Title: The Impact of ASD on Gesture and Spoken Language Integration in DS and FXS

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Introduction: Down syndrome (DS) and fragile X syndrome (FXS) are two genetic disorders associated with intellectual disability and language impairment. Children with DS and FXS demonstrate relative strengths and weaknesses within communication. For example, gesture use is a strength in DS but a relative weakness in FXS (Flenthrope & Brady, 2010; Iverson et al., 2003). There is a high comorbidity of autism spectrum disorder (ASD) in both FXS and DS (for a review see Moss & Howlin, 2009); this is important to consider when examining gesture use, given that gesture use is a significant weakness in ASD. However, it is unknown what impact a co-diagnosis of ASD has on gesture use in DS and FXS, given that many studies have excluded children with the co-diagnosis. Research has consistently demonstrated the importance of gestures in communication and found that people use gestures as a compensatory strategy when they have spoken language difficulties (Mainela-Arnold et al., 2014). This finding is also true for children with DS (Iverson et al., 2003). One study found that children with DS gestured and produced gesture-language combinations at a similar rate as TD peers, but produced no 2-word combinations like peers matched on language ability (Iverson et al., 2003). Conversely, children with idiopathic ASD have an asynchrony in speaking and gesturing (So et al., 2015). To our knowledge, no research exists on the impact of ASD on gesture-language integration in DS and FXS. The purpose of this study was to examine the role of gestures and the impact of ASD on gesture and spoken language combinations in children with FXS-only, FXS + ASD, DS-only, and DS + ASD.

Method: The children were from a larger study on expressive language sampling in children with DS and FXS. Twenty children with FXS and twenty children with DS between the ages of 9-22 years participated in this study. The participants completed nonverbal IQ testing, and the Autism Diagnostic Observation Schedule – Second Edition to assess ASD symptoms (ADOS-2; Lord et al., 2013). Fourteen children with FXS and 7 children with DS met criteria for ASD. We coded gestures during the ADOS-2 using a coding scheme adapted from previous studies. We coded whether the gesture co-occurred with spoken language, and the purpose of the gestures in relation to the language (redundant, additional information, unintelligible).

Results: There were no significant differences between the FXS and DS groups on comparison of concurrent gesture and language production, t(38)=0.87, p=.39, d = 0.28. The DS-only group had significantly more gesture-spoken language combinations compared to their age-matched peers with DS+ASD, t(18)=2.70, p<.05, d=1.17; however the purpose of the co-occurring gesture was not significantly different between the groups. The FXS-only and FXS+ASD groups did not show significant differences in the proportion of gestures with spoken language, t(18)=0.01, p=.99, d=0.00, and when gestures co-occurred with spoken language, there were no differences in the purpose of the gesture.

Discussion: In this study, DS and FXS groups did not significantly differ on gesture and spoken language integration. Children with DS+ASD produced fewer gesture-language combinations although the function of the gesturing remained qualitatively the same between DS-only and DS+ASD groups. Neither quantitative nor qualitative gesture and spoken language integration differentiated FXS-only and FXS+ASD groups. These findings suggest that gesture-language integration may be a weakness in DS+ASD, which may affect communication success. Since gesture use can aid in successful communication, especially for children with expressive language deficits, understanding how different populations utilize gestures is useful for designing interventions based on relative strengths.
References/Citations:


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