



Early communicative behaviors and their relationship to motor skills in extremely preterm infants



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ABSTRACT

Despite the predictive value of early spontaneous communication for identifying risk for later language concerns, very little research has focused on these behaviors in extremely low-gestational-age infants (ELGA < 28 weeks) or on their relationship with motor development. In this study, communicative behaviors (gestures, vocal utterances and their coordination) were evaluated during mother–infant play interactions in 20 ELGA infants and 20 full-term infants (FT) at 12 months (corrected age for ELGA infants). Relationships between gestures and motor skills, evaluated using the Bayley-III Scales were also examined. ELGA infants, compared with FT infants, showed less advanced communicative, motor, and cognitive skills. Giving and representational gestures were produced at a lower rate by ELGA infants. In addition, pointing gestures and words were produced by a lower percentage of ELGA infants. Significant positive correlations between gestures (pointing and representational gestures) and fine motor skills were found in the ELGA group. We discuss the relevance of examining spontaneous communicative behaviors and motor skills as potential indices of early development that may be useful for clinical assessment and intervention with ELGA infants.

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What this paper adds

Extremely premature birth can negatively impact on development in multiple domains, such as language development. Despite the relevance of identifying early predictors of language delay in at-risk populations, very little research has focused on this issue in extremely-low-gestational-age infants (ELGA < 28 weeks) or on their relationship with motor development. This paper adds a detailed description of gestures, vocal utterances, and their coordinations in ELGA infants at 12 months and their relationship with motor skills. The findings reveal that giving and representational gestures were produced at a lower rate by ELGA infants, and that pointing gestures and words were produced by a lower percentage of ELGA relative to FT infants. Less advanced motor and cognitive skills were also found in ELGA relative to FT infants. Pointing and representational gestures were related to fine motor skills in the ELGA group. These findings suggest that follow-up programmes for ELGA infants should include a detailed evaluation of early spontaneous gestural and vocal production and motor skills.

1. Introduction

Because of early sub-optimal biomedical and environmental conditions, premature birth represents an event that can have negative impacts on development in multiple domains. For instance, extremely preterm birth is a risk factor for language impairment (Sansavini, Guarini, et al., 2010; for review, see Sansavini, Guarini, & Caselli, 2011). Identifying predictors of language development is theoretically and clinically important because it can shed light on potential mechanisms underlying language acquisition in a population at-risk for delay and impairment and suggest potential targets for intervention. It is therefore surprising that relatively little work has addressed this issue in preterm infants.

The literature on typically developing (TD) infants has indicated close relationships between language development and both prelinguistic communicative behaviors (e.g., gesture, vocalization, gesture-vocalization coordinations) and fine motor skills (Hill, 2001; Iverson, 2010; Leonard & Hill, 2014). However, relatively few studies have investigated early gestural and vocal abilities in preterm infants and they have not generally examined the production of communicative coordinations, which are an important achievement in early communicative development (Iverson, Capirci, Volterra, & Goldin-Meadow, 2008). Moreover, the existing data are conflicting, potentially due to variation in sample selection criteria and tasks used to assess early production (Barre, Morgan, Doyle, & Anderson, 2011; Marlow, Wolke, Bracewell, Samara, & EPICure Study Group, 2005).

With regard to the relation between language and fine motor abilities, studies of TD infants have found relationships between increasing refinement in infants' object exploration activities, action imitation, and achievements in language development (Lifter & Bloom, 1989; Zambrana, Ystrom, Schjølberg, & Pons, 2013). Thus, delays in motor experiences may constrain learning opportunities (LeBarton & Iverson, 2013) in ways that may impact language development.

1.1. Gestures and vocal utterances in preterm infants

A developmental domain particularly affected in preterm children is language (Barre et al., 2011; Sansavini, Guarini, & Caselli, 2011; Van Noort-van der Spek, Franken, & Weisglas-Kuperus, 2012). A small number of longitudinal studies have investigated whether the risk for language impairment is greater among very preterm children (very low gestational age, VLGA, gestational age < 32 weeks) compared to FT children. These studies indicate that, relative to their FT peers, VLGA children exhibited a higher risk for language delay/impairment in the preschool years. Language delay/impairment was exhibited by 30–34% of VLGA children between the ages of 2 and 4 years, but only by 5–10% of FT children (Sansavini, Guarini et al., 2010; Woodward et al., 2009). In light of this enhanced risk, it is critical to investigate early components of language development that may be informative about possible subsequent language delays in the preterm population.

Early components of language development have been studied extensively in TD infants. The onset of communicative gestures (e.g., Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Bavin et al., 2008; Capirci & Volterra, 2008), babbling (e.g., Oller, Eilers, Neal, & Schwartz, 1999; Stoel-Gammon, 1989; Stoel-Gammon, 2011), and first words (e.g., Caselli, Rinaldi, Stefanini, & Volterra, 2012; Reilly et al., 2009) in the first year of life are signs of the typical course of language development. In addition, at around the end of the first year, TD infants begin to combine gestures and vocal utterances into tightly timed communicative coordinations. Relative to isolated gestures and vocal utterances, these coordinations are more effective in eliciting parental responses and may promote joint attention and language acquisition (Goldin-Meadow, Goodrich, Sauer, & Iverson, 2007; Tamis-LeMonda, Bornstein, & Baumwell, 2001; Tomasello, Carpenter, & Liszkowski, 2007).

Less is known about the development of gesture, babbling, first words, and communicative coordinations in infants who are at risk for delayed language development, as are preterm infants. The main studies of gesture and vocal production in this population focused on VLGA infants and generally examined gestures and vocal utterances separately. Regarding gestural production, some studies indicate that relative to FT infants, VLGA infants exhibit slower development of gestural communication at 12 months, as measured via parental questionnaires such as the MacArthur-Bates Communication

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