Title: Early Vocal Predictors of Later Language Ability in Children with Fragile X Syndrome

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Introduction: Children with Fragile X Syndrome (FXS) are typically delayed in speaking their first words (Roberts, Stoel-Gammon, & Barnes, 2008; Brady, Skinner, Roberts, & Hennon, 2006) and generally have impairments or delays in expressive language. The ability to determine reliable early vocal predictors of later verbal development in special populations may potentially yield more precise, targeted, and effective early intervention approaches. However, little is presently known about the development of consonant inventory and canonical vocalizations in children with FXS. In children with Autism Spectrum Disorders (ASD), consonant inventory and intentional communication are predictive of early expressive language growth (Yoder, Watson, & Lambert, 2015). Additionally, the use of early communicative vocalizations correlates to early language development in children with ASD (Plumb & Wetherby, 2013). Whether or not the presence of autism symptomatology correlates to the use of early canonical vocalizations is unclear (Patten, Belardi, Baranek, Watson et al., 2014; Plumb & Wetherby, 2013). Our study examined the relationship between early vocal predictors and vocabulary size in middle childhood, and how autism symptomatology may affect this relationship, in a sample of children with FXS.

Method: Participants were drawn from a pre-existing database through the Fragile X Lab at the University of Kansas. Early consonant inventory, proportion of canonical vocalizations, and frequency of intentional communication were measured in 48 toddlers with FXS (mean age in months = 30.6). These early measures were derived from three 5-minute structured mother-child interactions (book, free play, and snack). Vocabulary size was measured six years later (mean age in months = 113.6) based on number of different words produced during the same mother-child interactions, with two additional 30-minute naturalistic interactions. The Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988) was used to determine autism symptomatology during both early and later observations.

Results: A multivariate regression was employed to determine the impact of all early predictors on vocabulary size in middle childhood. An initial model including the three early vocal predictors (consonant inventory, canonical vocalizations, intentional communication) was significant (F=8.32, p<0.01). None of the vocal predictors accounted for significant variance uniquely, but in combination accounted for nearly 40% of variance in vocabulary size (R²=.373). When autism symptomatology was entered into the model, the model remained significant (F=17.79, p<0.01), and autism symptomatology uniquely accounted for 55% of variance in vocabulary size (prASD²=-0.55).

Discussion: Our results indicate that an aggregate of early vocal measures is predictive of vocabulary size in middle childhood in children with FXS. Autism symptomatology was also predictive of vocabulary size in the sample, as it clearly accounted for substantially more variance than the combination of three early vocal predictors. Previous findings in our lab indicate that maternal responsivity is also predictive of language ability, controlling for autism symptomatology and child developmental level. (Warren, Brady, Sterling, et al., 2010). Further research on vocal predictors may provide insight into individual differences in early language ability in children with FXS. Additionally, examining children with FXS separately from those with co-morbid FXS and Autism may also produce valuable insights into the nature of the disorder.
References/Citations: