



Does temperament influence language development? Evidence from preterm and full-term children



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ABSTRACT

The aims of this study are: (1) to describe language and temperament characteristics of one group of low risk preterm (PR) children and a group of full-term (FT) children and (2) to identify those factors which can predict language outcomes at 30 months of age, with special attention on temperament. There is evidence of differences between very or extremely PR and FT children in relation to characteristics of temperament and language development. However, not many studies have been carried out with healthy PR children.

The participants were 142 low risk PR children (mean gestational age (GA): 32.60 weeks) and 49 FT children (mean GA 39.84 weeks). The temperament of the children was assessed at 10 months of age through the Infant Behavior Questionnaire-Revised (IBQ-R). At 22 months of age the cognitive development of the children was assessed through the Spanish adaptation of the Batelle Developmental Inventory (BDI). In order to assess the children's language development the Galician adaptation of the MacArthur–Bates CDI was applied at 30 months of age. In addition, socio-demographic information about the children and their families was gathered at birth.

The results indicate that there were no significant differences in the language measures of interest (word production, MLU3, and sentence complexity) between groups. The only differences found between the PR and the FT children in the IBQ-R were restricted to the smiling and laughter and the fear subscales. Hierarchical regression analyses performed indicate that GA did not have any predictive effect on language measures taken at 30 months. Cognitive scores were an important predictor of language measures, although certain temperament subscales contributed in a significant way to the variance of language measures, particularly low intensity pleasure, approach, high intensity pleasure, sadness, and vocal reactivity. Therefore, extroverted (positive affectivity) temperament seems to be beneficial for language development.

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1. Introduction

A growing number of studies have shown that preterm children (PR) may present more inadequate temperament characteristics than full-term (FT) children, which may derive in negative consequences for their psychological development.

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Although different studies take into account different temperament dimensions depending on the measurement instrument used; infants' characteristics of temperament may be grouped into two basic dimensions: emotional reactivity (the axis positive affectivity–negative affectivity) and self-regulation, according to one of the more relevant theoretical models on temperament (Rothbart & Bates, 1998). Garstein and Rothbart (2003) also developed a model describing three temperament factors: the first one, introversion–extroversion refers to the child's tendency to positively respond to the environment and to the alertness level or interest in exploring the physical and/or social environment. This factor comprises high intensity pleasure, low intensity pleasure, vocal reactivity, approach, smiling and laughter, perceptual sensibility and duration of orienting; the second factor is negative affectivity which refers to a low level of tolerance in the face of physical and social stimulation, which includes distress, sadness and fear subscales; and the third factor, self-regulation refers to a child's ability to control a high level of stimulation and recover internal balance. This factor includes soothability, falling reactivity, cuddliness, and activity level subscales.

Significant differences were observed between PR and FT children in relation to characteristics of temperament, particularly those concerning positive emotional response and self-regulation mechanisms. PR children of approximately 9 to 24 months of age were reported to show lower scores than FT children in persistence, reactivity, intensity, and orientation toward environmental stimuli, as well as self-regulation, effortful control, discomfort, cuddliness, and attention focusing (Langkamp & Pascoe, 2001; Sajaniemi et al., 2001); they also showed higher scores than FT children in negative affectivity (Davis, Chang, & Burns, 2006; Rothbart, Ahadi, & Evans, 2000), high-intensity pleasure, and perceptual sensitivity (Consentino-Rocha, Klein, & Martins Linhares, 2014). Self-regulation mechanism deficits may have consequences in the long term on different developmental functions, especially those related to self-control capacity such as attention regulation (Huffman et al., 1998), which, in turn, may influence perceptual and cognitive operations as well as first language acquisition.

Most of the previously mentioned investigations were carried out with extremely preterm (EPR) or very preterm (VPR) children, who are at high risk of suffering developmental disabilities. Interestingly, however, one study with healthy preterm children did not find significant differences in temperament between PR and FT children from 6 to 12 months of age, with the only exception of activity level (Kerestes, 2005). Therefore, further studies are needed to confirm whether all PR children show peculiar temperamental characteristics or this peculiarity is only restricted to high-risk PR children.

In relation to language development, a number of studies indicate that very (VPR) or extremely preterm (EPR) children were delayed in their language abilities in relation to FT children of approximately 24–30 months of age (Delfosse, Le Normand, & Crunelle, 2000; Foster-Cohen, Edgin, Champion, & Woodward, 2007; Kern & Gayraud, 2007; Sansavini et al., 2010; Sansavini, Guarini, & Savini, 2011; Sansavini, Guarini, Savini, & Broccoli, 2011; Stolt et al., 2009, 2012). Differences were found not only in lexical development but also in grammatical development as well as phonological abilities. In contrast, other studies did not find any significant differences between PR and FT children (Cattani et al., 2010; Greenberg & Crnic, 1988; Menyuk, Liebergott, Schultz, Chesnick, & Ferrier, 1991; Pérez-Pereira et al., 2011; Pérez-Pereira, Fernández, Resches, & Gómez, 2013; Pérez-Pereira, Fernández, Gómez-Taibo, & Resches, 2014; Sansavini et al., 2006; Stolt et al., 2007). Most of these later studies were carried out with a wider range of PR children without health problems, and not only with VPR or EPR children. Again, studying healthy PR children seems to be necessary to know the separate effect of GA on language development.

Temperament has been related to language development in typically developing children. According to Dixon and Smith (2000), temperament measured between 13 and 20 months of age may influence language acquisition at 20 months of age through attention and through an emotionally positive profile. Many studies confirm those relationships between early language development and two dimensions of temperament: (1) emotionality or affectivity and (2) orientation and regulation.

- (1) With regard to affectivity and language development, there are many investigations that point out a direct relationship between positive affectivity and linguistic development. Slomkowski, Nelson, Dunn, and Plomin (1992) found that extroverted children 2 and 3 years old were more advanced in referential abilities than introverted children. This could be due to the fact that extroverted children involve their parents in more frequent interactions than introverted children, and social interaction promotes linguistic development. Other authors also found that positive emotionality (Molfese et al., 2010; Laake & Bridgett, 2014) or smiling and laughter (Morales et al., 2000), a subscale of the introversion–extroversion factor (positive emotionality), had significant relationships with productive and/or receptive vocabulary in very young children (12–18 months of age). Complementarily, other studies found that children with highest emotionality, or the tendency to become intensely and easily aroused, showed lower scores in receptive vocabulary (Noel, Peterson, & Jesso, 2008), or found a negative relationship between shyness and productive vocabulary at 24 months of age (Prior et al., 2008). Martínez Fuentes (1996) observed that pleasure correlated positively with vocabulary size and negatively with an index of expressive style (in contrast to referential style) at 15 and 18 months of age, and that persistence negatively correlated with vocabulary size at 18 months of age.
- (2) With regard to self-regulation, evidence indicates that dimensions related to attention-orientation seem to explain vocabulary acquisition. Todd and Dixon (2010) corroborated that self-regulation influences joint attention and gaze tracking capacity, and other studies related joint attention capacity to the rate of acquisition of new vocabulary at 18 months of age (Dunham, Dunham, & Curwin, 1993; Mundy et al., 2007). Other authors observed positive relationships between duration of orientation and soothability (subscales of the self-regulation factor) and receptive vocabulary (Morales et al., 2000) or the development of a more analytic referential style (Dixon & Shore, 1997) around 12 months of age. Reinforcing this same idea, Usai, Garello, and Viterbori (2009) observed that the children with a very low attention level, high motor activity and low social orientation showed vocabulary composition typical of children with low

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