 studies) and a mean birth weight of 3385.33 g (*SD* = 142.11; missing information for 7 studies). Children's age ranged from 2 months to 9 years (mean age = 25 months, *SD* = 25.0). Two thousand ninety-eight participants were girls - 1155 preterm and 943 full-term (missing information for 1 study). Parents had an average of 13.48 years of education (missing information for 17 studies).

Twenty studies measured controlling parenting based on observational measures (i.e., observational coding of parental behavior based on a parent-child interaction taking place either at the laboratory or at home), and seven relied on parental self-report. Most of the studies (*n* = 23) focused on parenting behavior, whereas four studied parental attitudes. Intrusiveness was the type of controlling parenting most studied, addressed by 12 studies, and was generally defined across studies as the parent's tendency to overstimulate and interfere with the child's activities (e.g., "(...) dictatorial instructions, non-verbal behaviors that were abrupt, poorly timed or that negatively impinged on the child's personal space of focus of attention, failure to allow the child time to process instructions or attempt the task independently, or taking over the completion of the task, allowing children little opportunity for autonomy" [Clark & Woodward, 2015]). Eight studies were longitudinal (i.e., had more than one assessment point for controlling parenting). Fourteen studies were carried out in America, 10 in Europe, two in Australia/New Zealand, and one in Asia. Most of the studies (*n* = 20) assessed controlling parenting of mothers, whereas seven assessed both mothers and fathers.

The combined effect size of controlling parenting was Hedges' *g* = .29 (95% confidence interval: .19-.39; *z* = 5.48; *p* < .001), indicating significant differences in the parenting of preterm and full-term children (see Figure 2). The effect size was positive, indicating that parents of preterm children used more control than parents of full-term children. The effect sizes in the set of studies were significantly heterogeneous (*Q* = 148.46, *p* < .001).

Figure 2

Forest Plot of Controlling Parenting Differences Between Parents of Children Born Preterm and Parents of Children Born Full-Term



Note. CI = confidence interval.

Moderator Analysis

Meta-regressions revealed that gestational age was not a significant moderator (β = .02, p = .42, k = 24), nor were birth weight (β = .00, p = .89, k = 25), child's age (β = -.00, p = .91; k = 19), child gender (β = -.01, p = .47, k = 26), parental education (β = .09, p = .14; k = 10), or year of publication (β = .01, p = .40; k = 27). Between-group heterogeneity analyses revealed that the type of parenting assessment method, parenting dimension, type of controlling parenting, study design, and geographical setting of the studies were also not significant moderators (see Table 2).

Table 2

Single Moderation Analyses for Categorical Variables in the Association Between Controlling Parenting and Prematurity

Variable	*k*	*g*	95% CI	*Q*	*p*
Overall effect	27	.29	[.19, .39]	148.46	< .001
Parenting assessment method				1.20	.27
Observational	20	.31	[.19, .44]		
Parental self-report	7	.22	[.10, .34]		
Parenting dimension				0.16	.69
Behavior	23	.29	[.18, .41]		
Attitudes	4	.24	[.03, .46]		
Type of controlling parenting				0.01	.91
Intrusiveness	12	.31	[.10, .52]		
Others	15	.30	[.17, .42]		
Study design				0.66	.42
Cross-sectional	19	.28	[.14, .42]		
Longitudinal	8	.38	[.17, .59]		
Geographical setting				1.64	.20
America	14	.18	[.08, .28]		
Europe	10	.34	[.12, .57]		

Note. CI = confidence interval; *g* = effect size; *k* = number of studies in an analysis; *p* = significance level of the between-group homogeneity estimate; *Q* = between-group homogeneity estimate.

Publication Bias

The Rosenthal's fail-safe N test indicated that 787 additional studies with null effects would be needed to increase the *p* value of the combined effect size to greater than .05. This number strongly exceeded the benchmark of 5*k*+10. Examination of the funnel plot suggested some asymmetry, indicating a potential publication bias. However, the trim and fill method (Duval & Tweedie, 2000) did not impute any studies, indicating no publication bias.

4. Discussion

This meta-analysis revealed that parents of children born prematurely were more controlling than parents of children born full-term, although the combined effect size was small with Hedges' *g* at .29 (Cohen, 1988). This is consistent with the literature that describes premature birth as a challenging event that represents an emotional burden for many parents (Forcada-Guex et al., 2011; Treyvaud et al., 2014), characterized by uncertainty about the infant's survival and worries about the child's abilities and resilience even when their current functioning does not justify that perception (Halpern et al., 2001; Horwitz et al., 2015; Potharst et al., 2015), which might lead to parental limitation of age-appropriate exploration and control of the child's behavior (Green & Solnit, 1964; Thomasgard, 1998). Our finding is also consistent with self-determination theory (Deci & Ryan, 2000), which describes parental control as playing an important role on children's development of autonomous versus controlled regulation of behavior. Infant regulation is initially orchestrated by the parental figure, who serves as an external regulator and gradually facilitates the child's increasing ability to self-regulate (Kopp, 1982; Sroufe, 1995). Parents using high levels of controlling parenting fail in this gradual facilitation because they limit their child's age-appropriate exploration of the world and undermine the child's ability for autonomous regulation, which is crucial for the development of social, emotional, and cognitive functioning (Berger et al., 2007; Davis & Burns, 2001). Conversely, parents using autonomy-supportive strategies promote the development of autonomous regulation and psychological well-being (Deci & Ryan, 2000).

Parenting quality may be even more salient as a predictor of developmental outcomes in the case of children born preterm, considering their biological vulnerability. Several studies pointed to the quality of parent-infant interaction as an important mediator between infants' neonatal risk status and later developmental outcomes (Poehlmann & Fiese, 2001; Smith et al., 2006). There is substantial evidence that children born preterm show higher rates of cognitive, behavioral, and psychological problems (Arpi & Ferrari, 2013; Bhutta et al., 2002), which may be partly due to exposure to controlling parenting. Accordingly, in a study with both full-term and preterm children, Maupin and Fine (2014) found that preterm status indirectly influenced children's socioemotional outcomes by its effect on early childhood parenting behaviors, including intrusiveness. Clark and Woodward (2015) also found an indirect effect of preterm status on children's executive control through early parental intrusiveness.

The set of studies included in the meta-analysis was significantly heterogeneous, but we found no moderator effects for the association between prematurity and controlling parenting. The effect size

for differential levels of parental control toward preterm children versus full-term children was independent of gestational age, birth weight, child age, child gender, parental education, type of assessment method (observational or parental self-report), parenting dimension measured (behaviors or attitudes), type of controlling parenting under study (intrusiveness or other types), study design (cross-sectional or longitudinal), year of publication, and geographical setting of the studies (America or Europe). However, it should be noted that the subsamples were small for some of these factors – namely, child age, parental education, assessment method in parental self-report, and parenting dimension in attitudes - which could have reduced the statistical power to detect significant moderation by these variables. Future research is needed to increase the number of studies available and allow further clarification. The moderation power of the type of controlling parenting could also be compromised, considering that the subsample of other types included a wide diversity of types of controlling parenting, which might have buffered potential differential effects between them. Unfortunately, the low number of studies available with each of these specific types of controlling parenting did not allow for a more detailed examination. To further clarify, more research is needed targeting the various types of controlling parenting.

The fact that the moderator variables could not explain the heterogeneity between studies suggests that other factors could influence the association between prematurity and controlling parenting. Additional moderators that could be considered in the future include other neonatal risk indicators, such as length of hospitalization and level of medical complications, and psychosocial risk factors associated with controlling parenting and/or with prematurity, such as other indicators of SES and parental psychological distress (Clark & Woodward, 2015; Forcada-Guex et al., 2011; Halpern et al., 2001; Loi et al., 2017). Other variables of interest could include maternal trauma symptoms in response to the preterm birth, coping styles, and social support, given recent evidence pointing to these variables as predictors of maternal perceptions of child vulnerability, instead of demographic and health characteristics (Horwitz et al., 2015). These variables could not be included in the current meta-analysis because there was a lack of consistency in their reporting across studies. In addition, parent gender should be considered as a potential moderator, given evidence that mothers are more likely than fathers to show controlling parenting in general population samples (Tamis-LeMonda et al., 2004). However, 28 of the studies included in this meta-analysis focused exclusively on the mother, indicating that future studies should take into account both mothers and fathers to further investigate potential differences. Finally, virtually all studies in this meta-analysis represent European or North American samples. Because cultural factors are known to relate to different parenting styles and attitudes (Keller,

2007), further research on families with preterm-born children in other parts of the world is also needed to clarify potential cultural effects on controlling parenting in response to prematurity.

A limitation of this study was the exclusive inclusion of articles written in English, which may have excluded studies of interest. In addition, we included a wide range of child ages. Parenting patterns change across developmental stages and, particularly, controlling parenting tends to decrease over time because of the increase of children's self-regulation (Kochanska et al., 2001). Therefore, the effect of premature birth on parental control might vary across different developmental stages. We tried to overcome this limitation by testing the child's age as a potential moderator, although the power for this moderator analysis could be reduced because of the reasons described above. Future research is needed to provide information on controlling parenting across different developmental stages. In addition, we included a wide range of gestational ages. Preterm children are a heterogeneous group, and the neonatal experiences of extremely preterm, very preterm, and late preterm children are different and might differently affect children and parents (Bhutta et al., 2002; Muller-Nix et al., 2004). We tried to overcome this by including mean gestational age as a continuous moderator; however, we were not able to distinguish between the groups because most of the studied samples included a wide range of gestational ages and did not distinguish between categories.

Conclusion

Our meta-analysis shows that parents of children born preterm may be at higher risk of engaging in controlling parenting strategies, stressing the importance of psychosocial follow-up support of parents of preterm infants. The small effect size observed may not provide sufficient reason for making controlling parenting a main target of prevention and intervention policies for families of preterm-born children. However, it seems important for health care providers to keep in mind parents' difficulties in the interaction with their children, particularly regarding parental control. Furthermore, our findings stress the importance of future research exploring possible mechanisms underlying the controlling parenting differences between parents of preterm and full-term children.

5. References

Agostini, F., Neri, E., Dellabartola, S., Biasini, A., & Monti, F. (2014). Early interactive behaviours in preterm infants and their mothers: Influences of maternal depressive symptomatology and neonatal birth weight. *Infant Behavior and Development, 37*(1), 86–93. https://doi.org/10.1016/j.infbeh.2013.12.003

Als, H., Butler, S., Kosta, S., & McAnulty, G. (2005). The assessment of preterm infants' behavior (APIB): Furthering the understanding and measurement of neurodevelopmental competence in preterm and full-term infants. *Mental Retardation and Developmental Disabilities Research Reviews, 11*(1), 94–102. https://doi.org/10.1002/mrdd.20053

Arpi, E., & Ferrari, F. (2013). Preterm birth and behaviour problems in infants and preschool-age children: A review of the recent literature. *Developmental Medicine & Child Neurology, 55*(9), 788-796. https://doi.org/10.1111/dmcn.12142

Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin, 129*(2), 195–215. https://doi.org/10.1037/0033-2909.129.2.195

Barkmann, C., Helle, N., & Bindt, C. (2018). Is very low infant birth weight a predictor for a five-year course of depression in parents? A latent growth curve model. *Journal of Affective Disorders, 15*(229), 415–420. https://doi.org/10.1016/j.jad.2017.12.020

Barrat, M. S., Roach, M. A., & Leavitt, L. A. (1996). The impact of low-risk prematurity on maternal behaviour and toddler outcomes. *International Journal of Behavioral Development, 19*(3), 581–602. https://doi.org/10.1177/016502549601900308

Berger, A., Kofman, O., Livneh, U., & Henik, A. (2007). Multidisciplinary perspectives on attention and the development of self-regulation. *Progress in Neurobiology, 82*(5), 256-286. https://doi.org/10.1016/j.pneurobio.2007.06.004

Bhutta, A. T., Cleves, M. A., Casey, P. H., Cradock, M. M., & Anand, K. J. S. (2002). Cognitive and behavioral outcomes of school-aged children who were born preterm: A meta- analysis. *Journal of the American Medical Association, 288*(6), 728-737. https://doi.org/10.1001/jama.288.6.728

Bilgin, A., & Wolke, D. (2015). Maternal sensitivity in parenting preterm children: A meta-analysis. *Pediatrics, 136*(1), 177-193. https://doi.org/10.1542/peds.2014-3570

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive meta-analysis version*

2. Biostat.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. John Wiley & Sons Inc.

Chapieski, M. L., & Evankovich, K. D. (1997). Behavioral effects of prematurity. *Seminars in Perinatology, 21*(3), 211-239. https://doi.org/10.1016/S0146-0005(97)80065-1

Clark, C. A. C., & Woodward, L. J. (2015). Relation of perinatal risk and early parenting to executive control at the transition to school. *Developmental Science, 18*(4), 525–542. https://doi.org/10.1111/desc.12232

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Erlbaum.

Culp, R. E., Cook, A. S., & Housley, P. C. (1983). A comparison of observed and reported adult-infant interactions: Effects of perceived sex. *Sex Roles, 9*(4), 475–479. https://doi.org/10.1007/BF00289787

Davis, D. W., & Burns, B. (2001). Problems of self-regulation: A new way to view deficits in children born prematurely. *Issues in Mental Health Nursing, 22*(3), 305-323. https://doi.org/10.1080/01612840119487

Deci, E. L., & Ryan, R. M. (2000). The ‘‘what” and ‘‘why” of goal pursuits: Human needs and the self determination of behavior. *Psychological Inquiry, 11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01

DeWitt, S. J., Sparks, J. W., Swank, P. B., Smith, K., Denson, S. E., & Landry, S. H. (1997). Physical growth of low birthweight infants in the first year of life: Impact of maternal behaviors. *Early Human Development, 47*(1), 19–34. https://doi.org/10.1016/s0378-3782(96)01757-4

DiPietro, J. A., Porges, S., & Uhly, B. (1992). Reactivity and developmental competence in preterm and full-term infants. *Developmental Psychology, 28*(5), 831–841. https://doi.org/10.1037/0012-1649.28.5.831

Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics, 56*(2), 455–463. https://doi.org/10.1111/j.0006-341X.2000.00455.x

Endendijk, J. J., Groeneveld, M. G., Bakermans-Kranenburg, M. J., & Mesman, J. (2016). Gender-differentiated parenting revisited: Meta-analysis reveals very few differences in parental control of boys and girls. *PLoS One, 11*(7). https://doi.org/10.1371/journal.pone.0159193

Faure, N., Habersaat, S., Harari, M. M., Müller-Nix, C., Borghini, A., Ansermet, F., Tolsa, J., & Urben, S. (2017). Maternal sensitivity: A resilience factor against internalizing symptoms in early

adolescents born very preterm?. *Journal of Abnormal Child Psychology, 45*(4), 671–680. https://doi.org/10.1007/s10802-016-0194-0

Feeley, N., Hayton, B., Gold, I., & Zelkowitz, P. (2017). A comparative prospective cohort study of women following childbirth: Mothers of low birthweight infants at risk for elevated PTSD symptoms. *Journal of Psychosomatic Research, 101*, 24–30. https://doi.org/10.1016/j.jpsychores.2017.07.014

Feldman, R. (2007). Maternal versus child risk and the development of parent-child and family relationships in five high-risk populations. *Development and Psychopathology, 19*(2), 293–312. https://doi.org/10.1017/S0954579407070150

Field T. M. (1977). Effects of early separation, interactive deficits and experimental manipulations on infant-mother face-to-face interaction. *Child Development, 48*(3), 763- 771. https://doi.org/10.2307/1128325

Field, T. (1979). Interaction patterns of high-risk and normal infants. In T. Field, A. Sostek, S. Goldberg, & H. H. Shuman (Eds.), *Infants born at risk* (pp. 333-356). Spectrum.

Field, T. (2010). Postpartum depression effects on early interactions, parenting, and safety practices: A review. *Infant Behavior and Development, 33*(1), 1–6. https://doi.org/10.1016/j.infbeh.2009.10.005

Forcada-Guex, M., Borghini, A., & Pierrehumbert, B. (2011). Prematurity, maternal posttraumatic stress and consequences on the mother-infant relationship. *Early Human Development, 87*(1), 21–26. https://doi.org/10.1016/j.earlhumdev.2010.09.006

Goldberg, S., & DiVitto, B. (2002). Parenting children born preterm. In M. H. Bornstein (Ed.), *Handbook of parenting* (pp. 329–354). Erlbaum.

Green, M., & Solnit, A. J. (1964). Reactions to the threatened loss of a child: A vulnerable child syndrome. *Pediatrics, 34*(1), 58-66.

Grolnick, W. S. (2013). *The psychology of parental control: How well-meant parenting backfires*. Psychology Press.

Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The self-determination theory perspective. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting and children's internalization of values: A handbook of contemporary theory* (pp. 135-161). John Wiley & Sons Inc.

Grolnick, W. S., & Pomerantz, E. M. (2009). Issues and challenges in studying parental control: Toward a new conceptualization. *Child Development Perspectives, 3*(3), 165-170.

https://doi.org/10.1111/j.1750-8606.2009.00099.x

Halpern, L. F., Brand, K. L., & Malone, A. F. (2001). Parenting stress in mothers of very-low-birth-weight (VLBW) and full-term infants: A function of infant behavioral characteristics and child-rearing attitudes. *Journal of Pediatric Psychology, 26*(2), 93–104. https://doi.org/10.1093/jpepsy/26.2.93

Hoffenkamp, H. N., Braeken, J., Hall, R. A., Tooten, A., Vingerhoets, A. J. & van Bakel, H. J. (2015). Parenting in complex conditions: Does preterm birth provide a context for the development of less optimal parental behavior?. *Journal of Pediatric Psychology, 40*(6), 559–571. https://doi.org/10.1093/jpepsy/jsv007

Horwitz, S. M., Storfer-Isser, A., Kerker, B. D., Lilo, E., Leibovitz, A., St. John, N., & Shaw, R. J. (2015). A model for the development of mothers' perceived vulnerability of preterm infants. *Journal of Developmental & Behavioral Pediatrics*, *36*(5), 371-380. https://doi.org/10.1097/DBP.0000000000000173

Imgrund, C. M. (2013). *Directive language input to children born preterm and full term* [Doctoral dissertation, University of Kansas]. http://hdl.handle.net/1808/26013

Ionio, C., Lista, G., Mascheroni, E., Olivari, M. G., Confalonieri, E., Mastrangelo, M., Brazzoduro, V., Balestriero, M. A., Banfi, A., Bonanomi, A., Bova, S., Castoldi, F., Colombo, C., Introvini, P., & Scelsa, B. (2017). Premature birth: Complexities and difficulties in building the mother–child relationship. *Journal of Reproductive and Infant Psychology, 35*(5), 509-523. https://doi.org/10.1080/02646838.2017.1383977

Jaekel, J., Wolke, D., & Chernova, J. (2012). Mother and child behaviour in very preterm and term dyads at 6 and 8 years. *Developmental Medicine & Child Neurology, 54*(8), 716-723. https://doi.org/10.1111/j.1469-8749.2012.04323.x

Johnston, C., Williamson, D., Noyes, A., Stewart, K., & Weiss, M. D. (2018). Parent and child ADHD symptoms in relation to parental attitudes and parenting: Testing the similarity-fit hypothesis. *Journal of Clinical Child & Adolescent Psychology, 47*(sup1), S127-S136. https://doi.org/10.1080/15374416.2016.1169538

Karabekiroglu, K., Akman, I., Orhan, Ş. K., Kuşçu, K., Altuncu, E., Karabekiroğlu, A., & Yüce, M. (2015). Mother-child interactions of preterm toddlers. *Archives of Neuropsychiatry, 52*(2), 157–162. https://doi.org/10.5152/npa.2015.7343

Keller H. (2007). *Cultures of infancy*. Erlbaum.

Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development, 72*(4), 1091–1111. https://doi.org/10.1111/1467-8624.00336

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199–214. https://doi.org/10.1037/0012-1649.18.2.199

Landry, S. H., Chapieski, M. L., Richardson, M. A., Palmer, J., & Hall, S. (1990). The social competence of children born prematurely: Effects of medical complications and parent behaviors. *Child Development, 61*(5), 1605–1616. https://doi.org/10.1111/j.1467-8624.1990.tb02887.x

Landry, S. H., Smith, K. E., Miller-Loncar, C. L., & Swank, P. R. (1997). Predicting cognitive-language and social growth curves from early maternal behaviors in children at varying degrees of biological risk. *Developmental Psychology, 33*(6), 1040–1053. https://doi.org/10.1037/0012-1649.33.6.1040

Landry, S. H., Smith, K. E., & Swank, P. R. (2002). Environmental effects on language development in normal and high-risk child populations. *Seminars in Pediatric Neurology, 9*(3), 192–200. https://doi.org/10.1053/spen.2002.35499

Landry, S. H., Smith, K. E., Swank, P. R., & Miller-Loncar, C. L. (2000). Early maternal and child influences on children's later independent cognitive and social functioning. *Child Development, 71*(2), 358–375. https://doi.org/10.1111/1467-8624.00150

Lawson, K. R., Parrinello, R., & Ruff, H. A. (1992). Maternal behavior and infant attention. *Infant Behavior and Development, 15*(2), 209-229. https://doi.org/10.1016/0163-6383(92)80024-O

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis. Applied social research methods series (Vol. 49)*. Sage Publications.

Loi, E. C., Vaca, K. E. C., Ashland, M. D., Marchman, V. A., Fernald, A., & Feldman, H. M. (2017). Quality of caregiver-child play interactions with toddlers born preterm and full term: Antecedents and language outcome. *Early Human Development, 115*, 110–117. https://doi.org/10.1016/j.earlhumdev.2017.10.001

Malatesta, C. Z., Grigoryev, P., Lamb, C., Albin, M., & Culver, C. (1986). Emotion socialization and expressive development in preterm and full-term infants. *Child Development, 57*(2), 316-330. https://doi.org/10.2307/1130587

Maupin, A. N., & Fine, J. G. (2014). Differential effects of parenting in preterm and full-term children on

developmental outcomes. *Early Human Development, 90*(12), 869–876. https://doi.org/10.1016/j.earlhumdev.2014.08.014

Miljkovitch, R., Moran, G., Roy, C., Jaunin, L., Forcada-Guex, M., Pierrehumbert, B., Muller-Nix, C., & Borghini, A. (2013). Maternal interactive behaviour as a predictor of preschoolers' attachment representations among full term and premature samples. *Early Human Development, 89*(5), 349–354. https://doi.org/10.1016/j.earlhumdev.2012.11.006

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G.; PRISMA Group. (2009) Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine, 6*(7). https://doi.org/10.1371/journal.pmed.1000097

Muller-Nix, C., Forcada-Guex, M., Pierrehumbert, B., Jaunin, L., Borghini, A., & Ansermet, F. (2004). Prematurity, maternal stress and mother-child interactions. *Early Human Development, 79*(2), 145–158. https://doi.org/10.1016/j.earlhumdev.2004.05.002

Neri, E., Agostini, F., Salvatori, P., Biasini, A., & Monti, F. (2015). Mother-preterm infant interactions at 3 months of corrected age: Influence of maternal depression, anxiety and neonatal birth weight. *Frontiers in Psychology, 6*, 1–12. https://doi.org/10.3389/fpsyg.2015.01234

O'Mara, L., & Johnston, C. (1989). Mother's attitudes and their children's behaviors in 3-year-olds born prematurely and at term. *Journal of Developmental & Behavioral Pediatrics, 10*(4), 192–197. https://doi.org/10.1097/00004703-198908000-00006

Orchinik, L. J. (2015). *Emotion regulation in preschool-aged children with very low birth weight: Outcomes relative to normal birth weight children and associations of child characteristics and maternal behavior* [Doctoral dissertation, Case Western Reserve University]. http://rave.ohiolink.edu/etdc/view?acc_num=case1415955246

Perry, N. B., Dollar, J. M., Calkins, S. D., Keane, S. P., & Shanahan, L. (2018). Childhood self-regulation as a mechanism through which early parenting is associated with adjustment in preadolescence. *Developmental Psychology, 54*(8), 1542-1554. https://doi.org/10.1037/dev0000536

Poehlmann, J., & Fiese, B. H. (2001). Parent-infant interaction as a mediator of the relation between neonatal risk status and 12-month cognitive development. *Infant Behavior and Development, 24*(2), 171–188. https://doi.org/10.1016/S0163-6383(01)00073-X

Potharst, E. S., Houtzager, B. A., van Wassenaer-Leemhuis, A. G., Kok, J. H., Koot, H. M., & Last, B. F. (2015). Maternal and paternal perceptions of child vulnerability and behavior problems in very preterm. *Infant and Child Development, 24*(5), 489-505. https://doi.org/10.1002/icd.1898

Potharst, E. S., Schuengel, C., Last, B. F., van Wassenaer, A. G., Kok, J. H., & Houtzager, B. A. (2012). Difference in mother-child interaction between preterm- and term-born preschoolers with and without disabilities. *Acta Paediatrica, 101*(6), 597–603. https://doi.org/10.1111/j.1651-2227.2012.02599.x

Rahkonen, P., Heinonen, K., Pesonen, A., Lano, A., Autti, T., Puosi, R., Huhtala, E., Andersson, S., Metsäranta, M., & Räikkönen, K. (2014). Mother-child interaction is associated with neurocognitive outcome in extremely low gestational age children. *Scandinavian Journal of Psychology, 55*(4), 311–318. https://doi.org/10.1111/sjop.12133

Rapee, R. M. (1997). Potential role of childrearing practices in the development of anxiety and depression. *Child Psychology Review, 17*(1), 47-67. https://doi.org/10.1016/s02727358(96)00040-2

Rosenthal, R. (1979). The "file drawer problem" and tolerance for null results. *Psychological Bulletin, 86*(3), 638-641. https://doi.org/10.1037/0033-2909.86.3.638

Rosenthal, R. (1991). *Meta-analytic procedures for social research (Vol. 6).* Sage Publications.

Rubin, K. H., Burgess, K. B., Dwyer, K. M., & Hastings, P. D. (2003). Predicting preschoolers' externalizing behaviors from toddler temperament, conflict, and maternal negativity. *Developmental Psychology, 39*(1), 164-176. https://doi.org/10.1037//0012-1649.39.1.164

Salvatori, P., Neri, E., Chirico, I., Andrei, F., Agostini, F., & Trombini, E. (2016). Mother-toddler play interaction in extremely, very low birth weight, and full-term children: A longitudinal study. *Frontiers in Psychology, 7*, 1–10. https://doi.org/10.3389/fpsyg.2016.01511

Samra, H. A., McGrath, J. M., & Wey, H. (2010). Are former late-preterm children at risk for child vulnerability and overprotection?. *Early Human Development, 86*(9), 557–562. https://doi.org/10.1016/j.earlhumdev.2010.07.005

Schermann-Eizirik, L., Hagekull, B., Bohlin, G., Persson, K., & Sedin, G. (2008). Interaction between mothers and infants born at risk during the first six months of corrected age. *Acta Paediatrica, 86*(8), 864–872. https://doi.org/10.1111/j.1651-2227.1997.tb08613.x

Smith, K. E., Landry, S. H., & Swank, P. R. (2006). The role of early maternal responsiveness in supporting school-aged cognitive development for children who vary in birth status. *Pediatrics, 117*(5), 1608–1617. https://doi.org/10.1542/peds.2005-1284

Smith, K. E., Landry, S. H., Swank, P. R., Baldwin, C. D., Denson, S. E., & Wildin, S. (1996). The relation of medical risk and maternal stimulation with preterm infants' development of cognitive, language and daily living skills. *Journal of Child Psychology and Psychiatry, 37*(7),

855–864. https://doi.org/10.1111/j.1469-7610.1996.tb01481.x

Sommerfelt, K., Ellertsen, B., & Markestad, T. (1995). Parental factors in cognitive outcome of non-handicapped low birthweight infants. *Archives of Disease in Childhood, 73*(3), 135–142. https://doi.org/10.1136/fn.73.3.f135

Sroufe, L. A. (1995). *Emotional development: The organization of emotional life in the early years.* Cambridge University Press.

Tamis-LeMonda, C. S., Shannon, J. D., Cabrera, N. J., & Lamb, M. E. (2004). Fathers and mothers at play with their 2- and 3-year-olds: Contributions to language and cognitive development. *Child Development, 75*(6), 1806–1820. https://doi.org/10.1111/j.1467-8624.2004.00818.x

Thomasgard, M. (1998). Parental perceptions of child vulnerability, overprotection, and parental psychological characteristics. *Child Psychiatry & Human Development, 28*(4), 223-240. https://doi.org/10.1023/A:1022631914576

Treyvaud, K., Lee, K. J., Doyle, L. W., & Anderson, P. J. (2014). Very preterm birth influences parental mental health and family outcomes seven years after birth. *The Journal of Pediatrics, 164*(3), 515–521. https://doi.org/10.1016/j.jpeds.2013.11.001

Vinall, J., Miller, S. P., Synnes, A. R., & Grunau, R. E. (2013). Parent behaviors moderate the relationship between neonatal pain and internalizing behaviors at 18 months corrected age in children born very prematurely. *PAIN, 154*(9), 1831–1839. https://doi.org/10.1016/j.pain.2013.05.050

Voegtline, K. M., & Stifter, C. A. (2010). Late-preterm birth, maternal symptomatology, and infant negativity. *Infant Behavior and Development, 33*(4), 545–554. https://doi.org/10.1016/j.infbeh.2010.07.006

Wagner, N. J., Propper, C., Gueron-Sela, N., & Mills-Koonce, W. R. (2015). Dimensions of maternal parenting and infants' autonomic functioning interactively predict early internalizing behavior problems. *Journal of Abnormal Child Psychology, 44*(3), 459-470. https://doi.org/10.1007/s10802-015-0039

Wightman, A., Schluchter, M., Drotar, D., Andreias, L., Taylor, H. G., Klein, N., Wilson-Costello, D., & Hack, M. (2007). Parental protection of extremely low birth weight children at age 8 years. *Journal of Developmental & Behavioral Pediatrics, 28*(4), 317–326. https://doi.org/10.1097/dbp.0b013e3180330915

CHAPTER 3

MATERNAL AND PATERNAL OVERPROTECTION OF CHILDREN BORN PRETERM: RELATIONS TO CHILD AND PARENTAL FACTORS[4]

1. Introduction

Parental overprotection is a controlling behavioral pattern that reflects an excessive level of parental protection, given the child's developmental level (Thomasgard et al., 1995), and is associated with negative child outcomes (Cooklin et al., 2013; Sharkey et al., 2019). Parents of children born preterm seem to be more prone to engage in controlling, overprotective behaviors, than parents of children born full-term (Wightman et al., 2007). However, the factors that might put parents of preterms at risk for overprotection are still not discerned from the literature. This study aims to contribute to our understanding of parental overprotection toward preterm children, by investigating correlates of overprotection through the standardized observation of both mothers' and fathers' overprotective behaviors.

The concept of overprotection was formulated by Levy (1943) as characterized by four main dimensions: Prevention of the child's independent behavior, excessive physical or social contact with the child, infantilization of the child, and excessive parental control. An extensive body of research shows that parental overprotection is associated with a child socioemotional and cognitive problems (Cooklin et al., 2013; Sharkey et al., 2019). However, less is known about the factors and mechanisms that may lead parents to engage in this type of behavior. Levy (1943) suggested that overprotection would most probably develop in the context of experiences that threaten the successful completion of the pregnancy and/or death-threatening illness of the child. Although several studies have examined overprotection with children with chronic illness (e.g., Mullins et al., 2007), overprotection with children born preterm has received less attention. A recent meta-analysis revealed that mothers of preterm children are at higher risk for engaging in controlling parenting strategies than mothers of full-term children (Toscano et al., 2020). However, only three studies specifically focused on overprotective behavior. Although overprotection with children born preterm has not been studied extensively, there are several reasons to expect preterm parents to be overprotective.

[4] This chapter corresponds to a published paper: Toscano, C., Soares, I., Baptista, J., Moutinho, V., Rippe, R. C. A., & Mesman, J. (2021). Maternal and paternal overprotection of children born preterm: Relations to child and parental factors. *Journal of Family Psychology.* Advance online publication. https://doi.org/10.1037/fam0000848

Because preterm-born children often present more developmental problems than children born full-term (Landry et al., 2000), they may elicit more controlling and protective responses from their parents. In addition, the adverse birth conditions and neonatal complications that usually come with a premature birth may leave a significant emotional mark on parents, and influence the way they perceive and interact with their child (Goldberg & DiVitto, 2002). Accordingly, some studies showed that parents of preterm infants with increased neonatal adversity exhibit more controlling behaviors (Grunberg et al., 2018). After discharge, parents often persist in perceiving their children as vulnerable even in the absence of health and developmental problems (Potharst et al., 2015), which can lead to parents' limitation of age-appropriate exploration (Thomasgard, 1998) and overprotective behavior (Samra et al., 2010). Further, studies have shown that mothers of preterm children display higher levels of psychological distress than mothers of full-terms (Yaari et al., 2019), which represents a risk factor for overprotective behavior (Cooklin, et al., 2013). Finally, considering that premature birth is most likely to occur in the context of socioeconomic deprivation (Goldberg & DiVitto, 2002) and that parents with fewer socioeconomic resources often engage in more controlling and overprotective behaviors (Mullins et al., 2007; Sharkey et al., 2019), this also seems to be an important factor to consider when trying to identify factors that may put preterm children at risk for overprotection.

Parental overprotection has traditionally been studied based on self-report measures and few studies are based on direct observation of parents' behaviors. However, parenting self-report measurement may be susceptible to distortion due to personal and social desirability biases, particularly in the case of negative parenting behaviors (Bornstein et al., 2015). Very often, studies report low agreement between observational and self-report measures of various parenting constructs (Gardner, 2000), but few have examined this with regard to overprotective behavior. This study focuses on observed overprotection as a more direct window to parents' actual behaviors and examines its agreement with parents' self-report. Understanding the extent to which parents' perception of their protective behavior is coherent with their actual observed behavior is important for decisions on the design and assessment methods of future studies on overprotection.

Some authors have suggested different roles of fathers and mothers in parenting. While the father's role may be more aimed at stimulating exploration, risk-taking, and autonomy, the mother's role may be more focused on providing care and protection (Bögels & Phares, 2008), thus overprotective behaviors may be more typical of mothers. However, to date, most studies on overprotection have focused exclusively on mothers, which represents a major gap in the literature because fathers' behaviors are equally important to the child's outcomes (Lamb & Lewis, 2010). The

few studies available comparing overprotective levels between mothers and fathers were exclusive to full-term samples and showed inconsistent results: While some reported more overprotection in mothers (Holmbeck et al., 2002), others found no differences (Mullins et al., 2007). This points to the need for more research to understand if parental gender is related to different levels of overprotection towards preterm children.

The main aim of the present study was to explore child and parental correlates of observed maternal and paternal overprotection in a sample of children born preterm in Portugal, where there is an increasing and one of the highest rates of premature birth in Europe (8%) (Euro-Peristat, 2018). We examined (a) the agreement between self-reported and observed overprotection of mothers and fathers; (b) the similarities and differences between maternal and paternal observed overprotection; and (c) the relations between the child and parental characteristics on the one hand and observations of maternal and paternal overprotection on the other hand. Child characteristics include neonatal risk and child development, and parental characteristics include perceptions of child vulnerability, psychological distress, and socioeconomic disadvantage.

2. Method

Participants

Participants were drawn from a larger longitudinal study about the cognitive and socioemotional development of children born preterm that recruited 150 preterm-born children and their parents, from two hospitals in Portugal. Children were born between 2013 and 2015. Inclusion criteria included child's gestational age <37 weeks and absence of congenital or current neurological problems, chromosomal disorders, and/or fetal drug/alcohol exposures. Families were assessed at three time points: At Time 1, children were on average 12 months of corrected age (i.e., the age the child would be if they had been born at term) (*SD* = 1.04); at Time 2, children were 24 months of corrected age (*SD* = 2.60); and at Time 3, children were 42 months of chronological age (*SD* = 1.36; corrected age ranging from 34 to 44 months). Attrition was 28% from Time 1 to Time 2, with no differences between those families who did and did not participate in terms of child neonatal risk, parental age, number of children, family income, and parental employment status measured at Time 1 (all *p* values > .12). In families lost to attrition, children had lower development scores, $t(148) = -2.54$, $p = .01$, and parents had lower education, with $t(92.31) = -2.61$, $p = .01$ for mothers and $t(145) = -0.28$, $p = .006$ for fathers. From Time 2 to Time 3, attrition was 29%, with no differences in child neonatal risk, child development,

parental age, number of children, family income, and maternal employment status measured at Time 1 (all p values > .12). In families who did not participate in the Time 3 assessment, parents had lower education, with $t(148) = -1.97$, $p = .05$ for mothers and $t(145) = -2.06$, $p = .04$ for fathers, and fathers were more likely to be unemployed at Time 1, $X^2(1) = 8.25$, $p = .004$. Both parents were invited, but not required, to participate, with the possibility of just the mother or just the father to participate. The current study is comprised of 85 children for whom maternal and/or paternal observed overprotection data were collected. For 47 out of the 85 children, both maternal and paternal data were available. For 32 children only maternal data were available, and for 6 children only paternal data were available. Detailed demographic information of participants is available in Table 3.

Table 3

Sample Demographic Characteristics at Time 1 (N = 85)

Variable	Range or frequency (%)	*M*	*SD*
Child gestational age	25-36	33.06	2.89
< 28 weeks	4 (4.7%)		
28-31 weeks	21 (24.7%)		
32-36 weeks	60 (70.6%)		
Child birth weight	742-3190	1931.92	588.81
Extremely low (< 1000 grams)	4 (4.7%)		
Very low (< 1500 grams)	20 (23.5%)		
Low (< 2500 grams)	45 (52.9%)		
≥ 2500 grams	16 (18.8%)		
Child gender (% male)	54 (63.5%)		
Child first born	62 (72.9%)		
Child twin	22 (25.9%)		
Maternal age (years)	22-48	34.29	4.60
Paternal age (years)	22-49	35.48	5.20
Maternal education (years)	6-17	12.69	2.73
Paternal education (years)	5-17	11.99	2.97
Monthly income (euros)	270-4000	1603.78	680.15
Parents married/common law marriage	81 (95.3%)		

Procedure

The study was approved by the Portuguese National Commission for Data Protection, and by the ethical commissions of the participating hospitals and of the University of Minho. Written informed consent was obtained from parents. Participation was voluntary with no financial compensation. At Time 1, a hospital visit took place with the families. At Time 2, questionnaires were sent to participants' homes with a prepaid return envelope. At Time 3, two assessment visits took place either at the hospital (n = 75), at the university laboratory (n = 4), or at the participants' home (n = 6), according to the family's availability. One visit was dedicated to the assessment of the mother and the other to the father (in 92% of the cases, conducted within 1 month), counterbalanced for order between families. Parents filled questionnaires and a parent-child interaction was videotaped, divided into three episodes: The child plays with a developmentally challenging toy with parental guidance (5 min); dyad plays with developmentally appropriate toys (2.5 min); and child cleans up the toys (2.5 min).

Measures

Observed Parental Overprotection. The parent-child interaction videotaped at Time 3 was coded using Johnson and Holmbeck's (1995) coding system, which includes six subscales that tap into Levy's (1943) dimensions of overprotection: (a) Nonverbal prevention of exploratory behavior in the child, (b) Parental encouragement of child's expression of individual views/opinions, (c) Excessive physical contact with the child, (d) Parental behavior that infantilizes the child, (e) Active catering to the child, and (f) Excessive parental control. In this study, subscale (b) was inverted so that higher scores on all the subscales would represent more overprotective behavior. All subscales are coded on a 5-point Likert scale and reflect excessive levels of parental protection, given the age-expected developmental level of the child. For each subscale, behaviors were coded separately for each of the tasks (see the "Procedure" section), and the mean score across all three tasks was used for analysis. Because of very low frequencies of occurrence, subscales (c) and (e) were dropped from further analysis. When entered in a principal component analysis (PCA), the remaining four subscales loaded on the first unrotated component (loadings between .31 and .92 for mothers, and between .37 and .94 for fathers) and thus were summed to create a global measure of overprotection (α = .75 for mothers and .83 for fathers), with a possible range of scores from 4 to 20. To examine interrater reliability, 33% of the mother cases and 25% of the father cases were double-coded by independent raters. Intraclass correlations (ICCs) across the four subscales ranged from .82 to .94 (mean ICC = .90) for mothers, and from .93 to .98 (mean ICC = .96) for fathers.

Self-Reported Parental Overprotection. Parents completed the Parent Protection Scale (PPS; Thomasgard, et al., 1995) at Time 3. The PPS comprises 25 items, rated on a 4-point Likert scale from 0 (*never*) to 3 (*always*), and yields four subscales (Supervision, Separation Problems, Dependence, and Control) and a total score (sum of the 25 items). In this study, the total score was used (α = .71 for mothers and .57 for fathers), with higher scores reflecting increased perceived overprotection.

Child Neonatal Risk Status. A neonatal health index (Poehlmann et al., 2012) was calculated based on children's neonatal intensive care unit (NICU) medical records. Child gestational age and birth weight were standardized, reverse scored, and combined with the standardized sum of the presence of 10 neonatal medical risk factors (the percentage of children in this sample in parentheses): Diagnosis of apnea (23%), respiratory distress (34%), chronic lung disease (9%), gastroesophageal reflux (9%), multiple births (26%), supplementary oxygen at NICU discharge (4%), apnoea monitor at NICU discharge (0%), 5 min Apgar score ≤6 (2%), ventilation during NICU stay (39%), and NICU stay ≥30 days (35%). Higher scores reflect increased neonatal risk.

Child Development. At Time 1, the Griffiths Mental Developmental Scales (0-2 years) (Griffiths, 1984) were used, assessing child mental and psychomotor development by means of five subscales: Locomotor, personal-social, language, eye-hand coordination, and performance. Each subscale's score is standardized for an expected value of 100 with an *SD* of 15. A global developmental quotient was calculated averaging the five subscores (average quotients on the range of 90-109). Cronbach's alpha was .76 for the sum of the five subscores.

Parental Perception of Child Vulnerability. Parents completed the Child Vulnerability Scale (CVS; Forsyth et al., 1996) at Time 2. The CVS comprises eight items, rated on a 4-point Likert scale from 0 (*definitely false*) to 3 (*definitely true*), with higher scores reflecting increased perceived vulnerability to illness and/or injury (cut off ≥10). Cronbach's alpha was .86 for mothers and .87 for fathers.

Parental Psychological Distress. Parents completed the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) at Time 3. The BSI comprises 53 items, rated on a 5-point Likert scale from 0 (*not at all*) to 4 (*extremely*), and yields 9 symptom scales (e.g. depression) and 3 global scores. This study used the Global Severity Index (mean of the 53 items), with higher scores reflecting more psychological distress in the past week (α = .97 for mothers and .96 for fathers).

Family Socioeconomic Disadvantage. Family's income and mother's and father's years of education at Time 1 were considered as socioeconomic indicators. When entered on a PCA, these

variables loaded on the first unrotated component (loadings of .82 for family's income, .91 for mother's education, .90 for father's education). Therefore, the socioeconomic disadvantage was computed as the sum of the standardized values of the income and education variables, with lower scores reflecting more socioeconomic disadvantage.

3. Results

Data were analyzed using R version 3.6.1 and R Studio 1.2.5001. Multiple imputation procedures were used to estimate missing data for the correlated variables, using the MICE system of chained equations (Royston, 2009) with 100 imputed data sets. A custom set of predictors, as well as the most appropriate imputation model, was determined specified per individual variable. The percentages of missing data ranged from 0 to 30. Analyses performed using the raw data and multiple imputation showed similar results, thus results using the imputed data are reported. Facing the inclusion of twins in the sample, analyses were also re-run after randomly selecting one twin of each pair and results were the same. Therefore, results using both twins are reported. The linearity of the tested relations was determined based on the nonimputed data by examination of scatterplots and normal P-P plots.

Preliminary analyses were performed to investigate potential demographic covariates of observed overprotection. Observed maternal and paternal overprotection was not correlated with parental age (p = .90 and .89, respectively), or with child birth order (p = .71 and .46, respectively). There were no child gender effects on maternal, $t(77) = 1.59$, p = .12, or paternal behavior, $t(51) = 0.08$, p = .94.

Objective 1: Agreement Between Self-Reported and Observed Overprotection

To examine the agreement between self-reported and observed overprotection, bivariate associations between the PPS total scores and observed overprotection of mothers and fathers were examined. Table 4 presents the descriptive information and bivariate associations between the study variables. As shown in the table, self-reported overprotection and observed overprotection were not significantly correlated for either mothers or fathers.

Table 4

Descriptive Statistics and Bivariate Associations for Study Variables

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
Child-related factors													
1. Child neonatal risk	-0.17	0.91	-										
2. Child development	97.38	7.06	-.09	-									
Parental factors													
3. Socioeconomic status	0.27	2.41	.17	.23*	-								
4. Mothers' perceptions of vulnerability	5.76	5.02	.13	-.28*	-.23+	-							
5. Fathers' perceptions of vulnerability	5.73	5.01	.07	-.24*	-.17	.66***	-						
6. Mothers' psychological distress	0.54	0.45	-.11	.32**	-.13	.14	.17	-					
7. Fathers' psychological distress	0.48	0.37	-.20+	.02	.11	.00	.15	.14	-				
Overprotection													
8. Mothers' self-reported overprotection	35.31	6.88	-.07	.11	-.04	.09	.06	.28*	.01	-			
9. Fathers' self-reported overprotection	35.07	5.91	-.07	-.18	-.26*	.19	.20	-.01	.04	.06	-		
10. Mothers' observed overprotection	7.59	2.17	-.02	-.35**	-.34**	.24*	.30*	.00	.01	.06	.15	-	
11. Fathers' observed overprotection	7.42	2.82	.22*	-.34**	-.21+	.16	.18	-.19	-.22*	.17	.14	.46***	-

Note. Pearson correlation coefficients (two-tailed). Statistics were computed after imputation of missing data. Analyses with mother variables were performed based on the 79 families for which maternal observed overprotection data were available. Analyses with father's variables were performed based on the 53 families for which paternal observed overprotection data were available. Correlations between child neonatal risk, child development, and socioeconomic status, and respective descriptives, were computed based on the entire sample ($N = 85$).

+ p < .10. *p < .05. **p < .01. ***p < .001.

Objective 2: Similarities and Differences Between Maternal and Paternal Overprotection

To examine the similarities and differences between maternal and paternal overprotection, bivariate associations between mother and fathers' observed overprotection were examined and student's *t*-tests were used to compare mothers and fathers regarding their behaviors. As shown in Table 4, there was a positive association between maternal and paternal observed overprotection. There were no significant differences between mothers and fathers in their levels of observed overprotection, $t(130) = 0.40$, $p = .69$. To account for the potential bias of dependence of the 47 mother-father pairs who parented the same child, a paired-sample *t*-test was performed for this subgroup, revealing very similar results, $t(46) = 0.43$, $p = .67$.

Objective 3: Relations Between Observed Overprotection With Child and Parental Factors

To examine the relations between child and parental characteristics and observed overprotection, bivariate associations between child characteristics (neonatal risk and child development) and parental characteristics (perception of child vulnerability, psychological distress, and socioeconomic disadvantage) with maternal and paternal overprotection were examined. Multiple regression models were then conducted separately for maternal and paternal overprotection as dependent variables with the appropriate significant bivariate correlates ($p < .05$) as predictors. Table 5 shows the unstandardized (B), standardized regression (β) coefficients, and total variance accounted (ΔR^2) for the regression models.

As shown in Table 4, greater observed overprotection of mothers was significantly associated with more socioeconomic disadvantage, higher perception of child vulnerability, and lower child development scores. Multiple regression analysis revealed that child development and socioeconomic disadvantage were significant predictors of maternal observed overprotection. For fathers, greater overprotection was associated with lower psychological distress, lower child development scores, and higher neonatal risk. Multiple regression analysis revealed that child development was a significant predictor of paternal observed overprotection (see Table 5). After excluding children with low development scores (i.e., global quotient below 90; $n = 8$), child development was still related to father's behavior, $\beta = -.37$, $p = .009$, but not mother's, $p = .10$, suggesting that paternal overprotection still occurred with children that were high functioning developmentally at 12 months of age.

Table 5

Multiple Regression Models Predicting Maternal and Paternal Observed Overprotection from Child and Parental Factors

Variable	ΔR^2	*B(SE)*	β
Maternal observed overprotection (*n* = 79)			
Model	.17	15.12 (3.35)	
Child development		-0.08 (0.03)	-.26*
Socioeconomic status		-0.22 (0.10)	-.24*
Maternal perceptions of child vulnerability		0.05 (0.05)	.11
Paternal observed overprotection (*n* = 53)			
Model	.14	20.59 (5.24)	
Child development		-0.13 (0.05)	-.32*
Child neonatal risk		0.39 (0.44)	.13
Paternal psychological distress		-1.36 (1.01)	-.18

*p < .05

4. Discussion

This study explored correlates of observed parental overprotection of children born preterm, by examining (a) the agreement between self-reported and observed overprotection; (b) the similarities and differences between mothers' and fathers' overprotection; and (c) the relations between the child (neonatal risk and child development) and parental characteristics (perception of child vulnerability, psychological distress, and socioeconomic disadvantage) with observed overprotection.

Parents' perception of their overprotective behavior did not converge with their actual observed behavior, in line with the few studies available assessing agreement between self-reported and observed overprotection in full-term samples (Clarke et al., 2013; Holmbeck et al., 2002). Such discordances may reflect the influence of biases on parents' self-report (Kraemer et al., 2003). Because parenting occurs mostly at an unconscious level, parents may not be aware of their behavior, or they may tend to respond in a sociable desired manner, hampering a reliable capture of overprotection through self-report. This highlights the importance of using the observational measurement of overprotection to access direct and unique information. However, discordances could be also partly explained by the context/situations of assessment (Kraemer et al., 2003), given that the self-report and observational

measures in this study target behaviors along rather different contexts (while the first one is directed to the daily care of the child, the second is directed to the play context). It should be also noted that the internal consistency of the self-report measure for fathers was poor (α < .60), so that the results based on it must be interpreted with caution. This might be because this measure was developed in the context of the mother-child relationship thus might not be appropriate for use with fathers, and goes in line with a previous study testing a short version with fathers (α = .45) (Ryan et al., 2011). Corrected item-total correlations revealed that several father items had values near zero (r < .10), which referred mostly to decision-making about daily routine aspects that are more typical of mothers' role (e.g., Item 21, "I decide what my child eats") and may not be applicable to the overprotection construct in fathers. More research is needed to better understand the appropriateness of the measure in its current form for use with fathers.

Mothers and fathers showed similar levels of observed overprotection, in line with the previous studies reporting no differences in overprotection between mothers and fathers of full-terms (Mullins et al., 2007). Preterms' fathers seem to equally struggle in their ability to engage in adequate protective behavior, highlighting the importance of providing psychosocial support to both parents following preterm birth, and including both on the study and intervention with preterms.

Lower child developmental level at 12 months of age predicted observed overprotection of both mothers and fathers at child's 42 months of age, in line with previous studies with preterms linking low child development to controlling parenting (Landry et al., 2000). Parents might become more controlling as a compensating attempt to help and stimulate the child, engaging in a restrictive, intrusive, and oversolicitous behavioral pattern. Perception of child vulnerability was correlated with overprotection in mothers, and child neonatal risk was correlated with overprotection in fathers, but when examined in a regression model with child developmental status, these relations were no longer significant. Taken together, these results may suggest that the engagement in overprotective behavior was not driven by the child's birth vulnerability per se, or by parents' perception of vulnerability, but by the child's actual vulnerability at 12 months of age. However, because we did not measure child development at Time 3, it was not possible to determine if children with a lower developmental level at Time 1 were still low functioning developmentally at Time 3, further justifying the parents' (over)protection. In the face of child lower developmental level, it seems important to intervene not only with the child, but also with the parents, helping them to develop adaptive parenting strategies.

Socioeconomic risk also predicted mothers' overprotection and was marginally associated with fathers' behavior. Correlational estimates were not that different for mothers (r = -.34) and fathers (r = -

.21), but it may be that the smaller sample of fathers limited the power to detect significance. Parents at socioeconomic risk may be more easily overwhelmed and have fewer resources to cope with the challenge of parenting a preterm, highlighting the importance of providing support to these families (Goldberg & DiVitto, 2002).

Despite the strengths of using a multimethod approach, and including mothers and fathers, this study has limitations. First, data were not collected with both parents of all the children and, therefore, there were more participating mothers than fathers. Second, attrition was high and selective on factors associated with overprotection (child development and socioeconomic indicators). Therefore, although results with the raw and imputed data were similar, data imputation was necessarily biased, and findings should be interpreted and generalized with caution. Third, a wide range of gestational ages was included, with most children being born moderately-to-late preterm. Preterm children are a heterogeneous group with varying neonatal experiences that might differently affect children and parents, and this heterogeneity can only be partially addressed by statistical control. Fourth, parental behavior was not always observed at the same location and, although the great majority of cases were assessed at the hospital (88%), different settings may have different effects on behavior (Gardner, 2000). Fifth, parental psychological distress was measured at Time 3, thus we cannot draw causal conclusions with these data. Finally, child development was not assessed at Time 3, thus it was not possible to determine if parents' (over)protection was adequate to the child's actual developmental level at the time of assessment. Future studies should explore more potential correlates of overprotection of preterms' parents. Research with other age groups is also needed to understand overprotection on other stages of development. Facing evidence of equivalent levels of overprotection for both parents, future studies should explore if mother and father's overprotective behavior also have equivalent effects on child outcomes.

Our study provides valuable information about the development of overprotection of parents of children born preterm, illuminating the child's lower developmental level and family socioeconomic disadvantage as related to overprotective behaviors. To our knowledge, this is the first study to examine observed overprotective behaviors in mothers and fathers of children born preterm, revealing that both parents engage in similar levels of overprotection. Results highlight the importance of targeting parents of preterm-born children with low socioeconomic status and whose children have lower developmental levels and provide support to both mother and father in the development of more adaptive parenting strategies.

5. References

Bögels, S. M., & Phares, V. (2008). Fathers' role in the etiology, prevention and treatment of child anxiety: A review and new model. *Clinical Psychology Review, 28*(4), 539–558. https://doi.org/10.1016/j.cpr.2007.07.011

Bornstein, M. H., Putnick, D. L., Lansford, J. E., Pastorelli, C., Skinner, A. T., Sorbring, E., Tapanya, S., Tirado, L. M. U., Zelli, A., Alampay, L. P., Al-Hassan, S., Bacchini, D., Bombi, A. S., Chang, L., Deater-Deckard, K., Giunta, L., Dodge, K. A., Malone, P. S., & Oburu, P. (2015). Mother and father socially desirable responding in nine countries: Two kinds of agreement and relations to parenting self-reports. *International Journal of Psychology, 50*(3), 174-185. https://doi.org/10.1002/ijop.12084

Clarke, K., Cooper, P., & Creswell, C. (2013). The parental overprotection scale: Associations with child and parental anxiety. *Journal of Affective Disorders, 151*(2), 618-624. https://doi.org/10.1016/j.jad.2013.07.007

Cooklin, A. R., Giallo, R., D'Esposito, F., Crawford, S., & Nicholson, J. M. (2013). Postpartum maternal separation anxiety, overprotective parenting, and children's social-emotional well-being: Longitudinal evidence from an Australian cohort. *Journal of Family Psychology, 27*(4), 618-628. https://doi.org/10.1037/a0033332

Derogatis, L. R., & Melisaratos, N. (1983). The Brief Symptom Inventory: An introductory report. *Psychological Medicine, 13*, 595-605. https://doi.org/10.1017/S0033291700048017

Euro-Peristat Project (2018). *European perinatal health report: Core indicators of the health and care of pregnant woman and babies in Europe in 2015*. www.europeristat.com

Forsyth, B. W. C., Horwitz, S. M., Leventhal, J. M., & Burger, J. (1996). The child vulnerability scale: An instrument to measure parental perceptions of child vulnerability. *Journal of Pediatric Psychology, 21*(1), 89-101. https://doi.org/10.1093/jpepsy/21.1.89

Gardner, F. (2000). Methodological issues in the direct observation of parent–child interaction: Do observational findings reflect the natural behavior of participants? *Clinical Child and Family Psychology Review, 2*(3), 185-198. https://doi.org/10.1023/a:1009503409699

Goldberg, S., & DiVitto, B. (2002). Parenting children born preterm. In M. H. Bornstein (Ed.), *Handbook of parenting: Children and parenting* (pp. 329–354). Erlbaum.

Griffiths, R. (1984). *The abilities of young children: A comprehensive system or mental measurement for the first eight years of life*. The Test Agency Limited.

Grunberg, V. A., Geller, P. A., Bonacquisti, A., & Patterson, C. A. (2018). NICU infant health severity and family outcomes: A systematic review of assessments and findings in psychosocial research. *Journal of Perinatology, 39*(2), 156-172. https://doi.org/10.1038/s41372-018-0282-9

Holmbeck, G. N., Johnson, S. Z., Wills, K. E., McKernon, W., Rose, B., Erklin, S., & Kemper, T. (2002). Observed and perceived parental overprotection in relation to psychosocial adjustment in preadolescents with a physical disability: The mediational role of behavioral autonomy. *Journal of Consulting and Clinical Psychology, 70*(1), 96-110. https://doi.org/10.1037//0022-006x.70.1.96

Johnson, S. Z., & Holmbeck, G. N. (1995). *Manual for OP coding system* [Unpublished manuscript]. Loyola University of Chicago.

Kraemer, H. C., Measelle, J. R., Ablow, J. C., Essex, M. J., Boyce, W. T., & Kupfer, D. J. (2003). A new approach to integrating data from multiple informants in psychiatric assessment and research: Mixing and matching contexts and perspectives. *The American Journal of Psychiatry, 160*(9), 1566-1577. https://doi.org/10.1176/appi.ajp.160.9.1566

Lamb, M. E., & Lewis, C. (2010). The development and significance of father-child relationships in two-parent families. In M. E. Lamb (Ed.), *The role of the father in child development* (5th ed., pp. 94–153). John Wiley.

Landry, S. H., Smith, K. E., Swank, P. R., & Miller-Loncar, C. L. (2000). Early maternal and child influences on children's later independent cognitive and social functioning. *Child Development*, *71*(2), 358–375. https://doi.org/10.1111/1467-8624.00150

Levy, D. M. (1943). *Maternal overprotection.* Columbia University Press.

Mullins, L. L., Wolfe-Christensen, C., Pai, A. L. H., Carpentier, M. Y., Gillaspy, S., Cheek, J., & Page, M. (2007). The relationship of parental overprotection, perceived child vulnerability, and parenting stress to uncertainty in youth with chronic illness. *Journal of Pediatric Psychology, 32*(8), 973-982. https://doi.org/10.1093/jpepsy/jsm044

Poehlmann, J., Hane, A., Burnson, C., Maleck, S., Hamburger, E., & Shah, P. E. (2012). Preterm infants who are prone to distress: Differential effects of parenting on 36-month behavioral and cognitive outcomes. *Journal of Child Psychology and Psychiatry, 53*(10), 1018-1025. https://doi.org/10.1111/j.1469-7610.2012.02564.x

Potharst, E. S., Houtzager, B. A., van Wassenaer-Leemhuis, A. G., Kok, J. H., Koot, H. M., & Last, B. F. (2015). Maternal and paternal perceptions of child vulnerability and behavior problems in very

preterm born children. *Infant and Child Development, 24*(5), 489-505. https://doi.org/10.1002/icd.1898

Royston, P. (2009). Multiple imputation of missing values: Further update of ice, with an emphasis on categorical variables. *The Stata Journal, 9*, 466–477. https://doi.org/10.1177/1536867X0900900308

Ryan, J. L., Ramsey, R. R., Fedele, D. A., Wagner, J. L., Chaney, J. M., & Mullins, L. L. (2011). The relationship of father parenting capacity variables to perceived uncertainty in youth with a chronic illness. *Children's Health Care, 40*(4), 297–310. https://doi.org/10.1080/02739615.2011.617237

Samra, H. A., McGrath, J. M., & Wey, H. (2010). Are former late-preterm children at risk for child vulnerability and overprotection?. *Early Human Development*, *86*(9), 557–562. https://doi.org/10.1016/j.earlhumdev.2010.07.005

Sharkey, C. M., Clawson, A. H., Mullins, L. L., Brinkman, T. M., Pui, C., Hudson, M. M., & Krull, K. R. (2019). The relationship of child executive functions to parenting capacities in childhood acute lymphoblastic leukemia survivors. *Pediatric Blood & Cancer, 66*(8), e27761. https://doi.org/10.1002/pbc.27761

Thomasgard, M. (1998). Parental perceptions of child vulnerability, overprotection, and parental psychological characteristics. *Child Psychiatry & Human Development, 28*(4), 223-240. https://doi.org/10.1023/A:1022631914576

Thomasgard, M., Metz, W. P., Edelbrock, C., & Shonkoff, J. P. (1995). Parent-child relationship disorders. Part I. Parental overprotection and the development of the parent protection scale. *Journal of Developmental & Behavioral Pediatrics, 16*(4), 244-250. https://doi.org/10.1097/00004703-199508000-00006

Toscano, C., Soares, I., & Mesman, J. (2020). Controlling parenting behaviors in parents of children born preterm: A meta-analysis. *Journal of Developmental & Behavioral Pediatrics, 41*(3), 230-241. https://doi.org/10.1097/DBP.0000000000000762

Wightman, A., Schluchter, M., Drotar, D., Andreias, L., Taylor, H. G., Klein, N., Wilson-Costello, D., & Hack, M. (2007). Parental protection of extremely low birth weight children at age 8 years. *Journal of Developmental & Behavioral Pediatrics, 28*(4), 317-326. https://doi.org/10.1097/dbp.0b013e31803309

Yaari, M., Treyvaud, K., Lee, K. J., Doyle, L. W., & Anderson, P. J. (2019). Preterm birth and maternal mental health: Longitudinal trajectories and predictors. *Journal of Pediatric Psychology, 44*(6), 736-747. https://doi.org/10.1093/jpepsy/jsz019

CHAPTER 4

PREMATURITY, OVERPROTECTIVE PARENTING, AND EFFORTFUL CONTROL: A STUDY WITH MOTHERS AND FATHERS OF 3-YEAR-OLDS[5]

1. Introduction

Children born preterm are at increased risk for self-regulation problems, including poorer effortful control (Voigt et al., 2012; Woodward et al., 2017; Witt et al., 2014). However, little is known about the factors and mechanisms underlying this risk. Besides children's neurobiological vulnerability associated with prematurity, parental controlling behaviors such as overprotection might also be a mechanism accounting for children's effortful control problems. Parental controlling behaviors have been associated with poorer effortful control in children (Poehlmann et al., 2010; Taylor et al., 2013; Zvara et al., 2019), and evidence suggests that mothers of children born preterm are more prone to engage in controlling behaviors than mothers of children born full-term (Toscano et al., 2020). To date, the very few studies investigating controlling parenting and/or effortful control on children born preterm are almost exclusively focused on children born very preterm (< 32 weeks gestation) and limited to the study of the mother-child relationship. This study aimed to adopt a more inclusive approach to the understanding of effortful control in children born preterm, by investigating the links between different levels of prematurity, maternal and paternal overprotection, and effortful control outcomes, in a sample of 42-months-olds born in Portugal, where there is one of the highest rates of premature birth in Europe (8%) (Euro-Peristat, 2018).

Effortful control is a key aspect of the broader domain of self-regulation, referring to the ability to inhibit a dominant behavioral or emotional response in order to express a subdominant contextually-appropriate response (Kochanska et al., 2000; Rothbart & Bates, 2006). Effortful control abilities include delaying gratification, slowing down motor activity, lowering one's voice, suppressing and initiating an activity upon signal, and effortful attention (Kochanska et al., 2000). Such abilities reflect an increasing control over one's impulses and behavior, by inhibiting and activating responses to achieve long-term goals (Kochanska & Aksan, 2006) and are crucial for children's cognitive, behavioral, socioemotional, and academic functioning (Burnson et al., 2013; Choe et al., 2013; Kochanska et al.,

[5] Toscano, C., Soares, I., Baptista, J., Moutinho, V., & Mesman, J. (2020). Prematurity, overprotective parenting, and effortful control: A study with mothers and fathers of 3-year-olds [Manuscript submitted for publication]. Psychology Research Center (CIPsi), School of Psychology, University of Minho.

2000; Rothbart & Bates, 2006; Voigt et al., 2012). The development of self-regulation skills such as effortful control is dependent on the child neurobiological maturation, as well as on parental socialization, progressing from a dyadic process of mutual regulation where the parent acts as an external regulator that is gradually self-organized (Feldman, 2009; Kochanska et al., 2000; Kopp, 1982; Sroufe, 1995). Parents' behaviors that are sensitive, autonomy-supportive, and encourage exploration, provide the child with the opportunities to learn to self-regulate. In contrast, controlling parenting behaviors that do not acknowledge the child's autonomy and discourage independent exploration undermine the development of self-regulation skills (Grolnick et al., 1997). Accordingly, several studies have shown that controlling parenting behaviors are associated with lower child effortful control (Choe et al., 2013; Taylor et al., 2013).

A growing body of research has shown that preschoolers born very preterm (< 32 weeks of gestation) tend to exhibit more self-regulation problems, including poorer effortful control, than their full-term peers (Clark et al., 2008; Voigt et al., 2012; Witt et al., 2014), with negative implications for later academic achievement and socioemotional development (Dilworth-Bart et al., 2018; Woodward et al., 2017). However, research has given less attention to effortful control in children born moderately-to-late preterm (32-36 weeks of gestation), although they represent about 90% of the preterm population (Euro-Peristat, 2018) and seem to also be at higher risk for cognitive, socioemotional, and academic problems in comparison to full-term children (Chyi et al., 2008; Talge et al., 2010).

Furthermore, the factors and mechanisms underlying preterm-born children's risk for effortful control problems are still underexplored in research. On the one hand, premature birth can have a significant impact on brain development proportionally to children's prematurity degree (i.e., gestational age) (Adams-Chapman, 2009). Such neurobiological vulnerability may partly explain preterm children's risk for effortful control problems as evidenced by previous studies (Feldman, 2009; Poehlmann et al., 2010). On the other hand, premature birth can have a significant impact on parenting (Goldberg & DiVitto, 2002), and a recent meta-analysis revealed that parents of preterm children exhibit more controlling behaviors than parents of children born full-term (Toscano et al., 2020). Therefore, controlling parenting behaviors may be an important factor to consider when trying explaining preterms' effortful control impairments, but examination of this relation is very limited (Poehlmann et al., 2010; Zvara et al., 2019).

A type of controlling behavior that might be particularly important to examine in the context of prematurity is parental overprotection, which refers to an excessive level of parental protection given the child's developmental level (Thomasgard et al., 1995). This behavioral pattern is characterized by

parental prevention of the child's independent behavior, excessive contact with the child, infantilization of the child, and excessive parental control (Levy, 1943), with parents intervening before the child attempting to regulate behavior on their own (Thomasgard & Metz, 1993). Overprotection may be more persistent among parents of preterm-born children because it seems to be associated with pregnancy-threatening experiences and/or death-threatening child illness (Levy, 1943). However, Toscano et al.'s (2020) meta-analysis on controlling behaviors of parents of preterm children only found three studies examining overprotection, with mixed results: While Wightman et al. (2007) found that preterms' mothers reported more overprotection than full-terms' mothers, others found no differences (O'Mara & Johnston, 1989; Samra et al., 2010). Furthermore, studies were exclusive to mothers and the examination of overprotection among fathers of preterm-born children remains unknown.

Furthermore, research on the impact of parenting behaviors on child self-regulation skills has been typically focused on mothers, and information on fathers is scarce and exclusive to full-term samples. Some authors suggested that fathers may be particularly important in fostering children's openness to the outside world, because their parental role may be more focused on stimulating exploration, risk-taking, and autonomy, while mothers' role is typically more focused on providing care and protection (Bögels & Phares, 2008; Paquette, 2004). Therefore, fathers' behaviors may be particularly important for the development of effortful control skills, as suggested by some studies with full-term samples (Karreman et al., 2008), and should be considered if we wish to better predict and support the development of effortful control in preterm-born children.

The main aim of this study was to investigate the links between prematurity, mothers' and fathers' overprotective behavior, and effortful control outcomes in 42-month-olds born in Portugal. We considered this a particularly important target-age because children's effortful control is already expected to be developed enough to allow for interindividual variation (Feldman, 2009; Kochanska et al., 2000). The focus on the preschool period facilitates the identification of risk factors that may be targeted for early intervention, especially before school entry, given the importance of effortful control for academic achievement (Dilworth-Bart et al., 2018; Woodward et al., 2017). The specific aims of the study were as follows: (a) to examine the differences between parents of very preterm, moderately-to-late preterm, and full-term children regarding overprotective behavior; (b) to examine the differences between very preterm, moderately-to-late preterm, and full-term children regarding effortful control skills; and (c) to examine the joint effects of prematurity degree and overprotective behavior on children's effortful control outcomes. It was hypothesized that very preterm, as well as moderately-to-late preterm children, would exhibit poorer effortful control skills compared to full-term children and that

their parents would exhibit higher levels of overprotective behavior than parents of full-term children. Moreover, we expected that both prematurity degree and higher levels of overprotective behavior would be associated with lower effortful control outcomes in the children.

2. Method

Participants

The sample comprised 30 very preterm (< 32 weeks gestation), 50 moderately-to-late preterm (32 to < 37 weeks gestation), and 38 full-term (≥ 37 weeks gestation) children who were 42 months old, born in Portugal from 2013 to 2015.

Preterm participants were drawn from a larger longitudinal study about the cognitive and socioemotional development of children born preterm. The study recruited 172 preterm-born children from two hospitals in Portugal, from which 110 participated in the 42-months-old assessment point. That assessment involved two sessions and effortful control was measured during the second session. Because 27 families missed the second visit, and three children refused assessment, the current study comprises 80 preterm children for whom effortful control was collected. There were no differences between participants included in this study and those who dropped out regarding child gender, gestational age, birth weight, parental age, parents' number of children, family income, and mother's employment status. Families who dropped had lower education, with $t(168) = -2.49$, $p = .01$ for mothers and $t(145) = -2.00$, $p = .05$ for fathers, and more unemployed fathers, $X^2(1) = 8.00$, $p = .005$.

Full-term participants were recruited from a pool of 86 families that had participated in a previous study coordinated by the same university as the current study, recruited from the broader community. Forty-five families accepted to participate, but seven missed the second assessment visit. Therefore, this study comprises 38 full-term children for whom effortful control was collected. There were no sociodemographic differences between families who were included and those who were not.

Exclusion criteria for all participants included congenital or current neurological problems, chromosomal disorders, and/or foetal drug/alcohol exposures. Because both parents were invited but not required to participate, data of both parents' overprotection was not collected for all children: In the very preterm group, 25 children had both paternal and maternal data and five only had maternal data; in the moderately-to-late group, 35 children had both paternal and maternal data, 13 only had maternal data, and two only had paternal data; and in the full-term group, 31 children had both paternal and maternal data, six only had maternal data, and one only had paternal data.

Table 6 provides demographic and medical information of participants per gestational age group. Demographics were comparable among the groups, except regarding socioeconomic status (SES) indicators. Both very preterm and moderately-to-late preterm children lived in families with lower SES compared to full-term children, $F(2, 66) = 11.39$, $p < .001$.

Table 6

Child and Family Characteristics of Children Born Very Preterm, Moderately-to-Late Preterm, and Full-Term

	Gestational age group			
Variable	VPT (*n* = 30)	MLPT (*n* = 50)	FT (*n* = 38)	*F*/ X^2
Child birth characteristics				
M (*SD;* range) gestational age (weeks)	29.47 (1.36; 27-31)	34.86 (1.29; 32-36)	39.05 (1.09; 37-41)	493.82***
M (*SD*) birth weight (grams)	1251.40 (268.43)	2269.60 (408.38)	3300.29 (520.94)	242.33***
% Male	63	62	55	0.577
% Twin	27	24	0	11.53**
% First child	80	66	61	3.04
% Diagnosis of apnoea	53	8	0	38.35***
% Respiratory distress	77	16	0	54.94***
% Bronchopulmonary dysplasia	27	0	0	23.57***
% Gastroesophageal reflux	17	0	0	14.28**
% Retinopathy	20	2	0	13.30**
% Periventricular leukomalacia	10	0	0	8.45*
% Sepsis	43	10	0	22.10***
% Supplementary oxygen at discharge	7	0	0	5.55+
% 5-min Apgar score ≤6	3	2	0	1.70
% ventilation during NICU stay	93	16	3	72.79***
% NICU stay ≥30 days	93	4	0	98.03***
Family characteristics				
M (*SD*) maternal age (years)	36.23 (5.27)	37.04 (4.21)	36.92 (3.76)	0.34
M (*SD*) paternal age (years)	38.03 (4.82)	38.36 (4.98)	39.13 (4.28)	0.51
M (*SD*) maternal education (years)	12.73 (3.12)	12.80 (2.73)	15.32 (2.07)	14.84***
M (*SD*) paternal education (years)	11.50 (3.80)	11.62 (2.97)	13.84 (2.60)	8.19**
M (*SD*) monthly income (euros)	1793.84 (834.49)	1669.08 (668.46)	2073.03 (660.65)	3.53*
% Married/common law marriage	100	90	97	5.68+

Note. VPT = very preterm; MLPT = moderately-to-late preterm; FT = full-term.

+p < .10. *p < .05. **p < .01. ***p < .001.

Procedure

The study was approved by the Portuguese National Commission for Data Protection, and by the ethical commissions of the participating hospitals and of the University of Minho. Written informed consent was obtained from parents. Participation was voluntary with no financial compensation.

Two assessment visits were conducted by a clinical psychologist. At the first visit, parents reported on demographic data and a parent-child interaction with one of the parents was videotaped for later coding of overprotective behavior, divided into three episodes: Child plays with a developmentally challenging toy with parental guidance (5 min); dyad plays with developmentally appropriate toys (2.5 min); child cleans up the toys (2.5 min). At a second visit (in 88% of the cases within one month after the first visit), child effortful control was measured and the same parent-child interaction took place with the other parent. The order in which mothers and fathers were assessed was counterbalanced between families. Preterm participants were assessed at the hospital (n = 71), at the university laboratory (n = 3), or at home (n = 6), according to the family's availability. Full-term participants were assessed at the university laboratory.

Measures

Child Effortful Control. A multitask battery (Kochanska et al., 2000) assessed five components of effortful control: Effortful attention (Day-night task), suppressing-initiating activity to signal (Towers task), lowering voice (Whispering task), slowing motor activity (Walk-a-line Slowly task), and ability to delay (Wrapped Gift task). Tasks were administered in the order in which they are described, except in a few cases in which the child refused a task and the experimenter had to leave it for a later moment of the session. Forty-three children had both parents present in the room during administration, 44 only had the mother, and 31 only had the father. The administration was videotaped and 25% of the cases were double-coded by independent raters to assess interrater reliability (intraclass correlations [ICCs]).

In the Day-night task, the child was presented with two pictures - a day sky picture and a night sky picture - and asked to point to the day sky when the experimenter said "Night" and to point to the night sky when the experimenter said "Day" (10 trials). Each of the trials was coded as 0 (*fails to point*), 1 (*incorrect and never self-corrects or starts correct but changes mind*), 2 (*self-corrects*), or 3 (*correct on first attempt and does not change mind*). Codes were summed up to create a final score for the task. Interrater reliability was excellent, ICC = 1.00.

In the Towers task, the child was asked to take turns with the experimenter while building a block tower (two trials). The coding of each trial was the proportion of blocks placed by the child in relation to the total number of blocks, and a penalty point was scored if the child knocked over the tower. The task final score was the mean of the two trials. Interrater reliability was ICC = 1.00.

In the Whispering task, the child was asked to whisper the names of 12 cartoon characters presented in cards. Each of the 12 trials was coded as 0 (*shouts*), 1 (*part loud, part whisper*), 2 (*nothing*), or 3 (*whisper*). Codes were summed into a final score. Interrater reliability was ICC = 1.00.

In the Walk-a-line Slowly task, the child was asked to walk on a line tap-glued to the floor as slowly as possible (two trials). The times (in seconds) for each trial were averaged into a final score. Interrater reliability was ICC = 1.00 for both trials.

In the Wrapped Gift task, the child was first asked to sit with the back to the experimenter and not to peek while the experimenter wrapped a gift (60 seconds). The child's peeking and turning was scored from 1 (*turns around and continues to peek*) to 5 (*does not peek*) and latencies to peek and turn were coded. The score and latencies of peeking/turning were highly correlated (mean r = .82) and were standardized and averaged to create a global waiting-for-wrapping score. After wrapping, the experimenter placed the gift on the table in front of the child, and the child was asked not to touch it while the experimenter left the room to get a bow (180 seconds). The child's extent of touching was scored from 1 (*opens the gift*) to 4 (*does not touch*) and latencies for touch, lift, and open the gift were coded. The score and latencies for touch/lift/open were highly correlated (mean r = .51) and were standardized and averaged to create a global waiting-for-bow score. ICCs ranged from .93 to 1.00 (mean ICC= .97).

Following previous studies (Burnson et al., 2013; Kochanska et al., 2000; Poehlmann et al., 2010), the standardized scores of the individual tasks were averaged into an effortful control composite (α = .63).

Parental Overprotective Behavior. The videotaped parent-child interaction was coded using Johnson and Holmbeck's (1995) coding system, which includes six subscales covering Levy's (1943) conceptualization of overprotection: (a) Nonverbal prevention of exploratory behavior in the child, (b) Parental encouragement of child's expression of individual views/opinions, (c) Excessive physical contact with the child, (d) Parental behavior that infantilizes the child, (e) Active catering to the child, and (f) Excessive parental control. Subscales are coded on a 5-point Likert scale and reflect excessive levels of parental protection, given the child's developmental level. In this study, subscale (b) was inverted so that higher scores on all the subscales would represent more overprotective behavior.

For each subscale, behaviors were coded separately for each of the three tasks (see the "Procedure" section), and the mean score across the tasks was used for analysis. Because of very low frequencies of occurrence, subscales (c) and (e) were dropped from further analysis. When entered in a principal component analysis (PCA), the remaining four subscales loaded on the first unrotated component (loadings between .42 and .93 for mothers, and between .45 and .92 for fathers) and thus were summed into a global measure of overprotection (α = .79 for mothers and .81 for fathers). To examine interrater reliability, 28% of the mother cases and 20% of the father cases were double-coded. ICCs across the four subscales ranged from .85 to .93 (mean ICC = .89) for mothers, and .92 to .97 (mean ICC = .95) for fathers. This measure has been used as an overall measure of parental overprotection in previous studies with clinical and normative samples (e.g., Holmbeck et al., 2002).

Covariates. Family's SES and neonatal adversity were examined as potential covariates based on previous studies showing their relevance in relation to prematurity, parenting quality, and/or effortful control (Burnson et al., 2013; Dilworth-Bart et al., 2018; Feldman, 2009; Poehlmann et al., 2010).

To measure child's neonatal adversity, a neonatal health index was calculated by summing the presence of eleven neonatal medical risks (Poehlmann et al., 2010) based on children's neonatal intensive care unit (NICU) medical records: Diagnosis of apnoea, respiratory distress, bronchopulmonary dysplasia, gastroesophageal reflux, retinopathy, periventricular leukomalacia, sepsis, supplementary oxygen at NICU discharge, 5-min Apgar score ≤6, ventilation during NICU stay, and NICU stay ≥30 days (α = .76). Higher scores represent greater neonatal severity. Table 6 presents the percentage of children per gestational group with the presence of each neonatal medical risk factor.

Assessment of family's SES was based on family's income and mother and father's years of education. When entered on a PCA, these variables loaded on the first unrotated component (loadings of .84 for family's income, .90 for mother's education, .90 for father's education). Therefore, SES was computed as the sum of the standardized values of the income and education variables, with higher scores reflecting higher SES. Two families had missing values for father's education and 15 families had missing values for income. In these cases, following previous studies (e.g., Prevoo et al., 2014), the missing values were computed based on a regression equation that included the available values as predictors of the missing value, before computing the SES variable.

Analysis Plan

Preliminary analyses were first conducted to assess bivariate relations among the study variables and to examine covariates that might need to be controlled for in the main analysis, using

Spearman correlation coefficients and independent samples *t*-tests with SPSS (version 24). Research objectives were then addresses. To examine the differences between the very preterm, moderately-to-late preterm, and full-term groups on parents' overprotective behavior (Objective 1), and on children's effortful control skills (Objective 2), one-way analyses of variance (ANOVA) and covariance (ANCOVA) were conducted. To examine the joint effects of prematurity degree and overprotective behavior in children's effortful control outcomes (Objective 3), path analysis was conducted using the Lavaan package (Rosseel, 2012) in R statistical software (3.6.1). Because of sample size constraints, it was not possible to include mothers and fathers in the same model simultaneously. Therefore, two models were tested: One for mothers' behavior, and one for fathers' behavior, specifying overprotective behavior and child gestational age as predictors of child effortful control. A minimum sample size-to-parameters ratio of 10:1 (Kline, 2011) was guaranteed for both models. Path models were estimated using a maximum likelihood parameter estimator robust to violations of multivariate normality (MLM estimator), due to non-normal distributions of effortful control and overprotection variables (Kline, 2011; Rosseel, 2012). Model fit was evaluated by examining the chi-square statistics (X^2), the comparative fit index (CFI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). A good model fit is indicated by a non-significant ($p < .05$) chi-square value, CFI values > .94, SRMR values < .08, and RMSEA values < .07 (Hooper et al., 2008).

Because twins were included in the preterm groups (prematurity is more common in multiple pregnancies), all analyses were repeated after randomly selecting one twin of each pair, revealing no significant changes in the results. Therefore, and in order to maintain the representativeness of prematurity, results using both twins are reported.

3. Results

Preliminary Analyses

Table 7 presents descriptive statistics and bivariate associations among the primary study variables and potential covariates. As shown in the table, all primary study variables were significantly interrelated. Family's SES was negatively correlated with maternal and paternal overprotective behavior, but there was no significant relation with children's effortful control. Also, there was no significant relation between children's neonatal adversity and effortful control skills. There were no child gender effects on maternal, $t(111) = 1.85$, $p = .07$, and paternal overprotection, $t(92) = 1.04$, $p = .30$. Girls showed higher effortful control performance than boys, $t(116) = -2.18$, $p = .03$. Because child effortful

control assessment was not always administrated with the same parent present in the room, we also tested the possible influence of parental presence on child's effortful control performance. Children's effortful control performance was dependent on which parent was present in the room during the task administration, $F(2, 74.27) = 3.46$, $p = .04$, as children who only had the mother present had lower performance than children who had both parents or only the father. Therefore, in the subsequent analyses, we controlled for the effect of SES on overprotective behavior, and for the effects of child sex and mother *vs* father/both parents present during assessment on effortful control.

Table 7

Descriptive Statistics and Bivariate Associations for Study Variables

Variable		1	2	3	4	5	6	*M* (*SD*) VPT (*n* = 30)	MLPT (*n* = 50)	FT (*n* = 38)
1.	Gestational age	-						29.47 (1.36)	34.86 (1.29)	39.05 (1.09)
2.	Child effortful control	.24**	-					-0.10 (0.49)	-0.13 (0.63)	0.23 (0.48)
3.	Maternal overprotection	-.22*	-.34***	-				8.02 (2.10)	7.63 (2.39)[a]	6.72 (1.97)[b]
4.	Paternal overprotection	-.27**	-.31**	.43***	-			8.16 (2.13)[c]	6.78 (2.78)[b]	6.77 (1.43)[d]
5.	Family SES	.21*	.07	-.31**	-.24*	-		-0.60 (3.01)	-0.71 (2.48)	1.40 (1.96)
6.	Child neonatal adversity	-.84***	-.15	.16+	.25*	-.15	-	5.17 (1.58)	0.98 (1.36)	0.03 (0.16)

Note. Pearson correlation coefficients (two-tailed). VPT = very preterm; MLPT = moderately-to-late preterm; FT = full-term.

[a] *n* = 48. [b] *n* = 37. [c] *n* = 25. [d] *n* = 32.

+p <.10. *p < .05. **p < .01. ***p < .001.

Objective 1: Differences in Overprotective Behavior Among Parents of Very Preterm, Moderately-to-Late Preterm, and Full-Term Children

In a first step without controlling for SES, ANOVA analysis revealed significant differences between parents of full-term and parents of very preterm children regarding overprotective behavior, $F(2, 112) = 3.25$, $p = .04$ for mothers and $F(2, 78) = 3.78$, $p = .03$ for fathers, with parents of very preterm children exhibiting higher levels of overprotection. However, ANCOVA analysis revealed that such effects were no longer significant after controlling for family's SES, which showed a significant effect on maternal overprotection, $F(1, 111) = 7.44$, $p = .007$, and a marginally significant effect on paternal overprotection, $F(1, 90) = 3.88$, $p = .05$.

Objective 2: Differences in Effortful Control Among Very Preterm, Moderately-to-Late Preterm, and Full-Term Children

The ANCOVA analysis revealed significant differences between the groups regarding their effortful control performance after controlling for the covariates (child gender and parental presence in the room), $F(2, 114) = 5.11$, $p = .008$. Post-hoc comparisons indicated that full-term children exhibited better effortful control than both very preterm, $p = .01$, and moderately-to-late children, $p = .003$, but there were no differences between the two preterm groups, $p = .82$.

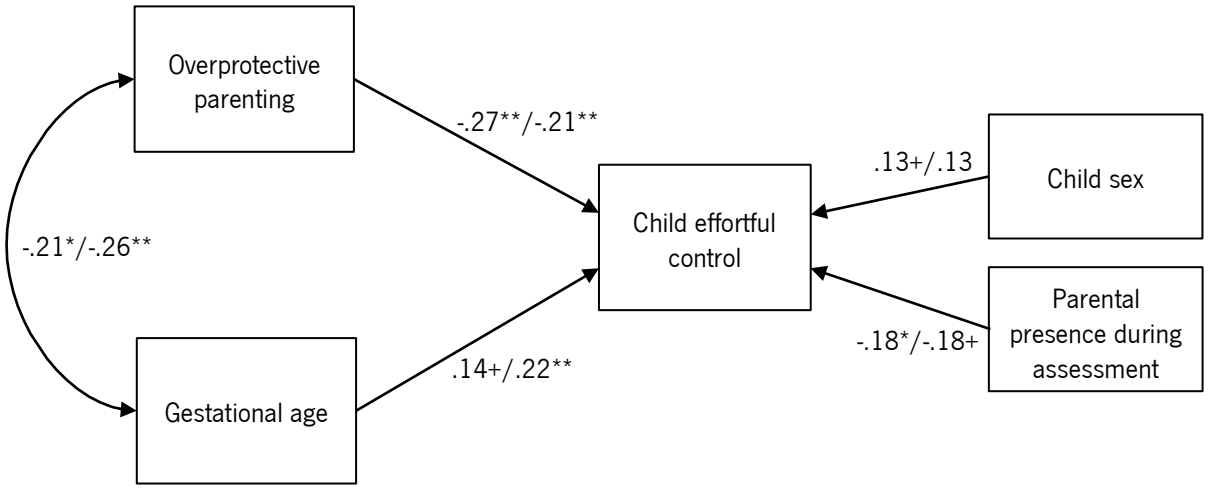
Objective 3: Effects of Prematurity Degree and Overprotective Behavior in Child Effortful Control

Figure 3 shows the path analytic model examining the joint effects of gestational age and parental overprotective behavior on child effortful control skills, controlling for child sex and parental presence during assessment. Given significant correlations between gestational age and overprotective behavior (see Table 7), these variables were allowed to covary.

There was a good fit of the model for mothers, $X^2(4) = 5.47$, $p = .24$, CFI = .95, SRMR = .06, and RMSEA = .05, as well as for fathers, $X^2(4) = 4.25$, $p = .37$, CFI = .99, SRMR = .06, and RMSEA = .02. Path estimates show that for both the mother and father models, greater parental overprotection predicted lower child effortful control performance, $p = .001$ in both models. Lower gestational age predicted lower effortful control in the model for fathers, $p = .003$, and neared significance, $p = .07$, in the model for mothers.

Figure 3

Model of Associations between Child Gestational Age, Overprotective Parenting, and Child Effortful Control Skills, Controlling for Child Sex and Parental Presence During Assessment



Note. Standardized estimates are shown. First values are for mothers (n = 115), second values are for fathers (n = 94).

+p <.10. *p < .05. **p < .01.

4. Discussion

This study investigated the links between prematurity, maternal and paternal overprotective behavior, and effortful control outcomes at age 42 months. More specifically, we examined (a) the differences between parents of very preterm, moderately-to-late preterm, and full-term children regarding overprotective behavior, controlling for family's SES; (b) the differences between preterm, moderately-to-late preterm, and full-term children regarding effortful control skills, controlling for child's sex and parental presence in the room during assessment; and (c) the joint effects of prematurity degree and overprotective behavior in children's effortful control outcomes.

To our knowledge, this is the first study comparing observed overprotection between parents of preterm-born children and parents of full-term-born children. Contrary to expectation, after controlling for the effect of SES, prematurity was not associated with parental overprotective behavior. Although parents of very preterm children did exhibit higher levels of overprotection than parents of full-term children, such differences seemed to be explained by SES differences between the groups, and not by the child's prematurity status per se. This is in line with previous studies reporting socioeconomic

indicators as stronger predictors of parenting behavior than preterm birth status (Loi et al., 2017). Our results confirm the importance of controlling for SES when examining parenting dimensions in the context of prematurity, also highlighted in studies showing that low SES is a strong predictor of maladaptive parenting (Conger & Donnellan, 2007), and that premature birth is more common among families with lower SES (Nagahawatte & Goldenberg, 2008). Furthermore, our results highlight the importance of providing psychosocial support to families living under socioeconomic disadvantage to prevent problems in parenting and child development.

As expected, both children born very and moderately-to-late preterm exhibited poorer effortful control than children born full-term. While self-regulatory problems have been well documented in very preterm children (Woodward et al., 2017; Witt et al., 2014), this is one of the first studies to report group differences in children born moderately-to-late preterm. Because moderately-to-late preterm children entail less neurobiological immaturity and are exposed to less neonatal adversity and fewer health problems, they generally do not receive additional follow-up after birth. Our results extend previous research showing that moderately-to-late preterm children are still at high risk for problematic developmental outcomes (Chyi et al., 2008; Talge et al., 2010), and may also require close monitoring. Furthermore, as very preterm and moderately-to-late preterm children did not differ in terms of their effortful control performance, results suggest that effortful control problems in preterm-born children may not be an exclusive result of neurobiological immaturity.

Indeed, path analysis' results showed that both higher prematurity degree and greater overprotective behavior of both mothers and fathers were related to worse child effortful control outcomes. In fact, in the model for mothers, while overprotective behavior had a significant effect on effortful control, there was only a marginal effect of prematurity degree, suggesting that maternal behaviors might have more weight in shaping children's effortful control rather than the neurobiological immaturity of prematurity. This highlights the importance of targeting parenting behavior for the promotion of self-regulation capacities of preterm-born children, which might have the potential to mitigate the adverse effects of prematurity. This is one of the first studies providing evidence for the importance of parental controlling behaviors in shaping effortful control in preterm-born children. Furthermore, to our knowledge, this is the first study evidencing the importance of both mothers' and fathers' behaviors to the development of self-regulation of preterm children, highlighting the importance of including both parents in the study and intervention with preterms.

Strengths of this study include the observational assessment of the major variables and inclusion of both mothers and fathers. However, results should be considered with caution in light of

some methodological limitations of the study. First, the number of participants in each gestational age group was nonequivalent and relatively small. Second, there were more participating mothers than fathers, which did not allow for more complex structural equation modeling including both parents in the same model. Third, preterm and full-term participants were drawn from different initial pools of families and, even though they did not differ in terms of major sociodemographic variables (except for SES), this may imply differences between the groups that might covary with birth status. Furthermore, the attrition rate was high, especially among preterm families with lower education. Fifth, the majority of preterm participants were assessed at the hospital (89%) whereas all full-term participants were assessed at the lab, and different settings may have different effects on behavior (Gardner, 2000). Finally, because of the cross-sectional nature of the data, although our results suggest an association between overprotective parenting and children's effortful control skills, causality cannot be determined. Future research would benefit from a longitudinal examination of these relations. Also, future studies should explore additional factors and mechanisms underlying effortful control impairments in children born preterm. Important insights could also be gained from studies with other age groups, in order to understand if the relations between prematurity, overprotective parenting, and child effortful control extend to earlier and/or later stages of child development.

In conclusion, our study shows that children born very preterm and moderately-to-late preterm are at risk for effortful control problems, and contributes to the understanding of the factors underlying that risk, evidencing the important role of mothers' and fathers' overprotection. Given the importance of effortful control for children's behavioral, social, and academic functioning (Woodward et al., 2017), such understanding is important for the identification of at-risk children and the development of interventions aimed at promoting better self-regulation, especially before school entry. Findings highlight the importance of providing psychosocial support to families of preterm-born children, including both mothers and fathers, and targeting the quality of parent-child relationship for the promotion of child's effortful control capacities.

5. References

Adams-Chapman, I. (2009). Insults to the developing brain and impact on neurodevelopmental outcome. *Journal of Communication Disorders, 42*(4), 256–262. http://doi.org/10.1016/j.jcomdis.2009.03.010

Bögels, S. M., & Phares, V. (2008). Fathers' role in the etiology, prevention and treatment of child anxiety: A review and new model. *Clinical Psychology Review, 28*(4), 539–558. https://doi.org/10.1016/j.cpr.2007.07.011

Burnson, C., Poehlmann, J., & Schwichtenberg, A. J (2013). Effortful control, positive emotional expression, and behavior problems in children born preterm. *Infant Behavior and Development, 36*(4), 564-574. https://doi.org/10.1016/j.infbeh.2013.04.003

Choe, D. E., Olson, S. L., & Sameroff, A. J. (2013). Effects of early maternal distress and parenting on the development of children's self-regulation and externalizing behavior. *Development and Psychopathology, 25*(2), 437-453. https://doi.org/10.1017/S0954579412001162

Chyi, L. J., Lee, H. C., Hintz, S. R., Gould, J. B., & Sutcliffe, T. L. (2008). School outcomes of late preterm infants: Special needs and challenges for infants born at 32 to 36 weeks gestation. *The Journal of Pediatrics, 153*(1), 25-31. https://doi.org/10.1016/j.jpeds.2008.01.027

Clark, C. A. C., Woodward, L. J., Horwood, L. J., & Moor, S. (2008). Development of emotional and behavioral regulation in children born extremely preterm and very preterm: Biological and social influences. *Child Development, 79*(5), 1444-1462. https://doi.org/10.1111/j.1467-8624.2008.01198.x.

Conger, R. D., & Donnellan, M. B. (2007). An interactionist perspective on the socioeconomic context of human development. *Annual Review of Psychology, 58*, 175-199. https://doi.org/10.1146/annurev.psych.58.110405.085551

Dilworth-Bart, J. E., Poehlmann-Tynan, J. A., Taub, A., Liesen, C. A., & Bolt, D. (2018). Longitudinal associations between self-regulation and the academic and behavioral adjustment of young children born preterm. *Early Childhood Research Quarterly, 42*, 193-204. https://doi.org/10.1016/j.ecresq.2017.09.007

Euro-Peristat Project (2018). *European perinatal health report.* https://www.europeristat.com/index.php/reports/european-perinatal-health-report-2015.html

Feldman, R. (2009). The development of regulatory functions from birth to 5 years: Insights from premature infants. *Child Development, 80*(2), 544–561. https://doi.org/10.1111/j.1467-8624.2009.01278.x.

Gardner, F. (2000). Methodological issues in the direct observation of parent–child interaction: Do observational findings reflect the natural behavior of participants? *Clinical Child and Family Psychology Review, 2*(3), 185-198. https://doi.org/10.1023/a:1009503409699

Goldberg, S., & DiVitto, B. (2002). Parenting children born preterm. In M. H. Bornstein (Ed.) *Handbook of parenting* (pp. 329-354). Lawrence Erlbaum Associates Publishers.

Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The self-determination theory perspective. In J. Grusec & L. Kuczynski (Eds.), *Parenting and children's internalization of values: A handbook of contemporary theory* (pp. 135–161). Wiley.

Holmbeck, G. N., Johnson, S. Z., Wills, K. E., McKernon, W., Rose, B., Erklin, S., & Kemper, T. (2002). Observed and perceived parental overprotection in relation to psychosocial adjustment in preadolescents with a physical disability: The mediational role of behavioral autonomy. *Journal of Consulting and Clinical Psychology, 70*(1), 96-110. https://doi.org/10.1037//0022-006x.70.1.96

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53-60. https://doi.org/10.21427/D7CF7R

Johnson, S. Z., & Holmbeck, G. N. (1995). Manual for OP coding system [Unpublished manuscript]. Loyola University of Chicago.

Karreman, A., van Tuijl, C., van Aken, M. A. G., & Dekovic, M. (2008). Parenting, coparenting, and effortful control in pre-schoolers, *Journal of Family Psychology, 22*, 30-40. https://doi.org/10.1037/0893-3200.22.1.30

Kline, R. B. (2011). *Principles and practice of structural equation modelling (*3rd ed.). The Guilford Press.

Kochanska, G., & Aksan, N. (2006). Children's conscience and self-regulation. *Journal of Personality, 74*(6), 1587–1617. https://doi.org/10.1111/j.1467-6494.2006.00421.x

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36*(2), 220-232. https://doi.org/10.1037/0012-1649.36.2.220

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199–214. https://doi.org/10.1037/0012-1649.18.2.199

Levy, D. M. (1943). *Maternal overprotection.* Columbia University Press.

Loi E. C., Vaca, K. E. C., Ashland, M. D., Marchman, V. A., Fernald, A., & Feldman, H. M. (2017). Quality of caregiver-child play interactions with toddlers born preterm and full term: Antecedents and language outcome. *Early Human Development*, *115*. 110–117. https://doi.org/10.1016/j.earlhumdev.2017.10.001

Nagahawatte, N. T., & Goldenberg, R. L. (2008). Poverty, maternal health, and adverse pregnancy outcomes. *Annals of the New York Academy of Sciences, 1136*, 80-85. https://doi.org/10.1196/annals.1425.016

O'Mara, L., & Johnston, C. (1989). Mother's attitudes and their children's behaviors in 3-year-olds born prematurely and at term. *Journal of Developmental & Behavioral Pediatrics, 10*(4), 192–197. https://doi.org/10.1097/00004703-198908000-00006

Paquette, D. (2004). Theorizing the father-child relationship: Mechanisms and developmental outcomes. *Human Development, 47*(4), 193-219. https://doi.org/10.1159/000078723

Poehlmann, J., Schwichtenberg, A. J. M., Shah, P. E., Shlafer, R. J., Hahn, E., & Maleck, S. (2010). The development of effortful control in children born preterm. *Journal of Clinical Child & Adolescent Psychology, 39*(4), 522-536. https://doi.org/10.1080/15374416.2010.486319

Prevoo, M. J. L., Malda, M., Mesman, J., Emmen, R. A. G., Yeniad, N., van Ijzendoorn, M. H., & Linting, M. (2014). Predicting ethic minority children's vocabulary from socioeconomic status, maternal language and home reading input: Different pathways for host and ethnic language. *Journal of Child Language, 41*(5), 963-984. https://doi.org/10.1017/S0305000913000299

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Rothbart, M., & Bates, J. (2006). Temperament. In N. Eisenberg, W. Damon, & L. M. Richard (Eds.), *Handbook of child psychology: Vol. 3, social, emotional, and personality development* (6th ed., pp. 99–166). Wiley.

Samra, H. A., McGrath, J. M., & Wey, H. (2010). Are former late-preterm children at risk for child vulnerability and overprotection?. *Early Human Development*, *86*(9), 557–562. https://doi.org/10.1016/j.earlhumdev.2010.07.005

Sroufe, L. A. (1995). *Emotional development: The organization of emotional life in the early years*. Cambridge University Press.

Talge, N. M., Holzman, C., Wang, J., Lucia, V., Gardiner, J., & Breslau, N. (2010). Late-preterm birth and its association with cognitive and socioemotional outcomes at 6 years of age. *Pediatrics, 126*(6), 1124-1131. https://doi.org/10.1542/peds.2010-1536

Taylor, Z. E., Eisenberg, N., Spinrad, T. L., & Widaman, K. F. (2013). Longitudinal relations of intrusive parenting and effortful control to ego-resiliency during early childhood. *Child Development, 84*(4), 1145– 1151. https://doi.org/10.1111/cdev.12054

Thomasgard, M., & Metz, W. P. (1993). Parental overprotection revisited. *Child Psychiatry & Human Development, 24*(2), 67-80. https://doi.org/10.1007/bf02367260

Thomasgard, M., Metz, W. P., Edelbrock, C., & Shonkoff, J. P. (1995). Parent-child relationship disorders. Part I. Parental overprotection and the development of the parent protection scale. *Journal of Developmental & Behavioral Pediatrics, 16*(4), 244-250. https://doi.org/10.1097/00004703-199508000-00006

Toscano, C., Soares, I., & Mesman, J. (2020). Controlling parenting behaviors in parents of children born preterm: A meta-analysis. *Journal of Developmental & Behavioral Pediatrics, 41*(3), 230-241. https://doi.org/10.1097/DBP.0000000000000762

Voigt, B., Pietz, J., Pauen, S., Kliegel, M., & Reuner, G. (2012). Cognitive development in very vs. moderately to late preterm and full-term children: Can effortful control account for group differences in toddlerhood? *Early Human Development, 88*(5), 307-313. https://doi.org/10.1016/j.earlhumdev.2011.09.001

Wightman, A., Schluchter, M., Drotar, D., Andreias, L., Taylor, H. G., Klein, N., Wilson-Costello, D., & Hack, M. (2007). Parental protection of extremely low birth weight children at age 8 years. *Journal of Developmental & Behavioral Pediatrics, 28*(4), 317–326. https://doi.org/10.1097/dbp.0b013e3180330915

Witt, A., Theurel, A., Tolsa, C. B., Lejeune, F., Fernandes, L., de Jonge, L. H., Monnier, M., Graz, M. B., Barisnikov, K., Gentaz, E., & Hüppi, P. S. (2014). Emotional and effortful control abilities in 42-month-old very preterm and full-term children. *Early Human Development, 90*(10), 565-569. https://doi.org/10.1016/j.earlhumdev.2014.07.008

Woodward, L. J., Lu, Z., Morris, A. R., & Healey, D. M. (2017). Preschool self-regulation predicts later mental health and educational achievement in very preterm and typically developing children.

The Clinical Neuropsychologist, 31(2), 404-422. https://doi.org/10.1080/13854046.2016.1251614

Zvara, B. J., Keim, S. A., Boone, K. M., & Anderson, S. E. (2019). Associations between parenting behavior and executive function among preschool-aged children born very preterm. *Early Childhood Research Quarterly, 48*, 317–324. https://doi.org/10.1016/j.ecresq.2019.01.012

CHAPTER 5

THE QUALITY OF INTERACTIVE BEHAVIORS IN THE CONTEXT OF PREMATURITY: FATHERS, MOTHERS, DAUGHTERS, AND SONS[6]

1. Introduction

Parent-child interactions are crucial for the child to develop an array of important cognitive, social, and emotional skills (McMahon et al., 2018; Tamis-LeMonda et al., 2004; Zvara et al., 2019). Interactive behaviors of infants born prematurely (i.e., before 37 weeks of gestation) seem to be compromised in the first early years of life (Feldman, 2007; Field, 1981; Forcada-Guex et al., 2011; Goldberg & DiVitto, 2002; Miles & Holditch-Davis, 1997), but it is still unclear whether infants' interactive difficulties persist into preschool age. Besides, although preterm boys present consistently worse developmental outcomes than preterm girls (Hintz et al., 2006; O'Driscoll et al., 2018), little is known about the influence of child gender on the quality of interactions between preterm-born children and their parents. In addition, most studies on interactive behaviors with preterm children have focused on mothers, and data on father-child interactions are scarce. This study aimed to examine the quality of interaction between preterm-born preschoolers and their mothers and fathers, through the observation of child cooperation-compliance and negativity-hostility and parental sensitive behaviors, and investigate the role of parental and child gender in these interactions.

The Importance of Parent-Child Interactions

The parent-child relation serves as a foundation for the child's future relationships and developmental outcomes, and is dependent on the quality of the interactions in which parent and child engage (Bowlby, 1969; Thompson, 2008). In interaction with their parents, infants begin to learn about relationships and social demands, starting to understand others as well as themselves (Ainsworth et al., 1974; Bowlby, 1969; Thompson, 2008). Infants must learn to modulate their behavior in order to cooperate and comply with the parents' demands and expectations, and to modulate their emotions and distress accordingly, entailing the development of self-regulation (Feng et al., 2017; Kopp, 1982). The development of such abilities is an important hallmark in the child's socioemotional development

[6] Toscano, C., Soares, I., Baptista, J., Moutinho, V., & Mesman, J. (2020). The quality of interactive behaviors in the context of prematurity: Fathers, mothers, daughters, and sons [Manuscript submitted for publication]. Psychology Research Center (CIPsi), School of Psychology, University of Minho.

and is dependent on the quality of parents' behavior in the interaction, particularly parental sensitive behavior, defined as the parent's ability to accurately perceive the child's signals and to respond to them promptly, contingently, and appropriately (Ainsworth et al., 1974). According to Bowlby's attachment theory (1969), the child translates the interaction patterns with parents into representations about the self and the others (i.e., internal working models), and these representations guide the child's expectations and responses to the parents and other social partners. Sensitive parental behavior promotes a secure attachment relationship and internal working models of the parent as trustworthy and available (Ainsworth et al., 1974), and predicts more optimal interactive behaviors of the child, such as cooperation and compliance to parents' demands (Feng et al., 2017; Kochanska et al., 2005) and positive emotionality (Menashe-Grinberg & Atzaba-Poria, 2017), and better child developmental outcomes (McMahon et al., 2018; Zvara et al., 2019). Parent-child interaction is a dyadic process and while parents' sensitive behavior contribute to shaping child's behavior, more compliant and positive behaviors of the child also elicit more sensitive responses on parents (Feng et al., 2017), thus both child and parent contribute to the quality of the interaction.

Parent-Child Interactions of Children Born Preterm

The quality of parent-child interaction may be compromised in the case of children born prematurely.

On the one hand, given their biological and neurological immaturity, preterm babies are less capable of organizing and regulating physiological and behavioral responses to the environment and, on average, are more passive, less responsive, less involved, and provide less clear behavioral cues while in interaction with their mothers (Field, 1981; Goldberg & DiVitto, 2002; Singer et al., 2003). However, much less is known about preterms' behavior in interaction with fathers. Moreover, some studies suggested that preterm infants tend to exhibit higher levels of negative emotionality (Feldman, 2007) and lower levels of cooperation towards their mothers (Forcada-Guex et al. 2011). Research examining interactive behaviors of children born preterm has been mostly limited to the first 2 years of life and it is important to understand if such interactive difficulties persist in later years. The observation of interactive behavior in the preschool years is particularly important because this is a period of multiple developmental achievements that allow the child to start engaging in complex and rich interactions (Marvin & Britner, 2008). In particular, at age 3, the typically developing child already has an integrated set of domain-specific control mechanisms that allow the modulation of attention, behaviors, and emotions in response to the environmental demands, and their ability for behavioral compliance is

expected to be fully developed (Feng et al., 2017; Kopp, 1982).

On the other hand, in the face of the adverse birth conditions, hospitalization and risk for death and disability of their newborn babies, preterms' parents face enormous psychological and emotional challenges, which may negatively impact the quality of parenting behaviors (Goldberg & DiVitto, 2002; Miles & Holditch-Davis, 1997). Several studies have examined whether mothers of children born preterm are less sensitive in interaction with their children compared to mothers of children born full-term, and a meta-analysis by Bilgin & Wolke (2015) revealed no differences between the two groups. However, very limited research has examined sensitivity of fathers of preterm-born children (and only in infancy), and yielded inconsistent results. Whereas some studies found no significant effect of prematurity on fathers' sensitive behavior (Feldman, 2007; Hall et al., 2015; McMahon et al., 2018), Hoffenkamp et al. (2015) found that fathers of preterm-born infants were less sensitive in interaction with their children compared to full-terms' fathers. The limited information on the quality of interaction between preterm-born children and their fathers represents a major gap in the literature on family processes and developmental outcomes of prematurity, given the equal importance of the father-child relationship and paternal sensitivity to the child's adjustment (Lamb & Lewis, 2010; Tamis-LeMonda et al., 2004).

The Role of Parental and Child Gender in Parent-Child Interactions

Research with children born full-term shows that fathers tend to exhibit less sensitivity than mothers (Kochanska et al., 2005; Kwon et al., 2012; Menashe-Grinberg & Atzaba-Poria, 2017), and that children can also exhibit different behavior towards mothers and fathers (Kerig et al., 1993). Thus, parental gender might be an important factor to consider when examining the quality of interactive behaviors in the context of prematurity but has received little attention.

Child gender might also be important to consider, given that research has consistently reported gender disparities among preterm infants that place boys in biological and developmental disadvantage. Such disparities are observed from birth onwards, with preterm boys having higher mortality, higher neonatal morbidity, and greater need for neonatal intensive care than girls (O'Driscoll et al., 2018). Across childhood, boys exhibit more neurodevelopmental and cognitive impairments (Hintz et al., 2006), poorer physiological regulation (Feldman, 2007), and worse executive functioning (Zvara et al., 2019), which are all important domains for one's capacity for self-regulated compliance and emotional modulation within interactions with the others. Therefore, gender disparities might also be observed regarding preterm children's interactive behavior, as suggested by Poehlmann et al.'s (2012) findings

showing that 24-months-old preterm boys exhibited less compliance in interaction with their mothers than girls did. Besides, although most studies with full-term samples suggest that parental sensitivity does not vary according to child gender (Mesman & Groeneveld, 2018), given the male disadvantage in preterms' outcomes, child gender may influence sensitive behavior in the case of preterm children's parents. The few studies available examining child gender differences in sensitivity levels of parents of preterm children yielded inconsistent results. Whereas some found that mothers of preterms were more sensitive towards their daughters than towards their sons (Gernstein et al., 2019), others found no significant effect of child gender on maternal sensitivity (Zvara et al., 2019).

The Current Study

The current study aimed to examine the quality of interaction of preterm-born and full-term-born preschoolers with their mothers and fathers, focusing on the role of child and parental gender. Regarding child behavior, we observed child's cooperation-compliance and negativity-hostility towards parents. Regarding parental behavior, we observed mother and father's sensitivity towards the child. More specifically, we addressed the following research questions:

1. Is preterm birth associated with parents' levels of sensitivity and children's levels of cooperation-compliance and negativity-hostility?

2. What is the role of parental and child gender in parents' levels of sensitivity towards preterm and full-term children?

3. What is the role of parental and child gender in preterm and full-term children's levels of cooperation-compliance and negativity-hostility towards their parents?

2. Method

Participants

Preterm participants were drawn from a larger longitudinal study about the cognitive and socioemotional development of children born prematurely during the first 3½ years postpartum. The study recruited 172 preterm children from two hospitals in Portugal, from which 110 participated in the last assessment point (i.e., when children were 3½ years old). Five families were not available for interactional assessment and four children refused assessment. There were 13 sets of twins, but data from one twin of each pair were randomly selected for the purposes of the current study. Therefore, the preterm sample of the current study comprises a total of 88 families. There were no differences

between the preterm participants included in the current study and those who dropped-out or were not available for interactional assessment in terms of parental age, parental education, mother's employment status, and child gestational age, birth weight, and gender. In families included in the current study, fathers were more likely to be employed at the time of recruitment, $X^2(1) = 8.23$, $p = .005$.

Full-term participants were recruited from a pool of 86 families that had participated in a previous study coordinated by the same university as the current study, recruited from the broader community through daycares and word-of-mouth. Parents were contacted by telephone to be informed about the study and invited to participate. Forty-five families accepted to participate. However, because one child refused assessment, the full-term sample of the current study comprises a total of 44 families. There were no sociodemographic differences between the full-term participants included in the current study and those who declined participation.

All children were born in Portugal from 2013 to 2015. Besides the gestational age criterion, children were included in the study if they had no congenital or current neurological problems, chromosomal disorders, and/or fetal drug/alcohol exposures. Because both parents were invited but not required to participate, data of both parents was not collected for all the participating families: In the preterm group ($n = 88$), 52 families had both mother-child and father-child interaction assessments, 31 families only had mother-child assessment, and the remaining five families only had father-child assessment; in the full-term group ($n = 44$), 31 families had both mother-child and father-child assessments, 10 only had mother-child assessment, and three only had father-child assessment.

Table 8 provides demographic and medical information of participants per group. Inspection of the table shows that preterm and full-term participants were comparable with respect to child gender, birth order, parental age, and parental marital status. Preterm families had lower education and income, which is not surprising given that preterm birth occurs in higher rates in low socioeconomic families. Within the preterm group, 54 children were born moderately-to-late preterm (i.e., between 32 and 36 weeks of pregnancy) and 34 children were born very preterm (i.e., before 32 weeks of pregnancy).

Table 8

Child and Family Characteristics of Children Born Preterm and Full-Term

Variable	Gestational age group		t/X^2
	Preterm (n = 88)	Full-term (n = 44)	
Child birth characteristics			
M (*SD;* range) gestational age (weeks)	32.57 (3.04; 25-36)	38.91 (1.16; 37-41)	17.25***
M (*SD*; range) birth weight (grams)	1846.22 (601.06; 742-3190)	3295.93 (505.33; 2300-4390)	13.75***
% Male	66	52	2.30
% First child	73	57	3.38+
% Diagnosis of apnoea	30	0	15.38***
% Respiratory distress	40	0	22.70***
% Bronchopulmonary dysplasia	11	0	5.11*
% Gastroesophageal reflux	10	0	4.56+
% Retinopathy	7	0	2.93
% Periventricular leukomalacia	2	0	0.95
% Supplementary oxygen at discharge	3	0	1.45
% 5-min Apgar score ≤6	2	0	1.02
% ventilation during NICU stay	48	2	26.25***
% NICU stay ≥30 days	42	0	24.50***
Family sociodemographic characteristics			
M (*SD*) maternal age (years)	36.43 (4.71)	37.00 (3.63)	0.70
M (*SD*) paternal age (years)	37.91 (5.17)	38.80 (4.24)	0.98
M (*SD*) maternal education (years)	12.55 (2.84)	15.39 (1.94)	6.74***
M (*SD*) paternal education (years)	11.38 (3.29)	14.02 (2.67)	4.62***
M (*SD*) monthly income (euros)	1701.11 (749.34)	2134.50 (651.26)	3.27**
% Married/common law marriage	94	98	0.79

+p < .10. *p < .05. **p < .01. ***p < .001.

Procedure

The study was approved by the Portuguese National Commission for Data Protection, and by the ethical commissions of the participating hospitals and of the University of Minho. Written informed consent was obtained from all participating parents. Participation was voluntary and participants received no financial compensation for taking part in the study.

Two assessment visits were conducted by a clinical psychologist. At the first visit, child intelligence quotient (IQ) was assessed and parents reported on demographic data. A 10-minutes parent-child interaction with one of the parents was videotaped for later coding of interactive behaviors, divided into three episodes: Child plays with a developmentally challenging toy with parental guidance (5 min); dyad plays with developmentally appropriate toys (2.5 min); and child cleans up the toys (2.5 min). At the second visit (in 86% of the cases, conducted within one month after the first visit), the same parent-child interaction took place with the other parent. To avoid order effects, the order in which mother-child and father-child interactions were conducted between the two visits was counterbalanced between families. Preterm participants were assessed either at the hospital (n = 79), at the university laboratory (n = 6), or at the participants' home (n = 3), according to the family's availability. All full-term participants were assessed at the university laboratory.

Measures

Parental Interactive Behavior. To assess the quality of mother and father's interactive behavior with the child, the videotaped parent-child interaction was coded using the Ainsworth Sensitivity Scale (Ainsworth et al., 1974), measuring parents' sensitive behavior. Parental behavior along the three interactive tasks (see the "Procedure" section) was coded on a 9-point Likert scale (1 = *highly insensitive* to 9 = *highly sensitive*), with higher scores representing more sensitive behavior. Interactions within the same family were coded by separate, independent coders who were also blind to all other assessments, in order to ensure that each coder would never code the same child more than once. To examine interrater reliability, 23% of the mother cases and 20% of the father cases were double-coded. Intracclass correlations (ICCs) were .91 for mothers, and .70 for fathers.

Child Interactive Behavior. To assess the quality of child's interactive behavior with the parents, the videotaped parent-child interaction was coded using two subscales of the Coding System for Mother-Child Interactions (CSMCI; Healey et al., 2010; Portuguese version by Baião et al., 2018): (a) Cooperation-compliance, measuring whether the child obeys parent's suggestions and commands quickly/cheerfully, and (b) Negativity-hostility, measuring whether the child forcefully rejects the

parent's ideas or is unreasonably demanding. For each subscale, child behaviors were coded separately for each of the tasks (see the "Procedure" section) on a 5-point Likert scale (1 = *very low* to 5 = *very high*), and the mean score across all three tasks was used for analysis. Negativity-hostility scores were inverted so that higher scores on both scales would represent more adaptive behavior (i.e., more cooperation-compliance and less negativity-hostility). Interactions within the same family were coded by separate, independent coders who were also blind to all other assessments. To examine interrater reliability, 23% of the mother-child interactions and 23% of the father-child interactions were double-coded. ICCs were >.70 for both mother-child and father-child dyads across the scales.

Covariates. Because low SES may negatively influence the quality of parent-child interactions (Feng et al., 2017; Hall et al., 2015; Tamis-LeMonda et al., 2004), and studies have found associations between preterm-born children's low quality of interactive behaviors with neonatal adversity (Poehlmann et al., 2012) and low cognitive development (Landry et al., 1990), we examined family's SES, child neonatal adversity, and child IQ as potential covariates of interactive behaviors.

Assessment of family's SES was based on family's monthly income, mother's years of education, and father's years of education. When entered on a PCA, these variables loaded on the first unrotated component (loadings of .84 for family's income, .90 for mother's education, and .91 for father's education). Therefore, SES was computed as the sum of the standardized values of the income and education variables, with higher scores reflecting higher SES. Twenty-six families had missing values for monthly income and one family had missing values for father's education. In these cases, the missing values were computed based on a regression equation that included the available values as predictors of the missing value, before computing the SES variable.

To measure child's neonatal adversity, we computed the sum of the presence of ten neonatal medical risk factors at the time of neonatal intensive care unit (NICU) hospitalization (Poehlmann et al., 2012): Diagnosis of apnoea, respiratory distress, bronchopulmonary dysplasia, gastroesophageal reflux, retinopathy, periventricular leukomalacia, supplementary oxygen at NICU discharge, 5-min Apgar score ≤6, ventilation during NICU stay, and NICU stay ≥30 days. Higher scores represent greater neonatal severity. Table 8 presents the percentage of preterm and full-term children with the presence of each neonatal medical risk factor.

Child IQ was measured using the Information and Block Design subtests of the Wechsler Preschool and Primary Scales of Intelligence (WPPSI; Wechsler, 2003), following recommendations by Sattler (1992).

Analysis Plan

Preliminary analyses were first conducted to assess bivariate relations among the study variables, and to examine covariates that might need to be controlled for in the main analyses. Research questions were then addressed using multilevel linear modeling (MLM), also known as mixed effects modelling, in R (version 3.6.1) and R Studio (1.2.5001) using the *lme()* function of the *nlme* package (Pinheiro et al., 2020). MLM is a regression-based approach for handling nested data, providing information about the variability of individuals across contexts (within-subject) as well as between individuals (between-subject). MLM is robust for missing data and is unaffected by unequal sample sizes (Field et al., 2012; Tabachnik & Fidell, 2007). Therefore, it allowed running the analyses on the full data set, including participants who only had maternal or paternal data available and, consequently, avoiding the bias of listwise deletion of incomplete cases.

To examine the impact of preterm birth and of parental and child gender in parental interactive behavior, a model was tested including parental sensitive behavior as the dependent measure, parental gender (mother, father) as within-subject predictor, and child gender (boys, girls) and preterm status (preterm, full-term) as between-subjects predictors. Following Field et al. (2012), a build-up strategy was used (i.e., building up the model one predictor at a time from a baseline that includes only the intercept), using maximum likelihood (ML) estimation. Therefore, first, an intercept-only model with no predictors was fitted (baseline model). Given the nested nature of the data, the model incorporated the random effect of parental gender, because data within each level of parental gender can be found for each participant child. The ICC for the intercept-only model was calculated to examine whether within-subject variance was large enough to justify the use of MLM as an analysis approach. Predictors were then included in the model as fixed factors: Control variables were entered first, followed by preterm status, child gender, and parental gender. Finally, interaction terms between the predictors were entered. To assess whether the addition of each predictor or interaction term would improve the model, we compared the model fit by examining the likelihood ratio (X^2) and its significance. A significant improvement of the model fit indicates a significant effect of the added predictor or interaction terms (Field et al., 2012). Parameter estimates of the final model were analysed in order to break down the significant effects. Normal distribution of residuals and absence of significant outliers were checked.

To examine the impact of preterm birth and of parental and child gender in children's interactive behavior, a model was tested including child behavior as the dependent measure, parental gender (mother, father) as a within-subject predictor, and child gender (boys, girls) and preterm status

(preterm, full-term) as between-subjects predictors, using the same strategy that was used for the parental sensitivity model. Normal distribution of residuals and absence of significant outliers were checked.

3. Results

Preliminary Analyses

Table 9 presents descriptive statistics and bivariate associations among the primary study variables and potential covariates. As shown in the table, all primary study variables were significantly interrelated. Examination of potential covariates revealed that family's SES was negatively associated with maternal and paternal sensitive behavior, but there was no significant relation with child interactive behaviors. Child IQ was positively associated with maternal sensitive behavior, and with child's levels of cooperation-compliance and negativity-hostility towards both parents. There were no significant associations between child neonatal risk and parental and child interactive behaviors. Therefore, in the subsequent analyses, we controlled for the effect of child IQ and family's SES on parental behavior, and for the effect of child IQ on child behaviors. Child neonatal risk was dropped.

Within the preterm group, there were no significant differences between those born moderately-to-late and those born very preterm regarding parents' sensitivity and child's compliance-cooperation and negativity-hostility (all p values > .34).

Table 9

Descriptive Statistics and Bivariate Associations for Study Variables

Variable	1	2	3	4	5	6	7	8	9	*M (SD)* Preterm (n = 88)	*M (SD)* Full-term (n = 44)
1. Maternal sensitivity	-									4.68 (1.82)[a]	5.81 (1.58)[c]
2. Paternal sensitivity	.32**	-								4.54 (1.69)[b]	4.88 (1.57)[d]
3. Child cooperation-compliance with mother	.48***	.28*	-							3.73 (0.71)[a]	4.10 (0.63)[c]
4. Child negativity-hostility with mother	.55***	.27*	.77***	-						4.27 (0.72)[a]	4.66 (0.46)[c]
5. Child cooperation-compliance with father	.31**	.41***	.51***	.39***	-					3.42 (0.80)[b]	3.68 (0.84)[d]
6. Child negativity-hostility with father	.30**	.43***	.50***	.44***	.90***	-				3.58 (0.85)[b]	3.77 (0.85)[d]
7. Child IQ	.37***	.13	.36***	.41***	.35**	.23*	-			106.84 (15.60)	119.52 (16.75)
8. Child neonatal risk	-.08	-.03	-.11	-.15	-.16	-.20+	-.23**	-		1.93 (2.09)	0.02 (0.15)
9. Family SES	.34***	.21*	.03	.04	-.04	-.06	.18*	-.18*	-	-0.75 (2.67)	1.62 (1.88)

Note. Pearson correlation coefficients (two-tailed). [a] n = 83. [b] n = 57. [c] n = 41. [d] n = 34.

+ p < .10. *p < .05. **p < .01. ***p < .001.

Parental Interactive Behavior

The ICC for the intercept-only model was large, ICC = .89, supporting the decision to model the data using MLM. Table 10 presents the results from the MLM analysis of the parental sensitivity final model (i.e., the model including all main predictors and interaction terms). Comparisons of model fit revealed a marginal main effect of parental gender on sensitivity, $X^2(9) = 3.81$, $p = .05$, reflecting lower levels of sensitive behavior of fathers in comparison to mothers, $b = -0.96$, $t(79) = -2.03$, $p = .05$. However, there was also a marginal interaction effect of parental gender and preterm status, $X^2(12) = 3.31$, $p = .06$, indicating that the effect of parental gender on parents' levels of sensitive behavior was different in preterm and full-term participants. Follow-up comparisons revealed that parental gender had a significant effect on sensitivity for the full-term group, $X^2(7) = 7.31$, $p = .007$, but not for the preterm group, $X^2(7) = 0.11$, $p = .75$, reflecting lower levels of sensitive behavior of fathers of full-term children in comparison to mothers, $b = -0.92$, $t(30) = -2.72$, $p = .01$. In the preterm group, fathers and mothers exhibited similar levels of sensitivity, $b = -0.08$, $t(51) = -0.32$, $p = .75$. There were no significant effects of child gender on parental sensitive behavior.

Table 10

Estimates and Model Comparison for Final Mixed Effects Model Predicting Parental Sensitivity

	Model summary		Model comparison		
	b	*SE*	X^2	df	*p*
(Intercept)	2.26	0.98			
Child IQ	0.02	0.01	29.58	6	<.001
Family SES	0.16	0.05			
Preterm status	-0.33	0.43	0.10	7	.75
Child gender	0.58	0.51	2.63	8	.10
Parent gender	-0.96	0.47	3.81	9	.05
Preterm status x child gender	-0.13	0.64	0.53	10	.46
Child gender x parent gender	0.13	0.68	0.60	11	.44
Parent gender x preterm status	1.04	0.57	3.31	12	.06
Preterm status x child gender x parent gender	-0.61	0.86	0.53	13	.47

Note. Child IQ and SES are control variables, preterm status and child gender are between-subjects predictors, and parent gender is a within-subjects predictor. Reference category for preterm status, 1 = preterm; for child gender, 1 = female; for parent gender, 1 = father.

Child Interactive Behavior

As shown in Table 9, child's levels of cooperation-compliance and negativity-hostility were highly correlated. Therefore, a composite measure was created by aggregating the two scales into a global measure of child behavior, which was considered for the subsequent analysis. The ICC for the intercept-only model was large, ICC = .89, supporting the decision to model the data using MLM. Table 11 presents the results from the MLM analysis of the child behavior final model (i.e., the model including all main predictors and interaction terms). Comparisons of model fit revealed a significant main effect of parental gender on child's behavior, $X^2(8) = 33.41$, $p < .001$, reflecting more cooperation-compliance and less negativity-hostility of children towards fathers in comparison to mothers, $b = -1.57$, $t(78) = -4.20$, $p < .001$. There was also a significant interaction effect of child gender and preterm status, $X^2(9) = 4.02$, $p = .04$. Follow-up comparisons revealed that child gender had a significant effect on the quality of child behavior for the preterm group, $X^2(6) = 3.99$, $p = .04$, but not for the full-term group, $X^2(6) = 0.50$, $p = .48$, reflecting more cooperation-compliance and less negativity-hostility of preterm girls in comparison to preterm boys, $b = 0.56$, $t(85) = 2.01$, $p = .04$. In its turn, in the full-term group, girls and boys exhibited similar levels of behavior quality, $b = -0.23$, $t(41) = -0.69$, $p = .49$.

Table 11

Estimates and Model Comparison for Final Mixed Effects Model Predicting Child Behavior

	Model summary		Model comparison		
	b	*SE*	X^2	df	*p*
(Intercept)	5.61	0.83			
Child IQ	0.03	0.01	19.85	5	<.001
Preterm status	-0.80	0.35	0.68	6	.41
Child gender	-0.49	0.42	1.90	7	.17
Parent gender	-1.57	0.37	33.41	8	<.001
Preterm status x child gender	0.93	0.52	4.02	9	.04
Child gender x parent gender	0.64	0.53	2.63	10	.10
Parent gender x preterm status	0.52	0.45	2.01	11	.16
Preterm status x child gender x parent gender	-0.12	0.67	0.03	12	.85

Note. Child IQ is a control variable, preterm status and child gender are between-subjects predictors, and parent gender is a within-subjects predictor. Reference category for preterm status, 1 = preterm; for child gender, 1 = female; for parent gender, 1 = father.

4. Discussion

The present study examined the quality of interaction between preterm-born preschoolers and their parents, focusing on the role of child and parental gender, through the observation of children's cooperation-compliance and negativity-hostility and parents' sensitive behaviors during a structured interactive task.

Results reveal no significant effect of preterm birth on the quality of parents' interactive behavior. These findings are in line with the previous body of research showing that mothers of preterm-born children exhibit similar levels of sensitivity compared to mothers of full-term children (Bilgin & Wolke, 2015), and bring innovative evidence by extending such similarity to fathers. To our knowledge, this is the first study examining sensitive behavior of fathers of preterm-born children during the preschool period in comparison to fathers of full-terms. In line with studies focused on infancy (Feldman, 2007; Hall et al., 2015; McMahon et al., 2018), our results suggest no impact of prematurity on fathers' sensitive behavior.

In the full-term group, fathers exhibited less sensitive behavior than mothers, which is in line with the general findings of previous research with general population samples (Kochanska et al., 2005; Kwon et al., 2012; Menashe-Grinberg & Atzaba-Poria, 2017). Conversely, in the preterm group, mothers and fathers showed similar levels of sensitive behavior, similar to previous findings (Harrison & Magill-Evans, 1996). These results may reflect a higher involvement of fathers of preterms in the caregiving of their children, potentially in response to preterm infants' more challenging care needs (Goldberg & DiVitto, 2002). As soon as these infants are born, fathers are required to take a strong, active caregiver role, because very often mothers need hospital care and the father is left with the early sole responsibility of accompanying the baby on the NICU. Some studies found that during the first months of life, fathers of preterm babies were more involved in the care of their child than fathers of babies born full-term (e.g., Miles & Holditch-Davis, 1997). Such higher involvement may facilitate a better knowledge of their children's needs and capacity to respond to them accordingly, decreasing the gap between mothers' and fathers' sensitivity that is typical of parents of children born full-term.

Furthermore, we found that child gender did not play a role in parents' levels of sensitivity. This finding extend the large body of literature with full-term-born children demonstrating that most parents use similar broad parenting behaviors - such as sensitivity - with sons and daughters (Mesman & Groeneveld, 2018), by showing that such similarities are also observed in parents of preterm-born children. As suggested by Mesman and Groeneveld (2018), different sensitivity levels toward girls and

boys should not be expected to occur because it is a dimension of socialization that is highly important for the development of all children irrespective of their gender; instead, gendered parenting may be observed in more implicit parenting practices that include behaviors and/or statements conveying messages about differential expectations of girls and boys.

Results also reveal no significant effect of preterm birth on children's levels of compliance-cooperation and negativity-hostility toward their parents. The quality of interactive behaviors was better explained by child IQ, which is consistent with the results of a previous study showing that differences between preterm and full-term 3-year-olds regarding compliant behavior were accounted for by the child's IQ (Landry et al., 1990). The fact that prematurity in itself might not lead to worse interactive behaviors in the preschool period is encouraging and may suggest that children born preterm may overcome the interactive difficulties that are typically observed during infancy (Feldman, 2007; Forcada-Guex et al., 2011). In line with this, a previous study examined the quality of parent-child interaction of preterm infants during the first two years of life and found that whereas parents' behaviors were optimally stable over time, interactive differences between preterm and full-term infants decreased over time (Hall et al., 2015). Others have found interactive differences to decrease over the first year (Miles & Holditch-Davis, 1997).

In the current study, child gender did not play a role in the quality of behaviors of children born full-term, consistent with previous research with findings in a sample of full-term preschoolers using the same observational measure as the current study (Baião et al., 2018). However, child gender did influence the quality of behaviors of preterm-born children, as preterm boys were found to be less compliant-cooperative and more negative-hostile toward their parents than preterm girls. This extends the large body of literature reporting a male disadvantage in clinical and developmental outcomes of children born preterm (Feldman, 2007; Hintz et al., 2006; O'Driscoll et al., 2018; Zvara et al., 2019), by showing that gender disparities can also be observed in the quality of children's interactive behaviors as they enter the preschool period, as it has been previously reported for the infancy period (Poehlmann et al., 2012). This highlights the importance of research and clinical practice to consider male gender as a risk factor for worse outcomes in preterm-born children. Such consideration might better elucidate research results and improve care and intervention for both preterm boys and girls. Some authors have suggested that preterm boys' disadvantage may be related to differences between boys and girls in immunological and hormonal responses, genetics, and brain structural and degenerative changes (Hintz et al., 2006; O'Driscoll et al., 2018). However, etiology of disparities is relatively underexplored and lacks further investigation.

Furthermore, children exhibited more cooperation-compliance and less negativity-hostility towards their father than towards their mother. This could be due to differences between mothers and fathers in more microbehavioral aspects during the interaction that were not covered by our behavioral assessment. For example, a previous study found that while fathers engaged more in game-playing and laugh more than mothers in interaction with their infants, infants also exhibited more positive behavior towards their fathers than towards their mothers (Field, 1981). Few studies have explored differences in child behavior in relation to parental gender, particularly regarding cooperation-compliance and negativity-hostility, reflecting a long tendency of the parenting field to focus exclusively on the study of mothers, which has only started to change over the last few years. In line with our results, Kerig et al. (1993) found that mothers received more negative responses from their children than fathers, but other researchers found no significant effect of parental gender on preschoolers' behaviors toward parents (Kwon et al., 2012). These inconsistent findings suggest the need for more research on parent-child interaction with both mothers and fathers to better understand the role of parental gender on the quality of child behaviors.

Several limitations of the study should be acknowledged. First, although the inclusion of both mothers and fathers represents a strength of the study, data was not collected with both parents of all children and, therefore, there were more participating mothers than fathers. Second, the sample size was relatively small and nonequivalent across the preterm and full-term groups. In addition, the attrition rate was high, especially among preterms' families in which the father was unemployed, which may limit the generalizability of results. Fourth, the great majority of preterm cases were assessed at the hospital (90%) whereas all the full-term participants were assessed at the lab, and different settings may have different effects on behavior (Gardner, 2000). Finally, the preterm group included a wide range of gestational ages, with most children being born moderately-to-late preterm, implying a large heterogeneity in terms of neonatal and medical experiences that might differently affect children and parents. Although there were no differences between very-preterm and moderately-to-late preterm born children regarding the main variables, and although we tested neonatal adversity as a potential covariate, such heterogeneity can only be partially addressed by statistical control.

As our study focused on parental sensitivity and child cooperation-compliance and negativity-hostility, future research is needed to examine the quality of interaction between preterm-born preschoolers and their parents regarding other types of interactive behaviors. Research with older age groups is also needed to examine interactive behaviors of preterm-born children and their parents

during later stages of child development. Furthermore, it would be relevant to examine preterm-born preschoolers' interactive behavior in relation to more distal contexts such as school and peers.

In conclusion, while research on the quality of parent-preterm child interaction, to date, has been almost exclusively focused on infancy and on the mother-child dyad, this study contributes to advance our understanding by examining interactive behaviors in the preschool period, with both mothers and fathers, and considering the underexplored role of parental and child gender. Results suggest that, despite the challenge that preterm birth represents for both parents and the child (Goldberg & DiVitto, 2002), prematurity in itself does not impact the quality of interactive behaviors of 3½-years-old preterms and their mothers and fathers. These findings are reassuring given the unquestionable importance of parent-child interaction for child development (Ainsworth et al., 1974; Bowlby, 1969; TamisLeMonda et al., 2004). Such importance might be even bigger in the case of children born prematurely, as high-quality parent-child interaction may serve as a compensating mechanism for the effect of child biological risk on later developmental outcomes (Goldberg & DiVitto, 2002). Moreover, given that preterm boys seem to exhibit more interactive difficulties than girls, child gender is an important variable to consider when monitoring and examining the development of preterm children and designing clinical interventions.

5. References

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M. P. Richards (Ed.), *The integration of a child into a social world* (pp. 99–135). Cambridge University Press.

Baião, R., Baptista, J., Pinto, R., Toscano, C., Fearon, P., Soares, I., & Mesquita, A. R. (2018). Assessing preschoolers interactive behaviour: A validation study of the "Coding System For Mother-Child Interaction". *Child: Care, Health and Development, 44*(4), 644-650. https://doi.org/10.1111/cch.12572

Bilgin, A., & Wolke, D. (2015). Maternal sensitivity in parenting preterm children: A meta-analysis. *Pediatrics, 136*(1), 177-193. https://doi.org/10.1542/peds.2014-3570

Bowlby, J. (1969). *Attachment and loss.* Basic Books.

Feldman, R. (2007). Maternal versus child risk and the development of parent–child and family relationships in five high-risk populations. *Developmental and Psychopathology, 19*(2), 293-312. https://doi.org/10.10170S0954579407070150

Feng, X., Hooper, E. G., & Jia, R. (2017). From compliance to self-regulation: Development during early childhood. *Social Development, 26*(4), 981-995. https://doi.org/10.1111/sode.12245

Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. Sage Publications Ltd.

Field, T. (1981). Fathers' interactions with their high-risk infants. *Infant Mental Health Journal, 2*(4), 249-256. https://doi.org/10.1002/1097-0355(198124)2:4<249::AID-IMHJ2280020407>3.0.CO;2-I

Forcada-Guex, M., Borghini, A., & Pierrehumbert, B. (2011). Prematurity, maternal posttraumatic stress and consequences on the mother-infant relationship. *Early Human Development, 87*(1), 21–26. https://doi.org/10.1016/j.earlhumdev.2010.09.006

Gardner, F. (2000). Methodological issues in the direct observation of parent–child interaction: Do observational findings reflect the natural behavior of participants? *Clinical Child and Family Psychology Review, 2*(3), 185-198. https://doi.org/10.1023/a:1009503409699

Gernstein, E. D., Njoroge, W. F. M., Paul, R. A., Smyser, C. D., & Rogers, C. E. (2019). Maternal depression and stress in the NICU: Associations with mother-child interactions at age 5 years. *Journal of the American Academy of Child & Adolescent Psychiatry, 58*(3), 350-358. https://doi.org/10.1016/j.jaac.2018.08.016

Goldberg, S., & DiVitto, B. (2002). Parenting children born preterm. In M. H. Bornstein (Ed.) *Handbook of parenting* (pp. 329-354). Lawrence Erlbaum Associates Publishers.

Hall, R. A. S., Hoffenkamp, H. N., Tooten, A., Braeken, L., Vingerhoets, A. J. M., & van Bakel, H. J. A. (2015). The quality of parent–infant interaction in the first 2 years after full-term and preterm birth. *Parenting, 15*(4), 247-268. https://doi.org/10.1080/15295192.2015.1053333

Harrison, M. J., & Magill-Evans, J. (1996). Mother and father interactions over the first year with term and preterm infants. *Research in Nursing & Health, 19*(6), 451-459. https://doi.org/10.1002/(SICI)1098-240X(199612)19:6<451::AID-NUR1>3.0.CO;2-N

Healey, D. M., Gopin, C. B., Grossman, B. R., Campbell, S. B., & Halperin, J. M. (2010). Mother-child dyadic synchrony is associated with better functioning in hyperactive/inattentive preschool children. *Journal of Child Psychology and Psychiatry, 51*(9), 1058-1066. https://doi.org/10.1111/j.1469-7610.2010.02220.x

Hintz, S. R., Kendrick, D. E., Vohr, B. R., Poole, W. K., Higgins, R. D., & the NICHD Neonatal Research Network (2006). Gender differences in neurodevelopmental outcomes among extremely preterm, extremely-low-birthweight infants. *Acta Paediatrica, 95*(10), 1239-1248. https://doi.org/10.1080/08035250600599727

Hoffenkamp, H. N., Braeken, J., Hall, R. A., Tooten, A., Vingerhoets, A. J. & van Bakel, H. J. (2015). Parenting in complex conditions: Does preterm birth provide a context for the development of less optimal parental behavior?. *Journal of Pediatric Psychology, 40*(6), 559–571. https://doi.org/10.1093/jpepsy/jsv007

Kerig, P. K., Cowan, P. A., & Cowan, C. P. (1993). Marital quality and gender differences in parent-child interaction. *Developmental Psychology, 29*(6), 931-939. https://doi.org/10.1037/0012-1649.29.6.931

Kochanska, G., Aksan, N., & Carlson, J. J. (2005). Temperament, relationships, and young children's receptive cooperation with their parents. *Developmental Psychology, 41*(4), 648-660. https://doi.org/10.1037/0012-1649.41.4.648

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199–214. https://doi.org/10.1037/0012-1649.18.2.199

Kwon, K., Jeon, H., Lewsader, J. T., & Elicker, J. (2012). Mothers' and fathers' parenting quality and toddlers' interactive behaviours in dyadic and triadic family contexts. *Infant and Child Development, 21*(4), 356-373. https://doi.org/10.1002/icd.1746

Lamb, M. E., & Lewis, C. (2010). The development and significance of father-child relationships in two-parent families. In M.E. Lamb (Ed.), *The role of the father in child development* (5th ed., pp. 94–153). John Wiley & Sons Inc.

Landry, S. H., Chapieski, M. L., Richardson, M. A., Palmer, J., & Hall, S. (1990). The social competence of children born prematurely: Effects of medical complications and parent behaviors. *Child Development, 61*(5), 1605–1616. https://doi.org/10.1111/j.1467-8624.1990.tb02887.x

Marvin, R., & Britner, P. (2008). Normative development: The ontogeny of attachment. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research and clinical applications* (pp. 269–294). The Guilford Press.

McMahon, G. E., Spencer-Smith, M. M., Pace, C. C., Spittle, A. J., Stedall, P., Richardson, K., Cheong, J. L. Y., Doyle, L. W., Anderson, P. J., & Treyvaud, K. (2018). Influence of fathers' early parenting on the development of children born very preterm and full term. *The Journal of Pediatrics, 205,* 195-201. https://doi.org/10.1016/j.jpeds.2018.09.073

Menashe-Grinberg, A., & Atzaba-Poria, N. (2017). Mother-child and father-child play interaction: The importance of parental playfulness as a moderator of the links between parental behavior and child negativity. *Infant Mental Health Journal, 38*(6), 772-784. https://doi.org/10.1002/imhj.21678

Mesman, J., & Groeneveld, M. G. (2018). Gendered parenting in early childhood: Subtle but unmistakable if you know where to look. *Child Development Perspectives, 12*(1), 22-27. https://doi.org/10.1111/cdep.12250

Miles, M. S., & Holditch-Davis, D. (1997). Parenting the prematurely born child: Pathways of influence. *Seminars in Perinatology, 21*(3), 254-266. https://doi.org/10.1016/s0146-0005(97)80067-5

O'Driscoll, D. N., McGovern, M., Greene, C. M., & Mollow, E. J. (2018). Gender disparities in preterm neonatal outcomes. *Acta Paediatrica, 107*(9), 1494-1499. https://doi.org/10.1111/apa.14390

Pinheiro J., Bates D., DebRoy S., Sarkar D., & R Core Team (2020). *nlme: Linear and Nonlinear Mixed Effects Models*. https://CRAN.R-project.org/package=nlme

Poehlmann, J., Schwichtenberg, A. M., Hahn, E., Miller, K., Dilworth-Bart, J., Kaplan, D., & Maleck, S. (2012). Compliance, opposition, and behavior problems in toddlers born preterm or low birth weight. *Infant Mental Health Journal, 33*(1), 34-44. https://doi.org/10.1002/imhj.20335

Sattler, J. M. (1992). *Assessment of children: Revised and updated third edition.* Jerome M. Sattler Publisher, Inc.

Singer, L. T., Fulton, S., Davillier, M., Koshy, D., Salvator, A., & Baley, J. E. (2003). Effects of infant risk status and maternal psychological distress on maternal–infant interactions during the first year of life. *Journal of Development & Behavioral Pediatrics, 24*(4), 233-241. https://doi.org/10.1097/00004703-200308000-00003

Tabachnik, B. G., & Fidell, L. S. (2007). Multilevel linear modeling. In S. Hartman's (Ed.), *Using multivariate statistics* (pp. 781–857). Pearson Education Inc.

Tamis-LeMonda, C. S., Shannon, J. D., Cabrera, N. J., & Lamb, M. E. (2004). Fathers and mothers at play with their 2- and 3—years-olds: Contributions to language and cognitive development. *Child Development, 75*(6), 1806-1820. https://doi.org/10.1111/j.1467-8624.2004.00818.x

Thompson, R. A. (2008). Early attachment and later development: Familiar questions, new answers. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical implications* (2nd ed., pp. 348-365). The Guilford Press.

Wechsler, D. (2003). *Escala de inteligência de Wechsler para a idade pré-escolar e primária: Edição revista.* CEGOC.

Zvara, B. J., Keim, S. A., Boone, K. M., & Anderson, S. E. (2019). Associations between parenting behavior and executive function among preschool-aged children born very preterm. *Early Childhood Research Quarterly, 48*, 317–324. https://doi.org/10.1016/j.ecresq.2019.01.012

CHAPTER 6

GENERAL DISCUSSION

1. Summary of Research Findings

The main goal of this dissertation was to examine the interplay between prematurity, parents' perceptions of child vulnerability, parenting behaviors regarding overprotection and sensitivity, and children's self-regulation skills at age 3½ years old.

Chapter 1 presented a general introduction to the research topic. The chapter advanced prematurity as a rising global problem (March of Dimes et al., 2012), with potentially negative implications for children's developmental outcomes such as self-regulation capacities (Clark et al., 2008; Voigt et al., 2012; Witt et al., 2014) as well as for parents' psychological wellbeing, perceptions, and parenting behaviors (Goldberg & DiVitto, 2002). In light of this, the chapter stressed the importance of investigating the potential role of parenting in explaining self-regulation problems in children born preterm. Controlling overprotective behavior seems to be particularly important to investigate in the context of prematurity, although it is still underexplored by research. Moreover, the chapter pointed to other important gaps in prematurity studies that were further addressed by this dissertation, pertaining to a major focus on children born very preterm, on the infancy period, and the mother-child relationship.

Chapter 2 reviewed the previously existing literature examining controlling parenting behaviors in parents of children born preterm and conducted a meta-analysis to test whether they differ from parents of full-term-born children in this regard. Thirty-four studies were included, pertaining to 27 independent sets with a total of 8053 participants - 3265 preterm and 4788 full-term children. Results suggested that parents of children born preterm engaged in more controlling parenting behaviors than parents of full-term children. Heterogeneity analysis showed significant variation in effects between studies, but the effects were not moderated by gestational age, birth weight, child age, child gender, parental education, type of parenting assessment method (observational *vs* parental self-report), parenting dimension measured (behaviors *vs* attitudes), type of controlling parenting (intrusiveness *vs* others), study design (cross-sectional *vs* longitudinal), year of publication, or geographical setting of the studies (America *vs* Europe). The review emphasized two major gaps in the literature on controlling parenting of parents of preterm-born children: First, the majority of studies available were focused

exclusively on mothers, highlighting the importance of further studying fathers; second, only three available studies were focused specifically on overprotective parenting, highlighting the importance of further exploring this specific type of controlling behavioral pattern. Chapter 2 concluded by stressing the importance of further investigating the factors underlying the risk of preterms' parents to engage in controlling parenting behaviors.

Building on this, **Chapter 3** examined the child and parental factors associated with observed overprotective behavior in parents of preterm-born children – both mothers and fathers – in a sample of 85 children born prematurely. The examined factors included child neonatal risk, child development, parental gender, parent-reported perception of child vulnerability, parent-reported perception of their protective behavior, parent-reported psychological distress, and family's socioeconomic disadvantage. Results pointed to lower child developmental level and family's socioeconomic disadvantage at child's 12 months of age as significant predictors of observed overprotective behaviors at child's 42 months of age.

Chapter 4 examined the relations between prematurity, overprotective parenting, and children's self-regulatory effortful control skills at 42 months of age. The study considered two groups of children born preterm – 30 children born very preterm and 50 moderately-to-late preterm – and a comparison group of 38 children born full-term. Building on the research gaps identified in Chapter 2, this chapter firstly examined differences among mothers and fathers of very preterm, moderately-to-late preterm, and full-term children regarding overprotective behavior. Results suggested that mothers and fathers of very preterm children exhibited more overprotective behavior than parents of full-terms, but these differences were accounted for by the family's socioeconomic status (SES) and not by the prematurity status per se. The chapter further tested the differences between very preterm, moderately-to-late preterm, and full-term children regarding effortful control skills and found that both groups of preterm children performed worse than the full-term group. Lower child effortful control was predicted not only by children's gestational age but also by higher overprotective behavior of both mothers and fathers.

Finally, **Chapter 5** examined the relations between prematurity, sensitive parenting, and children's self-regulated compliance and non-negativity toward parents at 42 months of age, considering the role of child and parental gender. The study relied on a sample of 88 preterm-born children and 44 full-term-born children. Results revealed no relation between prematurity and sensitive parenting, as well as no relation between prematurity and children's levels of compliance and negativity in interaction with their parents. Although child gender did not play a role in the quality of interactive

behavior of full-term children, preterm boys exhibited less compliance and more negativity than preterm girls.

The following two sections will discuss and integrate these findings, first, regarding the perceptions and behaviors in parents of children born preterm and, second, regarding the impact of parenting on children's self-regulation, narrowed to the context of the Portuguese neonatal healthcare services. Each section concludes with a reflection upon the main clinical and social implications for the intervention with preterm-born children and their parents. Afterward, the main limitations and strengths of the dissertation, as well as future research directions will be considered.

2. Perceptions and Behaviors in Parents of Children Born Preterm

Previous evidence suggested that parents of preterm-born children might develop exaggerated perceptions of their children's vulnerability, which might lead to overprotective behavior (Samra et al., 2010). However, in this dissertation, contrary to expectations, parents' perceptions of child vulnerability did not play a significant role in the occurrence of overprotective behavior, as shown in Chapter 3. Perceptions of child vulnerability were correlated with overprotective behavior in mothers but when examined in a regression model with child developmental level were not a significant predictor, suggesting that the child developmental level might be influencing both maternal perceptions and overprotective behavior. Thus, mothers' perceptions of vulnerability seemed to be adjusted to the child's actual vulnerability, and parents' overprotection occurred due to the child's actual lower developmental level at 12 months of age and the family's lower SES.

Chapters 4 and 5 showed that, in our sample, prematurity per se did not predict worse quality of parenting regarding overprotection and sensitivity. It was already well established by the literature that prematurity does not influence mothers' levels of sensitivity (Bilgin & Wolke, 2015) and this was the first study extending this result to fathers. Results regarding overprotection were, however, somehow surprising, given that the meta-analysis conducted in Chapter 2 found that parents of preterm-born children tended to exhibit more controlling parenting than parents of full-term children. The fact that parenting was not compromised due to prematurity is reassuring and might reflect the high-quality preterm care system that is available in Portugal, which prioritizes family-centered care and parents' support and engagement during the neonatal intensive care unit (NICU) hospitalization. In fact, in 2011, the European Foundation for the Care of Newborn Infants (EFCNI) pointed to the Portuguese preterm care practice as one of the best in Europe. Parents are well informed and involved in the

decision-making about their baby's treatments and take part in their baby's care as a fundamental component of the baby's care team. They receive psychological support from a team at the hospital dedicated to helping the families, are allowed to visit their baby 24h per day, and are encouraged to stay in the hospital with the baby (EFCNI, 2011; Guimarães et al., 2015). Previous evidence suggests that supportive hospital practices and parents' active engagement in the NICU are positively related to subsequent parents' psychological wellbeing and parenting positive behavior (Craig et al., 2015; Davis et al., 2003; Goldberg & DiVitto, 2005). For example, the provision of Kangaroo care by parents, which is a standard practice in neonatal units in Portugal, has been associated with later less worry about the child's health and vulnerability, less depressive symptoms, and more sensitive interactions with the child in both mothers and fathers (Feldman et al., 2002; Holditch-Davis et al., 2014; Tallandini & Scalembra, 2006). In another study, mothers who received more support from medical staff in the NICU reported less anxiety and depressive symptoms (Holditch-Davis et al., 2013). The support and involvement of parents in their baby's treatment during the NICU hospitalization may facilitate the development of appropriate perceptions of their child's health, development, and capacities, and ability to accurately perceive, interpret, and respond to the child's signals and exploratory behavior. In fact, in the face of the heterogeneity of results found in the meta-analysis of Chapter 2, the quality of hospital preterm care in terms of support and involvement of parents would be a relevant moderator to test, although this was not possible due to lack of information on the studies.

Moreover, lower quality of parenting behaviors regarding overprotection and sensitivity in preterms' parents was related to lower SES, as revealed by Chapters 3, 4, and 5. Parents living under socioeconomic disadvantage have lower education, experience more economic pressures, and, consequently, are exposed to multiple psychosocial stressors in their daily life. It is well recognized by research that living under such circumstances can have considerable negative effects on parents' ability to engage in adequate parenting (Conger & Donnellan, 2007). In our sample – such as in the population in general (Nagahawatte & Goldenberg, 2008) - parents of preterm-born children had lower SES than parents of full-term children and lower quality of behavior in preterms' parents seemed to be explained by their socioeconomic disadvantage rather than by preterm status, as shown in Chapter 4. Intriguingly, in Chapter 2, the meta-analytic effect of prematurity on controlling parenting was not moderated by family socioeconomic indicators. However, it is important to note that the moderation analysis was based only on the 10 studies that had available information on parental education, which could have reduced the statistical power to detect significance. Besides, given that only three out of the 35 studies included in the meta-analysis were specifically focused on overprotection, it may be that SES

plays a stronger role in predicting this type of behavior over other types of controlling behavioral patterns.

Finally, Chapters 3 and 5 revealed that preterms' mothers and fathers exhibited similar levels of parenting behaviors regarding both overprotection and sensitivity. The majority of studies with full-term samples have also found equivalence in levels of overprotective parenting across parental gender (Mullins et al., 2007). However, the literature with full-term samples suggests that fathers tend to exhibit less sensitivity than mothers (Hallers-Haalboom et al., 2014; Kwon et al., 2012), as was the case in our comparison sample, as shown in Chapter 5. The lack of gender differences in sensitivity levels of the preterms' parents is reassuring and may also reflect the high involvement of preterms' fathers in their baby's care during the NICU hospitalization (Feldman et al., 2002; Guimarães et al., 2015) as well as after discharge (Goldberg & DiVitto, 2002; Miles & Holditch-Davis, 1997).

The findings stressed here raise important reflections for the clinical practice with families with preterm-born children. The fact that lower quality of parenting behavior in preterms' parents was due to lower SES points to the need of providing additional, effective psychosocial and financial support to these families during NICU hospitalization. In Portugal, in general, the rights and governmental support to preterms' parents are similar to those of full-terms' parents, despite their distinct needs. In the last EFCNI report (2011), preterms' parents stressed the need for more financial and social support from the government and employers during the hospitalization. This might be particularly concerning and burdensome for families with lower SES. These families may struggle, for example, to afford the traveling costs to the hospital to visit and/or stay with their baby. They deal with the distress of the preterm birth in the background of the multiple psychosocial stresses already present in their daily life and may have fewer psychological resources to cope with the intense emotional responses related to preterm birth (Goldberg & DiVitto, 2002; Miles & Holditch-Davis, 1997; Pederson et al., 1987). Research has shown that mothers of preterm-born babies with lower SES experience more NICU stress and depressive symptoms following preterm birth (Davis et al., 2003; Gernstein et al., 2019). The improvement of governmental and social support to these families might facilitate their presence and involvement in the NICU. Furthermore, although parents are informed and involved in their baby's treatments, parents' lower education level may be an obstacle to understanding the medical decisions and multiple interventions around their baby, and to communicate effectively with the medical staff (Davis et al., 2003). Accordingly, in a study assessing parental needs during the hospitalization in NICUs in Portugal, mothers with lower education reported a higher need for support and comfort from the NICU staff than those with higher education (Amorim et al., 2019). This may ask for alternative

ways to provide information and support to families with lower SES and to provide interventions to reduce their stress. Furthermore, additional support and effective postnatal care to low SES families are also needed after discharge. It is true that, in Portugal, the National Health System (SNS) provides universal health coverage and, after discharge, preterm babies are offered long-term follow-up from multiple medical specializations. In the EFCNI report (2011), parents acknowledged the high quality of the follow-up care provided by the Portuguese SNS and reported that "if preterms are not receiving proper aftercare, this is often due to parents' failure to accept responsibility and non-compliance with medical appointments" (p. 69). However, the psychosocial stress under which low SES families live might impose significant obstacles to comply with postnatal care. For example, there are unexpected financial burdens, such as the traveling costs to the hospital, or parents – often performing precarious jobs - might not have large flexibility from employers to be dismissed for medical appointments. It is also important to stress that although the SNS offers a high quality of postnatal care, there are still significant health inequalities in Portugal and a significant gap in policies for equitability of care (Campos-Matos et al., 2016). The system is overloaded, with long waiting lists, and families with lower SES cannot afford extra private voluntary health insurance. Furthermore, the articulation between the hospital services and the primary healthcare services in the communities (i.e., local health centers) still faces great flaws (Torres & Monte, 2011) and may result in the families' disconnection from the services. An effective articulation and decentralization of the preterms' postnatal care are especially important in the case of families with lower SES, in order to facilitate the families' transition from hospital care to community-level care offering services closer to them, which might facilitate their participation and engagement. It is imperative to tackle equitability gaps in the health care and invest in greater support for disadvantaged families to facilitate their compliance and ensure postnatal care and monitoring for all families. Greater support to low SES families - at NICU stay and after discharge - might improve parents' well-being and parenting outcomes.

It is important to note though that while the focus of this dissertation is on the preterm population, the importance of support to low SES families goes beyond this specific population and extends to all families, considering the well recognized negative effect of socioeconomic disadvantage on parents and children's adjustment (Conger & Donnellan, 2007). Portugal's social policy regarding parenting support is very poor and there are no universal benefits and/or support services dedicated to parents. Such support is usually available through voluntary and private initiatives and thus reserved for socioeconomically privileged families, which is particularly concerning if we consider that Portugal is one of the countries in Europe with the highest rates of child poverty (Nata & Cadima, 2019).

3. Self-Regulation in Children Born Preterm and the Role of Parenting

The sooner a baby is born, the greater their neurobiological immaturity and, consequently, the risk for medical complications and impact on brain development (Adams-Chapman, 2009; Manuck et al., 2016). Therefore, studies on the developmental outcomes of prematurity have mainly focused on children born very preterm, pointing - among other negative outcomes - to impairments in self-regulatory capacities in these children (Clark et al., 2008; Witt et al., 2014). Chapter 4 of this dissertation revealed that not only children born very preterm, but also children born moderately-to-late preterm, exhibited self-regulatory impairments regarding effortful control skills at the beginning of the preschool period.

Although preterm-born children performed worse in effortful control tasks, their levels of compliance and non-negativity in interaction with parents were not compromised. Children's quality of interactive behavior toward the parents was not related to prematurity status but rather explained by the child's cognitive abilities. Taken together, these results might suggest that, in our sample, prematurity sequelae were more evident at a cognitive level rather than at an interactive, behavioral level with parents. This may also reflect the promotion of parents' involvement and interaction with their babies during NICU's hospitalization in Portugal (EFCNI, 2011; Guimarães et al., 2015), which may facilitate later positive and synchronized interactions between parents and children. Previous studies have shown that maternal involvement in NICU care predicts better quality of infant-mother interactions, including infants' social behaviors and positive affect towards their mothers at 2 and 6 months of age (Holditch-Davis et al., 2014). In the same line, another study found that babies who received Kangaroo care from their mothers were better able to express their needs and were more responsive in interaction with their mothers (Tallandini & Scalembra, 2006).

Another important point that should be stressed regarding this dissertation's findings on preterms' self-regulation is the fact that boys performed worse than girls on all the assessed self-regulatory outcomes in Chapters 4 and 5. These findings are in line with a large body of evidence that suggests a male disadvantage in the neurodevelopmental and cognitive outcomes of preterm-born children, including self-regulation capacities (Feldman, 2007; Hintz et al., 2006; O'Driscoll et al., 2018; Zvara et al., 2019). Although girls tend to have survival and developmental advantage compared to boys in general, such disparities seem to be particularly pronounced in the case of the preterm population (O'Driscoll et al., 2018). A large body of research comparing boys and girls born preterm under the

same gestational age and birth weight distributions have shown that boys have higher rates of mortality and experience more neonatal complications, such as higher incidence of brain lesions, sepsis, respiratory distress, bronchopulmonary dysplasia, among others (Mohamed & Aly, 2010; O'Driscoll et al., 2018; Stevenson et al., 2000). They also seem to evidence more pronounced brain alterations (Vasileiadis et al., 2009). Such greater clinical and biological vulnerability of males could partly explain the neurodevelopmental and cognitive disadvantage of preterm boys (Hack et al., 2000). Some studies have also suggested the potential role of prenatal factors, such as placental differences between preterm boys and girls (O'Driscoll et al., 2018). The fact is that the etiology of clinical, neurodevelopmental, and cognitive disparities between preterm boys and girls is still relatively unknown and may reflect a complex interaction of immunological, hormonal, and genetic differences that could lead to an inherent male risk for adverse outcomes (Hintz et al., 2006; O'Driscoll et al., 2018).

So far, little was known about the factors and mechanisms accounting for self-regulation problems in children born preterm, especially regarding potential parenting influences. Chapter 4 evidenced the accounting role of both neurobiological immaturity and parental socialization in the development of self-regulation problems in children born preterm, as both gestational age and overprotective parenting were associated with lower effortful control. The fundamental importance of parenting and its influence on child development in general population samples, particularly regarding self-regulation, is well recognized and established by developmental theorists and researchers (Ainsworth et al., 1974; Bowlby, 1969; Deci & Ryan, 1985, 2000; Grolnick et al., 2019; Kochanska et al., 2000; Kopp, 1982; Sroufe, 1995). This dissertation brings evidence to the importance of parenting for the development of self-regulation in biologically vulnerable children due to prematurity, in line with the few previous studies that, notably, also explored the influence of parenting on the development of self-regulation capacities in children born preterm (Poehlmann et al., 2010; Zvara et al., 2019). However, previous studies were focused exclusively on mothers. This dissertation showed that not only mothers' but also fathers' overprotective behaviors seem to play a significant role in the development of self-regulatory effortful control capacities in children born-preterm.

As in the previous section, the findings stressed here raise important reflections for the clinical practice with preterm-born children. First, findings support the importance of healthcare services to provide an effective continuum of care and monitor throughout the child developmental cycle, not only to those born very preterm but also to those born moderately-to-late preterm, while considering the higher vulnerability of boys. Given the potential cognitive sequelae of prematurity, it is crucial to continuously assess these children in order to target those at risk and respond appropriately and

promptly to their needs and, consequently, prevent later associated behavioral, emotional, and school problems (Clark & Woodward, 2015; Dilworth-Bart et al., 2018; Woodward et al., 2017). Second, the parent-child relationship might be a powerful intervention target to promote children's self-regulation. While the neurobiological risk condition of prematurity already places children at higher risk for negative developmental outcomes such as self-regulatory problems, the parent-child relationship has the potential for training to enhance the child's capacities, and the promotion of adaptive parenting behavior may work as a protective factor. It is important for clinical professionals to help parents – both mothers and fathers - in the development of strategies that facilitate and help their child's development of self-regulatory skills by supporting exploration and development of autonomy instead of strategies that provide an excessive amount of control and undermine the child's autonomy. There is evidence showing that early interventions aimed at improving maternal behavior in mothers of preterm-born children have a positive effect on children's outcomes (Blair et al., 2003). Parenting interventions such as the triple P – Positive Parenting Program (Sanders, 2008) and the Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD; Juffer et al., 2008) are examples of robust tools that have been shown to benefit children's self-regulation and adjustment outcomes (Sanders & Mazzucchelli, 2013), and to be effective in the Portuguese population including in families living under socioeconomic risk (Negrão et al., 2014; Nogueira et al., 2016).

4. Main Limitations and Strengths

Throughout the previous four chapters, the limitations specific to each of the studies of this dissertation were discussed. Nonetheless, some general methodological limitations should be emphasized here, pertaining to participation and attrition. First, the attrition rate in the initial assessed sample of 150 preterm-born children was high and selective to socioeconomic factors, which is common in longitudinal studies (Gustavson et al., 2012), including neonatal clinical research (DeMauro et al., 2019), and compromises the generalizability of results. However, this is understandable given the multistress context under which low SES families live in. Because of financial constraints of the project, there was no financial compensation for participation in the study, and the families' low economic resources might limit their possibility of transport to the hospital or the university laboratory. Although the option of assessment at the participants' home was available, these families often live under poor housing conditions that might constrain them to open their doors to researchers. Furthermore, parents' lower education might limit their understanding of the importance of research. Low SES families also

tend to have increased mobility (Groves & Couper, 1998) and were more difficult to relocate. Second, also because of financial constraints of the project, the recruitment and assessment of the full-term comparison sample entailed major limitations: The sample was recruited from a different initial pool of families who had previously participated in another study, which may have hampered the adherence of participants due to participation fatigue (Lugtig, 2014); it was only possible to assess participants cross-sectionally at child's age 42 months old, preventing the possibility of group longitudinal comparisons and of specifying the directionality of the relations between parenting and children's self-regulation; and the assessments took place in the university laboratory, as opposed to most of the preterm participants who were assessed in the hospital, which could confound differences in behavior between the groups (Gardner, 2000). Third, several participants could not complete the data collection protocol, which was especially heavy at the 42 months old-assessment comprising two sessions of approximately 1h30 each. This resulted in different sample sizes between the studies of Chapters 3, 4, and 5. Finally, there were more participating mothers than fathers, which did not allow for more complex analyses on the joint effect of both parents' behaviors on children's self-regulation. This is in line with other studies attempting to include both parents (Hechler et al., 2019; Tamis-LeMonda et al., 2004), as fathers appear to be more difficult to recruit and tend to drop out of studies more than mothers (Mitchell et al., 2007). For purposes of cost-effectiveness, the contact for participation was, in most cases, made exclusively with mothers, who would afterward coordinate the contact between researchers and fathers, and this is one factor that could have contributed to different numbers of participating mothers and fathers. Studies have shown that this approach can, one the one hand, result in a biased sample because fathers are more likely to have higher SES and positive relationships with their partners and, on the other hand, mothers can act as gatekeepers to the fathers' involvement in the research (Mitchell et al., 2007).

Despite lower rates of participating fathers, the fact that both mothers and fathers were considered is still a strength of this dissertation, defying a long tradition in developmental studies to include only mothers and overlook the importance of fathers, especially among the preterm population. The consideration of both mothers and fathers allowed for a more complete and inclusive picture of the outcomes of prematurity. Another major strength of this dissertation is the observational measure of the main variables, which allowed for more direct and complete access to parents' behaviors and children's self-regulatory capacities.

5. Future Research Directions

This dissertation opens new avenues for future studies. First, considering the findings and clinical implications raised regarding low SES families, it is crucial to proceed to the examination of potential barriers to the access of care of low SES families in Portugal, and the intersectionality with other social dimensions entailing structural inequalities that can result in marginalization, such as ethnic minority and/or migrant status, so we can better promote the care of these families. Second, while we verified the separate influence of mothers' and fathers' parenting in a dyadic context on children's self-regulation capacities, it would be relevant for future studies to investigate joint and interactive influences of mothers' and fathers' behaviors, considering not only the dyadic context but also the triadic context. The family system is dynamic and involves multiple, complex influences, and there is evidence that fathers' and mothers' behaviors influence each other and might differ across dyadic and triadic contexts (Kwon et al., 2012; Lamb, 1997). Future studies should also consider the role of siblings in the development of self-regulation of preterm-born children and its interaction with parents' influence, in the face of evidence with general population samples suggesting that siblings may work as promoters of children's self-regulation (McAlister & Peterson, 2006). Furthermore, considering that we analyzed the relations between parenting and children's self-regulation capacities based on cross-sectional data, it is also crucial to proceed to the longitudinal examination of these relations in order to specify directionality, especially in light of previous studies proposing a bidirectional relation between controlling parenting behavior and children's poor self-regulation capacities (Eisenberg et al., 2015). Thus, while in this dissertation we hypothesized that overprotective behavior promoted children's poorer self-regulation, it may also be that children's poorer self-regulation due to their neurobiological immaturity promotes overprotective behavior. Additionally, while this dissertation focused on the preschool period, the examination of parental influence on preterms' self-regulation in later periods is also important because patterns of parenting behavior may change over time (Fagan et al., 2014). The knowledge on self-regulation of children born preterm would also benefit from future studies examining the influence of other parental and environmental factors. Finally, it would be relevant to examine self-regulation skills in relation to more distal contexts such as school and peers considering, for example, previous studies showing that preterm-born children exhibit more difficulties in peer relationships and that such difficulties are related to worse parent-infant relationship (Heuser et al., 2017).

6. Concluding Remarks

As mentioned earlier, most research on the child development and family outcomes of prematurity have focused on early development, particularly in infancy, in children born very preterm, and have only included mothers. This dissertation attempted to make a shift to a more inclusive approach to the study of the outcomes of prematurity by focusing on the preschool period, including a wider range of prematurity degree, and including both mothers and fathers.

This dissertation confirms that the negative impact of prematurity on child development may continue beyond hospital discharge, affecting self-regulation capacities of both those born very preterm and moderately-to-late preterm during the preschool period. Furthermore, this dissertation provides novel evidence suggesting that mothers and fathers of children born preterm exhibit similar levels of parenting behaviors, and both mothers' and fathers' parenting behaviors play a significant role in the self-regulation capacities of these children. Prematurity per se did not seem to have a negative impact on parents' perceptions and behaviors, and lower quality of parenting behavior in parents of preterm-born children was rather related to their lower SES. Overall, the findings of this dissertation support the importance of monitoring the development of children born preterm, providing psychosocial support to their families, and including both mothers and fathers in the study and intervention with this population. It is fundamental that governments and other policy makers place neonatal care – entailing not only care to the child, but also the parents - in the center of policy agendas, and ensure equitable access to quality healthcare services to all families, including those socioeconomically vulnerable, as an investment in the future world generations.

7. References

Adams-Chapman, I. (2009). Insults to the developing brain and impact on neurodevelopmental outcome. *Journal of Communication Disorders, 42*(4), 256–262. http://doi.org/10.1016/j.jcomdis.2009.03.010

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M. P. Richards (Ed.), *The integration of a child into a social world* (pp. 99–135). Cambridge University Press.

Amorim, M., Alves, E., Kelly-Irving, M., & Silva, S. (2019). Needs of parents of very preterm infants in Neonatal Intensive Care Units: A mixed methods study. *Intensive & Critical Care Nursing, 54*, 88-95. https://doi.org/10.1016/j.iccn.2019.05.003

Bilgin, A., & Wolke, D. (2015). Maternal sensitivity in parenting preterm children: A meta-analysis. *Pediatrics, 136*(1), 177-193. https://doi.org/10.1542/peds.2014-3570

Blair, C., Peters, R., & Lawrance, F. (2003). Family dynamics and child outcomes in early intervention: The role of developmental theory in the specification of effects. *Early Childhood Research Quarterly, 18*, 446-467. https://doi.org/10.1016/j.ecresq.2003.09.005

Bowlby, J. (1969). *Attachment and loss.* Basic Books.

Campos-Matos, I., Russo, G., & Perelman, J. (2016). Conecting the dots on health inequalities – a systematic review on the social determinants of health in Portugal. *International Journal for Equity in Health, 15*(26), 1-10. https://doi.org/10.1186/s12939-016-0314-z

Clark, C. A. C., & Woodward, L. J. (2015). Relation of perinatal risk and early parenting to executive control at the transition to school. *Developmental Science, 18*(4), 525–542. https://doi.org/10.1111/desc.12232

Clark, C. A. C., Woodward, L. J., Horwood, L. J., & Moor, S. (2008). Development of emotional and behavioral regulation in children born extremely preterm and very preterm: Biological and social influences. *Child Development, 79*(5), 1444-1462. https://doi.org/10.1111/j.1467-8624.2008.01198.x

Conger, R. D., & Donnellan, M. B. (2007). An interactionist perspective on the socioeconomic context of human development. *Annual Review of Psychology, 58*(1), 175-199. https://doi.org/10.1146/annurev.psych.58.110405.085551

Craig, J. W., Glick, C., Phillips, R., Hall, S. L., Smith, J., & Browne, J. (2015). Recommendations for involving the family in developmental care of the NICU baby. *Journal of Perinatology, 35*(1), S5-S8. https://doi.org/10.1038/jp.2015.142

Davis, L., Edwards, H., Mohay, H., & Wollin, J. (2003). The impact of very premature birth on the psychological health of mothers. *Early Human Development, 73*(1-2), 61-70. https://doi.org/10.1016/s0378-3782(03)00073-2

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 319-338. https://doi.org/10.1207/S15327965PLI1104_01

DeMauro, S. B., Bellamy, S. L., Fernando, M., Hoffman, J., Gratton, T., Schmidt, B., & PROP Investigators (2019). Patient, family, and center-based factors associated with attrition in neonatal clinical research: A prospective study. *Neonatology, 115*(4), 328-334. https://doi.org/10.1159/000494105

Dilworth-Bart, J. E., Poehlmann-Tynan, J. A., Taub, A., Liesen, C. A., & Bolt, D. (2018). Longitudinal associations between self-regulation and the academic and behavioral adjustment of young children born preterm. *Early Childhood Research Quarterly, 42*, 193-204. https://doi.org/10.1016/j.ecresq.2017.09.007

Eisenberg, N., Taylor, Z. E., Widaman, K. F., & Spinrad, T. L. (2015). Externalizing symptoms, effortful control, and intrusive parenting: A test of bidirectional longitudinal relations during early childhood. *Development and Psychopathology, 27*(4pt1), 953-968. https://doi.org/10.1017/S0954579415000620

European Foundation for the Care of Newborn Infants (2011). *EU benchmarking report 2009/2010: Too little, too late? Why Europe should do more for preterm infants.* https://www.efcni.org/downloads/efcnipolicypublications/#1

Fagan, J., Day, R., Lamb, M. E., & Cabrera, N. J. (2014). Should researchers conceptualize differently the dimensions of parenting for fathers and mothers? *Journal of Family Theory & Review, 6*(4), 390–405. https://doi.org/10.1111/jftr.12044

Feldman, R. (2007). Maternal versus child risk and the development of parent–child and family relationships in five high-risk populations. *Developmental and Psychopathology, 19*(2), 293-312. https://doi.org/10.10170S0954579407070150

Feldman, R., Eidelman, A., Sirota, L., & Weller, A. (2002). Comparison of skin-to-skin (kangaroo) and traditional care: Parenting outcomes and preterm infant development. *Pediatrics, 110*(1), 16-26. https://doi.org/10.1542/peds.110.1.16

Gardner, F. (2000). Methodological issues in the direct observation of parent–child interaction: Do observational findings reflect the natural behavior of participants? *Clinical Child and Family Psychology Review, 2*(3), 185-198. https://doi.org/10.1023/a:1009503409699

Gerstein, E. D., Njoroge, W. F. M., Paul, R. A., Smyser, C. D., & Rogers, C. E. (2019). Maternal depression and stress in the NICU: Associations with mother-child Interactions at age 5 years. *Journal of the American Academy of Child & Adolescent Psychiatry*, *58*(3), 350-358. https://doi.org/10.1016/j.jaac.2018.08.016

Goldberg, S., & DiVitto, B. (2002). Parenting children born preterm. In M. H. Bornstein (Ed.), *Handbook of parenting* (pp. 329-354). Erlbaum.

Grolnick, W. S., Caruso, A. J., & Levitt, M. R. (2019). Parenting and children's self-regulation. In M. H. Bornstein (Ed.), *Handbook of parenting: Vol. 5, the practice of parenting* (3rd ed., pp. 34-64). Routledge.

Groves, R. M., & Couper, M. P. (1998). *Nonresponse in household interview surveys*. John Wiley.

Guimarães, H., Guedes, B., Almeida, S., Rodrigues, M., Ramos, M., Maia, T., & Clemente, F. (2015). Parents in the neonatal intensive care unit of "Hospital de São João" (Porto, Portugal). *Journal of Pediatric and Neonatal Individualized Medicide, 4*(1), e040120. https://doi.org/10.7363/040120

Gustavson, K., von Soest, T., Karevold, E., & Røysamb, E. (2012). Attrition and generalizability in longitudinal studies: Findings from a 15-year population-based study and a Monte Carlo simulation study. *BMC Public Health, 12*(918), 1-11. https://doi.org/1471-2458/12/918

Hack, M., Wilson-Costello, D., Friedman, H., Taylor, G. H., Schluchter, M., & Fanaroff, A. A. (2000). Neurodevelopment and predictors of oucomes of children with birth weights of less than 1000g: 1992-1995. *Archives of Pediatrics & Adolescent Medicine, 154*(7), 725-731. https://doi.org/10.1001/archpedi.154.7.725

Hallers-Haalboom, E. T., Mesman, J., Groeneveld, M. G., Endendijk, J. J., Van Berkel, S. R., Van der Pol, L. D., & Bakermans-Kranenburg, M. J. (2014). Mothers, fathers, sons, and daughters: Parental sensitivity in families with two children. *Journal of Family Psychology, 28*(2), 138–147. https://doi.org/10.1037/a0036004

Hechler, C., Beijers, R., Riksen-Walraven, M., & de Weerth, C. (2019). Prenatal predictors of postnatal quality of caregiving behavior in mothers and fathers. *Parenting, 19*(1-2), 101-119. https://doi.org/10.1080/15295192.2019.1556010

Heuser, K. M., Jaekel, J., & Wolke, D. (2017). Origins and predictors of friendship in 6- to 8-year-old children born at neonatal risk. *The Journal of Pediatrics, 193*, 93-101. https://doi.org/10.1016/j.jpeds.2017.09.072

Hintz, S. R., Kendrick, D. E., Vohr, B. R., Poole, W. K., Higgins, R. D., & the NICHD Neonatal Research Network (2006). Gender differences in neurodevelopmental outcomes among extremely preterm, extremely-low-birthweight infants. *Acta Paediatrica, 95*(10), 1239-1248. https://doi.org/10.1080/08035250600599727

Holditch-Davis, D., White-Traut, R., Levy, J., O'Shea, T. M., Geraldo, V. & David, R. J. (2014). Maternally administered interventions for preterm infants in the NICU: Effects on maternal psychological distress and mother-infant relationship. *Infant Behavior and Development, 37*(4), 695-710. https://doi.org/10.1016/j.infbeh.2014.08.005

Holditch-Davis, D., White-Traut, R., Levy, J., Williams, K. L., Ryan, D., & Vonderheid, S. (2013). Maternal satisfaction with administering infant interventions in the NICU. *Journal of Obstetric Gynecologic & Neonatal Nursing, 42*(6), 641-654. https://doi.org/10.1111/1552-6909.12255

Juffer, F., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2008). *Promoting positive parenting: An attachment-based intervention*. Lawrence Erlbaum Associates.

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36*(2), 220-232. https://doi.org/10.1037/0012-1649.36.2.220

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199–214. https://doi.org/10.1037/0012-1649.18.2.199

Kwon, K., Jeon, H., Lewsader, J. T., & Elicker, J. (2012). Mothers' and fathers' parenting quality and toddlers' interactive behaviours in dyadic and triadic family contexts. *Infant and Child Development, 21*(4), 356-373. https://doi.org/10.1002/icd.1746

Lugtig, P. (2014). Panel attrition: Separating stayers, fast attriters, gradual attriters, and lurkers. *Sociological Methods & Research, 43*(4), 699–723. https://doi.org/10.1177/0049124113520305

Manuck, T. A., Rice, M. M., Bailit, J. L., Grobman, W. A., Reddy, U. M., Wapner, R. J., Thorp, J. M., Caritis, S. N., Prasad, M., Tita, A. T. N., Saade, G. R., Sorokin, Y., Rouse, D. J., Blackwell, S. C.,

& Tolosa, J. E. (2016). Preterm neonatal morbidity and mortality by gestational age: A contemporary cohort. *American Journal of Obstretics & Gynecology, 215*(1), 103.e1-101.e14. https://doi.org/10.1016/j.ajog.2016.01.004

March of Dimes, The Partnership for Maternal Newborn & Child Health, Save the Children, & World Health Organization (2012). *Born too soon: The global action report on preterm birth.* https://www.who.int/maternal_child_adolescent/documents/born_too_soon/en/

McAlister, A., & Peterson, C. C. (2006). Mental playmates: Siblings, executive functioning and theory of mind. *British Journal of Developmental Psychology, 24*(4), 733–751. https://doi.org/10.1348/ 026151005X70094

Miles, M. S., & Holditch-Davis, D. (1995). Compensatory parenting: How mothers describe parenting their 3-year-old, prematurely born children. *Journal of Pediatric Nursing, 10*(4), 243-253. https://doi.org/10.1016/S0882-5963(05)80021-1

Mitchell, S. J., See, H. M., Tarkow, A. K. H., Cabrera, N., McFadden, K. E., & Shannon, J. D. (2007). Conducting studies with fathers: Challenges and opportunities. *Applied Development Science, 11*(4), 239-244. https://doi.org/10.1080/10888690701762159

Mohamed, M. A., & Aly, H. (2010). Male gender is associated with intraventricular hemorrhage. *Pediatrics, 125*(2), 333-339. https://doi.org/10.1542/peds.2008-3369

Mullins, L. L., Wolfe-Christensen, C., Pai, A. L. H., Carpentier, M. Y., Gillaspy, S., Cheek, J., & Page, M. (2007). The relationship of parental overprotection, perceived child vulnerability, and parenting stress to uncertainty in youth with chronic illness. *Journal of Pediatric Psychology, 32*(8), 973-982. https://doi.org/10.1093/jpepsy/jsm044

Nagahawatte, N. T., & Goldenberg, R. L. (2008). Poverty, maternal health, and adverse pregnancy outcomes. *Annals of the New York Academy of Sciences, 1136*(1), 80-85. https://doi.org/10.1196/annals.1425.016

Nata, G., & Cadima, J. (2019). Parent- and family-focused support in Portugal: Context and analysis of services/programmes from an equity perspective. *Child and Adolescent Social Work Journal, 36*, 269-283. https://doi.org/10.1007/s10560-019-00613-y

Negrão, M., Pereira, M., Soares, I., & Mesman, J. (2014). Enhancing positive parent–child interactions and family functioning in a poverty sample: A randomized control trial. *Attachment & Human Development, 16*(4), 315-328. https://doi.org/10.1080/14616734.2014.912485

Nogueira, S., Costa, C., Abreu-Lima, I., & Cruz, O. (2016). *Triplo P: Programa de Parentalidade Positiva: Um estudo piloto com mães em situação de risco psicossocial*. FPCEUP - Artigo em Livro de Atas de Conferência Nacional. https://repositorio-aberto.up.pt/handle/10216/111974

O'Driscoll, D. N., McGovern, M., Greene, C. M., & Mollow, E. J. (2018). Gender disparities in preterm neonatal outcomes. *Acta Paediatrica, 107*(9), 1494-1499. https://doi.org/10.1111/apa.14390

Pederson, D. R., Bento, S., Chance, G. W., Evans, B., & Fox, A. M. (1987). Maternal responses to preterm birth. *American Journal of Orthopsychiatry, 57*(1), 15–21. https://doi.org/10.1111/j.1939-0025.1987.tb03504.x

Poehlmann, J., Schwichtenberg, A. J. M., Shah, P. E., Shlafer, R. J., Hahn, E., & Maleck, S. (2010). The development of effortful control in children born preterm. *Journal of Clinical Child & Adolescent Psychology, 39*(4), 522-536. https://doi.org/10.1080/15374416.2010.486319

Samra, H. A., McGrath, J. M., & Wey, H. (2010). Are former late-preterm children at risk for child vulnerability and overprotection? *Early Human Development, 86*(9), 557–562. https://doi.org/10.1016/j.earlhumdev.2010.07.005

Sanders M. R. (2008). Triple P-Positive Parenting Program as a public health approach to strengthening parenting. *Journal of Family Psychology, 22*(4), 506-517. https://doi.org/10.1037/0893-3200.22.3.506

Sanders, M. R., & Mazzucchelli, T. G. (2013). The promotion of self-regulation through parenting interventions. *Clinical Child and Family Review, 16*(1), 1-17. https://doi.org/10.1007/s10567-013-0129-z

Sroufe, L. A. (1995). *Emotional development: The organization of emotional life in the early years*. Cambridge University Press.

Stevenson, D. K., Verter, J., Fanaroff, A. A., Oh, W., Ehrenkranz, R. A., Shankaran, S., Donovan, E. F., Wright, L. L., Lemons, J. A., Tyson, J. E., Korones, S. B., Bauer, C. R., Stoll, B. J., & Papile, L. A. (2000). Sex diferences in outcomes of very low birthweight infants: The newborn male disadvantage. *Archives of Disease in Childhood - Fetal and Neonatal Edition*, *83*(3), 182-185. https://doi.org/10.1136/fn.83.3.F182

Tallandini, M. A., & Scalembra, C. (2006). Kangaroo mother care and mother-premature infant dyad interaction. *Infant Mental Health Journal, 27*(3), 251-275. https://doi.org/10.1002/imhj.20091

Tamis-LeMonda, C. S., Shannon, J. D., Cabrera, N. J., & Lamb, M. E. (2004). Fathers and mothers at play with their 2- and 3—years-olds: Contributions to language and cognitive development. *Child Development, 75*(6), 1806-1820. https://doi.org/10.1111/j.1467-8624.2004.00818.x

Torres, M. A. P., & Monte, A. P. (2011, June 29-July 02). *A articulação de cuidados de saúde primaries e hospitais e o seu impacto a nível regional* [Paper presentation]. 17° Congresso APDR, Congresso Internacional APDR/AECR. http://hdl.handle.net/10198/8898

Vasileiadis, G. T., Thompson, R. T., Han, V. K. M., & Gelman, N. (2009). Females follow a more "compact" early human brain development model than males. A case-control study of preterm neonates. *Pediatric Research, 66*(5), 551–555. https://doi.org/10.1203/PDR.0b013e3181ba1ae7

Voigt, B., Pietz, J., Pauen, S., Kliegel, M., & Reuner, G. (2012). Cognitive development in very vs. moderately to late preterm and full-term children: Can effortful control account for group differences in toddlerhood? *Early Human Development, 88*(5), 307-313. https://doi.org/10.1016/j.earlhumdev.2011.09.001

Witt, A., Theurel, A., Tolsa, C. B., Lejeune, F., Fernandes, L., de Jonge, L. H., Monnier, M., Graz, M. B., Barisnikov, K., Gentaz, E., & Hüppi, P. S. (2014). Emotional and effortful control abilities in 42-month-old very preterm and full-term children. *Early Human Development, 90*(10), 565-569. https://doi.org/10.1016/j.earlhumdev.2014.07.008

Woodward, L. J., Lu, Z., Morris, A. R., & Healey, D. M. (2017). Preschool self-regulation predicts later mental health and educational achievement in very preterm and typically developing children. *The Clinical Neuropsychologist, 31*(2), 404-422. https://doi.org/10.1080/13854046.2016.1251614

Zvara, B. J., Keim, S. A., Boone, K. M., & Anderson, S. E. (2019). Associations between parenting behavior and executive function among preschool-aged children born very preterm. *Early Childhood Research Quarterly, 48*, 317–324. https://doi.org/10.1016/j.ecresq.2019.01.012

APPENDIX

Universidade do Minho

SECVS

Subcomissão de Ética para as Ciências da Vida e da Saúde

Identificação do documento: SECVS 011/2015

Título do projeto: *Vinculação e autorregulação em crianças prematuras - uma abordagem GXE*

Investigador(a) responsável: Doutora Isabel Maria Costa Soares, Centro de Investigação em Psicologia, Escola de Psicologia, Universidade do Minho

Outros investigadores: Carla Martins, Ana Mesquita, Adriana Sampaio e Joana Baptista, da Escola de Psicologia da Universidade do Minho; Maria Hercília Ferreira Guimarães Pereira Areias, Sara Girão Almeida e Maria de Fátima Reis Clemente do Serviço de Neonatologia do Hospital de S. João; Jay Belsky da University of California Davis

Subunidade orgânica: Centro de Investigação em Psicologia, Escola de Psicologia, Universidade do Minho

Outras Unidades: Serviço de Neonatologia, Hospital Pediátrico Integrado, do Centro Hospitalar São João

PARECER

A Subcomissão de Ética para as Ciências da Vida e da Saúde (SECVS) analisou o processo relativo ao projeto intitulado *"Vinculação e autorregulação em crianças prematuras - uma abordagem GXE".*

Os documentos apresentados revelam que o projeto obedece aos requisitos exigidos para as boas práticas na experimentação com humanos, em conformidade com o Guião para submissão de processos a apreciar pela Subcomissão de Ética para as Ciências da Vida e da Saúde.

Face ao exposto, a SECVS nada tem a opor à realização do projeto.

Braga, 01 de abril de 2015.

A Presidente

Maria Cecília de Lemos Pinto Estrela Leão