Title: Prelinguistic Communication and Early Symbol use in Toddlers with Down Syndrome: Using the IGDI-ECI to Model Growth

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Introduction: While the literature on early communication development in children with Down syndrome (DS) describes trends in vocabulary and gesture development, fewer empirical studies offer data on expected rates of early presymbolic and symbolic communication skills in this population. Because infants and toddlers with DS often communicate at a lower rate than TD peers (Crais, Watson & Baranek, 2009), it is important to use standardized samples to model expected changes in rates across major expressive communication skills to describe development and to monitor the effects of early communication interventions (Greenwood, Buzhardt, Walker, McCune, & Howard, 2013). This study used data from the Individual Growth and Development Indicator- Early Communication Index (IGDI-ECI; Luze et al., 2001), to model growth in a sample of infants and toddler with DS across time to provide preliminary data on trends across four major skills—gestures, vocalizations, words, and word combinations. A secondary purpose was to compare children with DS to the normative sample of TD children on the IGDI-ECI.

Method: We collected data on infants and toddlers with DS (n=19) across time as part of a model demonstration project on naturalistic communication intervention for children eligible for Part C. The IGDI-ECI was administered at entry and every 3 months thereafter by the interventionist who coached the family in a parent-implemented model. We used hierarchical linear modeling (Raudenbush & Bryk, 2002) to generate growth curves for rates of gestures, vocalizations, words and word combinations in children with DS, and then compared those data to the normative data from the IGDI-ECI for children 12-36 months (Greenwood et al. 2010).

Results: We generated growth curves for four communication skills (gestures, vocalizations, words, multiple word combinations) and plotted each curve alongside the normative growth curve for the same skills presented by Greenwood et al. (2010). We also plotted all four elements for children with DS on the same graph to provide a composite picture of how children communicate across the infant, toddler, and early preschool period. Results indicate that children with DS are stable in their rates of gesture use across the first few years of life and do not show any time related trends, using approximately one gesture per minute across the early childhood period (β₃₀=1.15; p<0.001). Children with DS increased their rates of vocalizations at a rate of 0.034 vocalizations per minute each month (β₁₂ =0.034; p=0.039), leading to an increase of about three gestures per minute between the ages of 12 and 36 months. Rates of vocalizations also displayed a very small deceleration rate (β₂₆ =0.004; p=0.045), indicating a very slight curvilinear trend. Rate of single word use grew linearly at a rate of 0.088 words per minute, per month (β₃₆ =0.088; p<0.001) across the toddler period with significant between-child variability. At 36 months, children with DS used 1.31 single words per minute (β₃₆=1.31; p<0.001). Multiple words grew at a rate of 0.01 multiple words per minute, per month (β₃₆=0.01; p=0.002). At 36 months, children with DS used 0.10 multiple word combinations per minute (p=0.009), compared to the TD sample in which children used 4.57 (p<0.001) word combinations per minute at 36 months.

Discussion: The data confirm trends identified in earlier research regarding the persistent use of gestures during the toddler and early preschool years in children with DS. Like children who are TD, children with DS use gestures both before and after the onset of symbol use. The data also indicate lower rates of vocalizations, single words, and multiple words for children with DS compared to typical children at all timepoints, except for the time period in which TD children decrease their rates of vocalizations in favor of single words (about 18 months). Frequent use of the IGDI-ECI during intervention as a progress monitoring tool is an important means to assess whether children with DS are making gains in their rates of communication and whether children are narrowing the gap between expected rates for children with DS and those who are TD. We can see form this data that the gap in expressive communication between children who are TD and with DS grows as children approach preschool, underscoring the need for frequent progress monitoring and support. Intervention teams can use data from the IGDI-ECI to determine whether the intervention dosage, strategies, and support to caregivers are sufficient to support growth during this critical window of early development.
References/Citations: