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**Objective:** Concerns that exposure to more than one language in the home might negatively impact language development in young children with autism spectrum disorder (ASD) are common among caregivers. Although research directly examining the impact of a multilingual home environment in ASD is scarce, emerging evidence shows that language outcomes might be equivalent or better in children with ASD exposed to more than one language (Romero & Uddin, 2021). However, no evidence to date exists on whether exposure to more than one language affects early brain functional development in children with ASD. The current study aims to examine the (1) cross-sectional and (2) longitudinal associations between home language environment (exposure to one v. multiple languages at home,  $H_{1L}$  vs.  $H_{>1L}$ ) and receptive and expressive language skills in young children with and without ASD, and (3) to investigate links between home language environment and brain functional network organization.

**Participants and Methods:** Participants included young children with ASD ( $n=67$ , mean age:  $35\pm 13$  months,  $H_{>1L}$   $n=43$ ) and typically developing (TD) children ( $n=39$ , mean age:  $32\pm 16$  months,  $H_{>1L}$   $n=17$ ) enrolled in a longitudinal study of early brain markers of autism. A subset of children with ASD for whom longitudinal behavioral data from two study visits were available ( $n=21$ ,  $H_{>1L}$   $n=11$ ) were used for exploratory analysis. Receptive language (RL) and expressive language (EL) skills were assessed by the Mullen Scales of Early Learning at each study visit. Data from 42 children with ASD ( $H_{>1L}$   $n=27$ ) and 38 TD children ( $H_{>1L}$   $n=15$ ) for whom functional MRI data were acquired during natural sleep were included in functional connectivity (FC) analysis. ANCOVAs were employed to examine the effect of diagnosis, home language environment ( $H_{1L}$  vs.  $H_{>1L}$ ) and its interaction on RL and EL skills while controlling for socioeconomic variables (i.e., maternal education level, income-to-needs ratio) and gestational age at birth. Linear mixed models were applied to explore the longitudinal effect of home language environment on RL and EL skills across two study visits in the ASD group. Lastly, FC analysis was conducted to

compare functional connectivity across 7 canonical brain networks in children with and without ASD who were raised in  $H_{1L}$  and  $H_{>1L}$ .

**Results:** We found significant diagnosis by home language environment interaction effect on EL skills, with children with ASD and  $H_{1L}$  exhibiting the lowest EL skills. Longitudinal analysis identified a significant home language environment by study visit interaction effect on EL skills in children with ASD. Specifically, children with ASD and  $H_{1L}$  showed lower EL skills at study visit 1 but equivalent EL skills at study visit 2 compared to children with ASD and  $H_{>1L}$ . FC analysis revealed that children with ASD and  $H_{>1L}$  displayed more typical brain network organization (similar to TD children) compared to those with  $H_{1L}$ , specifically for FC between language, frontoparietal, and default mode networks.

**Conclusions:** These results suggest that early exposure to more than one language in the home may be linked with better expressive language skills in young children with ASD. Results of functional connectivity analysis also suggest that exposure to more than one language may be associated with more neurotypical functional network organization, particularly involving language and high-order networks.

**Categories:** Autism Spectrum Disorders/Developmental Disorders/Intellectual Disability

**Keyword 1:** autism spectrum disorder

**Keyword 2:** bilingualism/multilingualism

**Keyword 3:** brain development

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### 3 Development of a Computerized Neurocognitive Battery for Children and Adolescents Affected by Human Immunodeficiency Virus in Botswana

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**Objective:** Children born to mothers infected with human immunodeficiency virus (HIV) during pregnancy experience increased risk of neurocognitive impairment. In Botswana, HIV infection is common, but standardized cognitive testing is limited. The Penn Computerized Neurocognitive Battery (PennCNB) is a widely used cognitive test battery that streamlines evaluation of neurocognitive functioning. Our group translated and culturally adapted the PennCNB for use among children and adolescents in this high-burden, low-resource setting. The current study examined the construct validity and sensitivity to HIV infection and exposure of the culturally adapted PennCNB among a cohort of HIV-affected children and adolescents in Gaborone, Botswana.

**Participants and Methods:** 628 school-aged children aged 7-17 years (n=223 children living with HIV [HIV+]; n=204 HIV exposed, uninfected [HEU]; and 201 HIV unexposed, uninfected [HUU]) completed the PennCNB. Participants were recruited from a clinic specializing in the care and treatment of HIV+ children and adolescents in Gaborone, Botswana, as well as from local schools. Confirmatory factor analyses were performed on efficiency measures for 13 PennCNB tests. Multiple regressions examined associations between HIV and neurocognitive functioning while controlling for age and sex. Multivariate normative comparisons were used to examine rates of overall cognitive impairment by comparing individual profiles of test scores to the multivariate distribution of test scores using age-normed data from the HUU group.

**Results:** Confirmatory factor analysis supported four hypothesized neurocognitive domains: executive functioning, episodic memory, complex cognition, and sensorimotor/processing speed. As expected, there were main effects of age on cognitive performance across all domains ( $ps < .001$ ), and there were small sex differences, with females performing better in executive functioning and males performing better on visuospatial processing. Children and adolescents living with HIV performed significantly worse than HUU across all domains ( $ps < .001$ ), with the largest effect sizes on measures of abstraction, working memory, and processing speed. HEU also performed worse

than HUU across several domains, with smaller effect sizes. Multivariate normative comparisons indicated that 27% of the HIV+ group evidenced global neurocognitive impairment.

**Conclusions:** Overall, results support the validity of a neurocognitive battery adapted for use in Botswana, a non-Western, resource-limited setting. Results indicated that the adapted battery applied to children and adolescents with limited computer familiarity had a similar factor structure as in Western settings, indicating that the PennCNB appeared to assess the hypothesized neurocognitive domains. Hypothesized associations with age and sex supported the battery's construct validity. Moreover, the battery appears to be sensitive to cognitive impairments associated with perinatally-acquired HIV and in utero HIV-related exposures, as it discriminated between the HUU, HIV+, and HEU groups. Differences were found in specific domains and in detection of overall impairment, including approximately one quarter of children and adolescents living with HIV in this cohort evidencing global neurocognitive impairment. Together, these results provide evidence that the PennCNB could serve as a useful tool for the assessment of neurocognitive functioning in school-aged children and adolescents from Botswana and, potentially, other resource-limited settings.

**Categories:** Cross Cultural Neuropsychology/  
Clinical Cultural Neuroscience

**Keyword 1:** cross-cultural issues

**Keyword 2:** HIV/AIDS

**Keyword 3:** brain development

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#### 4 Educational and Social/Economic Opportunity Associated with IQ in DC Metro Children

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**Objective:** Social determinants of health (SDOH) are social conditions (e.g., employment, access to healthcare, quality schools) which are