**Title**: The Association of Social Communication and Sensory Regulation Traits to Cognition in Infants with Varying Levels of Neurodevelopmental Risk

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**Introduction**: Both social communication (SC) and sensory regulation (SR) difficulties have been associated with decreased cognitive skills for infants and children both with and without developmental disabilities (de Paula Machado et al., 2019; Pastor-Cerezuela et al., 2020, Carson et al., 1998). Challenges with SR impact an infant’s arousal modulation, leading to difficulties with general learning and adaptive functions, while challenges with SC impact an infant’s object categorization as early as 6 months and the linkage of language to fundamental conceptual categories (de Paula Machado et al., 2019; Perszyk & Waxman, 2018). However, less is known about SC and SR correlates of cognitive functioning in infants at varying levels of neurodevelopmental risk, such as autism. The Bayley Scales of Infant and Toddler Development, fourth edition (Bayley-4; Bayley & Aylward, 2019) and the Developmental Assessment of Young Children, second edition (DAYC-2; Voress & Maddox, 2013) are two commonly used tools for measuring cognition in infants. The Bayley-4 is a highly structured observational measure that is often considered the gold standard in clinical practice and research (Ranjitkar et al., 2018). The DAYC-2 allows for flexible administration of items (i.e., observation, parent report, and/or direct assessment) and takes less time, compared to the Bayley-4. We sought to understand the associations between autism traits within SC and SR domains and cognitive scores on the Bayley-4 and DAYC-2 among infants 6 to 16 months. We hypothesized that SC as compared to SR traits would be more highly correlated with cognitive scores. Further, we expect that correlations would be higher with the Bayley-4 verses the DAYC-2 on the SC domain, due to the highly structured nature of the Bayley-4 and large percentage of items dependent on receptive communication.

**Method**: Data for this study were pulled from a longitudinal project examining developmental trajectories of infants 6-16 months old (n=62) from a community sample with varying levels of neurodevelopmental risk indicators based on early screening. Parents completed the First Years Inventory, version 3.1 (FYI v3.1; Baranek et al., 2013; Baranek et al., 2022), a screening measure of autism traits within SC and SR domains (age adjusted). The DAYC-2 and Bayley-4 cognitive subscales were also administered concurrently. We used Pearson correlations to test the associations of SR and SC scores on the FYIv3.1 with the cognitive subscales of the DAYC-2 (n=62) and the Bayley-4 (n=18). Fisher’s Z was used to test whether the correlations with SR and SC were significantly different with each cognitive measure that was used.

**Results**: SC was moderately correlated (r=.43, p<.001) with the DAYC-2 and strongly correlated (r=.75, p<.001) with the Bayley-4. SR was weakly correlated (r=.24, p<.001) with the DAYC-2 and moderately correlated (r=.52, p<.001) with the Bayley-4. Although the magnitude of correlations was stronger for the Bayley-4 than the DAYC-2 for both SC and SR domains, the Fisher’s Z test was not significantly different for the two cognitive measures (SR z=1.16; SC z=1.75). The Bayley-4 and DAYC-2 were found to be moderately correlated in this sample (r=.54, p<.02).

**Discussion:** As hypothesized, SC traits had a stronger association to cognition than did SR traits; the strength of the associations for both domains was stronger for the Bayley-4 than the DAYC-2. The Bayley-4, a structured observational measure, appears to be more challenging for infants with higher levels of SC and SR risk, with these infants scoring lower on the Bayley-4 compared to the DAYC-2. Those with high levels of SC and SR traits may be more likely to become frustrated and dysregulated in clinical settings, particularly since the Bayley-4 cognitive items have high language demands; thus, the DAYC-2, which incorporates options for parent-report of infant performance across naturalistic contexts, may provide more opportunities for infants with higher risk to succeed. Ultimately, although the DAYC-2 and Bayley-4 were moderately correlated, client and contextual factors should be considered when selecting a tool.

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