

Cognitive Factors Associated with Mathematical Achievement in Tunisian Children With and Without Dyscalculia

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INTRODUCTION & AIM

Dyscalculia is a specific cognitive disorder affecting the understanding of quantities and numerical symbols, which can significantly impede mathematical learning in children with otherwise preserved intellectual abilities (Butterworth, 2026; Lambert, 2024). This study aims to identify cognitive factors correlated with mathematical achievement in Tunisian children, comparing those with dyscalculia to typically developing peers.

METHOD

Participants: 100 children aged 8–16, equally divided into dyscalculia and control groups.

Cognitive Assessment:

Executive functions: Inhibition (Stroop Test), Planning (Tower of London), Cognitive flexibility (Trail Making Test).

Working memory: Digit Span (verbal) and Corsi Block-Tapping Test (visuospatial). Non-verbal reasoning: Raven's Progressive Matrices.

Academic Achievement: Most recent mathematics grade.

Analyses: Pearson correlations for cognitive-math associations, independent-samples t-tests for group differences, and two-way ANOVA for effects of age and socioeconomic status.

RESULTS & DISCUSSION

Dyscalculia group:

Strong correlations: Mathematics scores with verbal working memory and inhibition.

Moderate correlations: Non-verbal reasoning and planning

Weak but significant correlation: Visuospatial memory.

Control group:

Moderate correlations: Planning.

Weak correlations: Verbal memory and non-verbal reasoning.

No significant correlations: Inhibition or visuospatial memory.

Group differences: Significant differences in verbal working memory and planning; moderate differences in non-verbal reasoning; other cognitive measures were similar.

ANOVA: Age significantly affected executive functioning; socioeconomic status had no effect.

Children with dyscalculia rely mainly on verbal working memory and inhibition for math achievement, whereas typically developing peers rely on planning.

These differences highlight distinct cognitive mechanisms and suggest that verbal working memory and planning are key targets for educational interventions. Age effects indicate developmental considerations are important for teaching strategies.

CONCLUSION

Verbal working memory and planning are central to mathematical achievement, particularly in children with dyscalculia. These cognitive functions should be targeted in educational interventions.

FUTURE WORK / REFERENCES

Future research should explore intervention strategies to strengthen executive functioning and working memory in dyscalculic children and examine longitudinal effects on academic outcomes.

References

Butterworth, B. (2025). *Dyscalculia: From science to education*. Routledge.

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