



# Assessing the Executive Functioning of Colombian Children

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Information about executive functioning in normally developing children in Colombia is limited. The aim of this research was to establish the cognitive profile of Executive Function (EF) of children from Bogotá (Colombia) to gain insight into how they are developing in this population.

As a process of cognitive and metacognitive control of mental processing (Eslinger, 1996), EF is essential to cognitive development in children since as it allows the children to learn and expands their cultural knowledge (Barkley, 2001). It can be conceived as the act of voluntarily controlling the individual's own behavior to adapt to present and future environmental conditions.

## Method

### Participants

A cross-sectional exploratory study was conducted using 120 rural and urban normally developing Colombian children (60 girls, 60 boys) from four public and private schools, grouped equally according to two variables: age (4, 6 and 8 years old) and socioeconomic status –SES (low, middle, high).

### Materials

The measures used were chosen because they are developmentally relevant in the scientific literature concerning EF and had appropriate statistical values within the Spanish population. These measures included a *go/no go* task, a digit-span task, a planning task, a hand movement task, a spatial orientation task, a motor task, and a verbal regulation task, all of them subtests of the Luria Inicial EF dimension for the 4 and 6-year old group (Manga & Ramos, 2006) and the *Diagnóstico Neuropsicológico Infantil de Luria* for the 8-year old group (Manga & Ramos, 1991). The subtests of Vocabulary, Phrases, Digits and Block Design of the WIPPSI and WISC-IV Spanish versions completed the test administration.

## Results and Discussion

Multivariate analysis of variance was conducted to search for the effects and interactions of age, sex and SES in the different EF subtests applied. See Table 1.

Significant effects of age were seen in all subtests, while SES effects were seen in almost all of them. No sex effects were found.

Significant interactions between age and SES were found in the vocabulary, *go/no go* and verbal regulation tasks.

Table 1. Summary of analysis of variance for each of the EF subtests

Executive Function Tasks (test)	F values by age	F values by SES
Verbal Fluency (Vocabulary WIPPSI/WISC-IV)	31.22	9.15
Go/ no go and verbal regulation	58.93	5.72
Digit Span (WIPPSI / WISC-IV)	3.24	3.94
Planning (Block Design)	37.04	3.34
Hand Movement	41.87	2.82
Spatial Orientation	348.48	2.82
Motor	9.44	8.33

Post hoc comparisons (Tukey DHS) were used to determine at which age and SES status the differences were located. See figure 1.

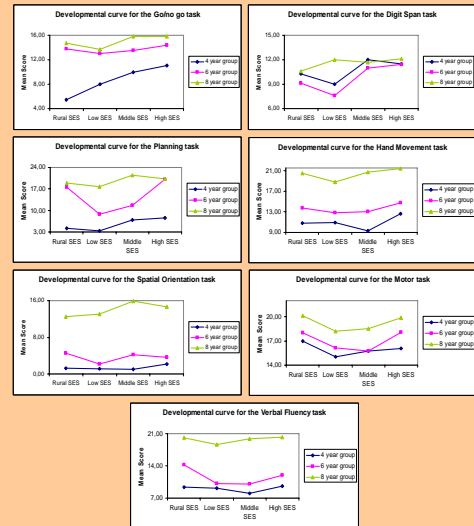


Figure 1. EF developmental curves

## Discussion

The findings were seen to depend on the measures used. Nonetheless, they have proven good metrical and clinical properties in other Spanish population studies.

Our results suggest a gradual trend for increased EF throughout childhood. Significant differences between ages suggest the existence of developmental spurts in skills associated with the tests applied, at all three ages studied.

Additionally, the motor, inhibition and regulation tasks revealed a stabilization between 6 and 8 years old, while working memory improved significantly between the ages of 6 and 8.

Some SES differences were also evident for this domain. We observed a significant difference between the performance of low SES children and the other SES groups, regardless of age. It is likely that some of the children's living conditions could have influenced the performance of this group in the EF tasks.

In the case of rural children, we found that these performed better on nonverbal task than on verbal ones, pointing to a fluctuating performance within the EF domain. In contrast, the children from the middle and high SES groups had comparable performances as regards efficiency on all the subtests applied. In particular, we found a significant interaction between age, SES and sex in the scores on the *go/no go* and verbal regulation tasks.

Taken together, our results suggest that the educational, cultural and family resources available to the children may vary their possibility of successfully developing their EF to meet daily and academic requirements. Moreover, their ability to use language as a mean to control and coordinate their own performance and behaviour could depend on the possibility of socioeconomic variables influencing the development and efficiency of daily executive functioning.

Future research should focus on careful study of these socioeconomic differences in the development of EF and in the comparison between different Spanish-speaking populations.

## References

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