



Full length article

## Exploring predictors of change in behavioral problems over a 1-year period in preterm born preschoolers



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### ABSTRACT

**Objective:** Although predictors of the prevalence of behavioral problems in preterm-born children have been frequently studied, predictors of behavioral change in these children remain unknown. Therefore, in this study we explore predictors of short-term changes in problem behavior in preterm-born preschoolers, an age period characterized by rapid behavioral change.

**Method:** Two- to 5-year-old children born with a gestational age < 32 weeks and/or birth weight < 1500 g were eligible, because of their high risk for behavioral problems. Following screening, 59 children with a *t*-score  $\geq 60$  on either the internal, external or total problem scale of the Child Behavior Checklist were included in the study. Linear mixed modeling was used to investigate predictors of change in behavior over a 1-year period.

**Results:** Higher levels of parenting stress, parent perceived child vulnerability, and parental hostility towards the child and lower educational levels of the mother significantly predicted increases in externalizing behavior. The higher the age of the child, the more internalizing problems decreased.

**Conclusions:** Parenting stress, parent perceived child vulnerability and parental hostility towards the child were the only modifiable predictors of increases in externalizing behavior, whilst no modifiable predictors of internalizing behavior were found. There may be a reciprocal interaction between stress in parents and child externalizing problems. Furthermore, stress and worries may directly influence parents' reports on behavioral measures, because it could cause them to be concerned by behavior otherwise perceived as normal. Therefore, future interventions for parents of preterm-born children should primarily address parental stress and concerns regarding their child.

### 1. Introduction

Preterm-born children are at higher risk of developing emotional and behavioral problems than healthy term-born children (Bhutta, Cleves, Casey, Cradock, & Anand, 2002; Gray, Indurkha, & McCormick, 2004). These problems may affect school achievement and family functioning during childhood and adolescence (Delobel-Ayoub et al., 2009; Taylor et al., 2001). Although the prevalence and correlates of behavioral problems in preterm-born children are frequently studied, less attention has been paid to predictors of change in internalizing (self-directed) and externalizing (directed outward) behavior. Especially during the preschool

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period, when problem behaviors emerge and are prone to rapid changes, identifying predictors of change would be helpful in deciding which factors should be addressed by behavioral interventions for preterm-born children (Gray et al., 2004; Spittle et al., 2009).

The prevalence of behavioral problems in preterm-born children is approximately 20%, versus 10% in term-born children (Bhutta et al., 2002; Gray et al., 2004). Furthermore, the onset of these problems in preterm-born children is reported to occur as early as 2 years of age (Spittle et al., 2009). Transactional theories on the development of behavioral problems in preterm-born children suggest that the interplay between parents' preexisting personality and family factors, prenatal experiences, and emotional distress during the neonatal intensive care unit (NICU) admission period, may result in a parenting style that differs from that of parents of healthy term-born children (Miles & Holditch-Davis, 1997). This parenting style may be due to both parenting stress and the perception of parents of their preterm-born preschooler as still being vulnerable (De Ocampo, Macias, Saylor, & Katikaneni, 2003). In combination with preterm-born children's neurological predisposition to emotional and behavioral problems, these overprotective and inconsistent parenting practices may negatively impact the behavior of the child (Campbell, 2006; Clark, Woodward, Horwood, & Moor, 2008).

There is little empirical knowledge on the developmental trajectory of internalizing and externalizing behavior in preterm-born children. Therefore, we describe developmental trajectories of behavioral problems in term-born children. It could however be argued that problems may be more persistent in preterm-born children due to the neurological basis of their behavioral problems. In term-born children, behavioral seems to change most rapidly during the preschool period. In a study investigating 1171 children aged 2–9 years, mothers and teachers indicated that externalizing behavior changed most rapidly from 3 to 4 years (Miner & Clarke-Stewart, 2008). The decrease during this 1-year period was larger than the total decrease in externalizing behaviors from 4 to 9 years of age. A study on partly the same sample, following 1232 children from age 2 to age 12, found the largest change in externalizing behavior between 3 and 4.5 years of age (Fanti & Henrich, 2010). This study also investigated internalizing behavior, which showed the greatest change between 2 and 3 years of age.

Regarding general trajectories of behavioral problems in term-born children, externalizing behavior has been shown to decrease during preschool age (Mesman et al., 2009; Miner & Clarke-Stewart, 2008; Owens & Shaw, 2003). This could be explained by parents' attempt to socialize their children, and biological maturation in children's capacities for perspective taking and frustration tolerance (Campbell, 1995). These processes may be similar in preterm-born and term-born children. In contrast to externalizing behavior, findings on the developmental trajectory of internalizing behavior are contradictory. In some studies, internalizing problems seem to remain relatively stable during the preschool years in term-born children (Keiley, Bates, Dodge, & Pettit, 2000). An explanation for this stability could be that internalizing behavior is related to child temperament, and therefore less susceptible to external influences (Sterba, Prinstein, & Cox, 2007). However, in other studies internalizing behaviors decrease and/or increase during the preschool period. One study that measures behavioral problems almost yearly found that internalizing problems increased from age 2 to 4.5 years, and decreased from 4.5 to 6 years (Fanti & Henrich, 2010). The authors suggest that these fluctuations in internalizing behavior reflect vulnerability to environmental stressors. This could indicate that preterm-born children may show even larger fluctuations in internalizing behavior, since they are neurologically more vulnerable. Nonetheless, another study reported a general increase in internalizing behavior from 2 to 6 years (Gilliom & Shaw, 2004), and explains this to be due to the maturation of cognitive abilities of the child, which enables the child to self-reflect. There is no reason to assume that these maturation processes are different in preterm-born children.

The development of behavioral problems in preterm-born preschoolers remains to be explored, but more is known about predictors of the prevalence of behavioral problems in these children. Numerous child, family, and socioeconomic predictors have been investigated, but the most prominent predictors of behavioral problems during preschool age seem to be parental psychological distress, stress, and depression (Delobel-Ayoub et al., 2009; Gray et al., 2004; Huhtala et al., 2012; Miceli et al., 2000; Poehlmann et al., 2012). Furthermore, maternal cigarette smoking during pregnancy and a lower maternal age are also often found to be predictors of problem behavior (Delobel-Ayoub et al., 2009; Gray et al., 2004; Stoelhorst et al., 2003). Other predictors of an increased prevalence of behavioral problems for which there is less evidence are lower gestational age of the child, being small for gestational age (SGA), non-native ethnicity, child developmental delay, low parental education, and parent perceived child vulnerability (De Ocampo et al., 2003; Delobel-Ayoub et al., 2009; Gray et al., 2004; Huhtala et al., 2012). Some predictors seem to act differently for specific types of problem behavior. For example, SGA, parental depression, and parental negative affect seem to predict internalizing problems, but not externalizing problems (Huhtala et al., 2012; Stoelhorst et al., 2003; Treyvaud et al., 2009).

Regarding the prediction of change in internalizing and externalizing behavioral problems, information is scarce for preterm-born children and even in term-born children it seems difficult to establish consensus among studies about these predictors. In term-born preschoolers, most research is focused on the development of externalizing behavior. Ineffective and irritable parenting predicted increases in externalizing behavior from 5 to 7 years in children from a low socioeconomic neighborhood (Hollenstein, Granic, Stoolmiller, & Snyder, 2004; Snyder, Cramer, Afrank, & Patterson, 2005). In another study, maternal psychopathology and having fewer siblings predicted an increase in externalizing behavior from 2 to 3 years of age (Mesman et al., 2009). Predictors of changes in internalizing problems in term-born preschoolers were found in a study on 1.5- to 6-year-olds, which found that lower levels of maternal sensitivity predicted an increase in internalizing problems (Keiley et al., 2000).

Although several studies have investigated predictors of the prevalence of internalizing and externalizing behavioral problems in preterm-born children, it is not known whether these predictors also predict short-term changes in problem behavior, and whether they act differently for internalizing and externalizing behavior. Therefore, in this study we explored whether predictors that have been found to predict the prevalence of problem behavior, also predict short-term behavioral change in preterm-born preschoolers. Determining these predictors is especially important in preterm-born children, because modifiable predictors could be an important foundation for the development of effective interventions for these children. The predictors that we investigate are those that have

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