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Executive functions development in children with transposition of the great arteries: A first longitudinal study

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Objectives
Executive functions (EF) impairments are part of the main neurocognitive morbidities after cyanotic congenital heart disease (CHD). EF are higher-order neurocognitive skills underlined by the progressive maturation of prefrontal brain networks. Few studies have focused on EF development in children with CHD despite their crucial influence on academic achievement and social adaptation. More importantly, current data does not allow to draw conclusions on the evolution of these deficits as children grow up. The aim of this study is to characterize the pattern and severity of EF impairments in children with transposition of the great arteries (TGA) at a key developmental period of transition from preschool to school-age.
Methods
45 children with TGA with or without ventricular septal defect (VSD) (mean age at intake= 5 y 4 mo; 67% males) were compared to 45 control children (mean age at intake= 5 y 5 mo; 62% males) on formal neuropsychological evaluation once a year for three consecutive years. Assessments included a comprehensive evaluation of motor and attentional inhibition, short-term and working memory, cognitive flexibility as well as a general IQ and language measures. Demographic variables were controlled.
Results
All children with TGA had normal IQ scores and did not differ from controls in any demographic variable including parental socio-economic status and educational levels (ps>0.05). No significant differences between the groups were found in working memory measures (verbal and visuo-spatial) at any time point (p>0.05). At age 5, patients displayed significantly worse scores at all measures of motor and attentional inhibition and cognitive flexibility (all p<0.05). However, a different pattern of evolution was observed according to the EF domain. Impairments at motor inhibition tests normalized at age 6 contrary to deficits in cognitive flexibility that tended to aggravate with age and remained clinically important at age 7 (p<0.05).
Conclusions
TGA, as other types of cyanotic CHD, is associated with altered EF. However, all EF domains may not have the same risk of dysfunction. Some deficits catch-up and some tend to worsen with age. Further characterization of these morbidities is necessary to develop targeted cognitive prevention and intervention programs at different age periods.