Title: Trajectories of Receptive and Expressive Vocabulary Development in Adolescents with Down Syndrome and Fragile X Syndrome Compared to Younger Typically Developing Children

Authors: Sarah Nelson, Danielle Harvey, & Leonard Abbeduto

*University of California, Davis

Introduction: Fragile X syndrome (FXS) is the leading inherited cause of intellectual disability and second only to Down syndrome (DS) as a genetic cause of intellectual disability. In addition to cognitive impairments, individuals with DS and FXS have significant impairments in multiple domains of language compared to their typically developing (TD) peers of the same cognitive level. However, past studies have shown that individuals with FXS outperform those with DS on measures of both receptive and expressive language [e.g., Abbeduto et al., 2001]. Notably, there have been few longitudinal studies examining trajectories of receptive and expressive language in adolescents and young adults with DS and FXS. In the current study, therefore, we examined the age-related trajectories of receptive vocabulary (RV) and expressive vocabulary (EV) in adolescents with DS and FXS, as well as a sample of younger TD children of a similar nonverbal developmental level. We also examined factors affecting those trajectories. Such data can provide insights into potential pathways of intervention.

Method: We employed multilevel growth modeling to examine the longitudinal trajectory of RV and EV across four annual assessments in adolescents with DS (N = 30, M age = 13.89 years, range = 10-18) and FXS (N = 52, M age = 14.03 years, range = 10-19), and younger TD children (N = 56, M age = 7.20 years, range = 3-12). Raw scores on the Peabody Picture Vocabulary Test–3rd Edition (PPVT-III) and Expressive Vocabulary Test (EVT) provided the dependent measures of RV and EV, respectively. Age was centered at the first assessment, such that each participant’s age at the Time 1 visit was zero. Covariates included mean-centered growth scores from the Leiter-R and a mean-centered metric of maternal education level.

Results: At the initial visit, individuals with DS had significantly lower RV (M = 64.93, SD =23.06) and EV (M = 44.69, SD = 13.50) scores compared to individuals with FXS (RV: M = 97.33, SD = 34.88; EV: M = 65.69, SD = 23.99) and TD youth (RV: M = 96.89, SD = 31.88; EV: M = 65.49, SD = 19.10), who did not differ from each other at the first visit. For youth with DS, neither RV nor EV increased significantly with age across the annual assessments (RV: β = -1.24, SE = 1.18, p = 0.29; EV: β = 0.81, SE = 0.94, p = 0.38). However, both RV and EV increased linearly with age for individuals with FXS (RV: β = 2.17, SE = 0.68, p = 0.002; EV: β = 2.98, SE = 0.52, p < .001) and TD youth (RV: β = 6.08, SE = 0.92, p < .001; EV: β = 6.39, SE = 0.67, p < .001), with TD youth demonstrating steeper growth over time compared to those with FXS. The age-related trajectories for the diagnostic groups were all significantly different from each other. In addition, Leiter-R growth scores predicted both RV and EV raw scores at the first assessment (RV: β = 0.89, SE = 0.08, p < .001; EV: β = 0.54, SE = 0.06, p < .001), whereas maternal education level only contributed to RV scores (RV: β = 4.25, SE = 2.12, p = 0.04; EV: β = -0.73, SE = 1.45, p = 0.62).

Discussion: The findings are consistent with previous studies that have demonstrated that individuals with FXS have vocabulary skills similar to their younger TD peers, whereas those with DS have lower vocabulary skills compared to these groups [Price, Roberts, Vandergrift, & Martin, 2007; Roberts et al., 2007]. Moreover, unlike the TD and FXS groups, individuals with DS did not demonstrate growth across annual assessments in either RV or EV. This conflicts with a recent study by Conners, Tungate, Abbeduto, Merrill, and Faught (2018), who found that adolescents with DS showed significant growth in RV over two years and that adolescents less than 16 years of age showed growth in EV. Future studies are needed to discern whether there is indeed a plateau in vocabulary development in DS during adolescence, at what age skills may begin to plateau, and what contributes to reduced growth in language skills during this developmental period in this population. The present results also suggest that efforts should be made to bolster both receptive and expressive lexical skills in adolescence for individuals with both DS and FXS.
References:

