

THE RELATIONSHIP BETWEEN TIME PROCESSING SKILLS, NUMERICAL ABILITIES, AND ATTENTION IN A SAMPLE OF PRIMARY SCHOOL CHILDREN: A PILOT STUDY



Federica Cortesi^{1, 2}, Anna Lucia Ogliari^{1, 2}, Valentina Tobia^{1, 2}
 f.cortesi1@studenti.univr.it; ogliari.anna@hsr.it; tobia.valentina@univr.it

¹ Faculty of Psychology, Vita-Salute San Raffaele University, Italy
² Child in Mind Lab, Vita-Salute San Raffaele University, Italy



Theoretical Background

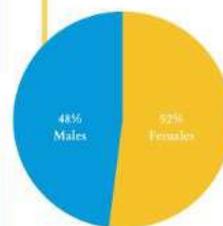
Time processing skills are essential for daily functioning, supporting both time **management** and temporal **orientation** (Grondin, 2010). Difficulties in these abilities can impact various life contexts, from structured environments (e.g., school and work) to more flexible ones (e.g., relationships and extracurricular activities). Research indicates that such **impairments** are particularly common in children with **neurodevelopmental disorders** like Attention Deficit and Hyperactivity Disorder (**ADHD**; Ptacek et al., 2019) and **Developmental Dyscalculia** (Skagerlund & Träff, 2014, 2016).

Aim of the study

The pilot study aims to investigate the relationships between temporal, attentional, and numerical/mathematical abilities in primary school children, focusing on how these **cognitive abilities** are interconnected. Furthermore, it seeks to identify **specific temporal profiles** in children with ADHD and Developmental Dyscalculia.

Methods

The study involved **266 children** (mean age: 9.27 ± 1.22 years; 52% female). They completed ad-hoc computerized tasks assessing time reproduction (TR), time discrimination (TD), and time estimation (TE). In addition, they completed self-report questionnaires on time perception (STQ), mathematical tests (e.g., mental calculations, numerical reasoning; BDE-2, 2016), and attentional tests (e.g., sustained and selective attention; BVN 5-11, 2021).



Results

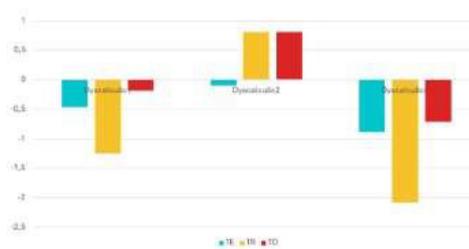
Spearman's Correlations

	Counting	Mental Calculation	Triplets	Insertion	Numerical Reasoning
TE	-0,057	-,249*	-,279*	-0,182	-,256*
TR	-,260*	-0,236	-0,120	-0,106	-,319**
TD	-0,164	-,345**	-,246*	-0,019	-,419**
QST Orientation	-,314*	-,345**	-,268*	-,381**	-,389**
QST Management	0,222	-,503**	-,325**	0,233	-,432**

	Disattention	Hyperactivity	Auditory Inhibition	Auditory Omission	Auditory Selective Attention
TE	0,088	-0,020	-,139*	-,252**	-,146*
TR	0,019	-0,002	-,323**	-,267**	-,297**
TD	-,166*	0,104	-,218**	-,304**	-,272**
QST Orientation	-,256**	-0,088	-,193**	-0,129	-,220**
QST Management	-,186*	-,216**	0,112	-0,070	-0,042

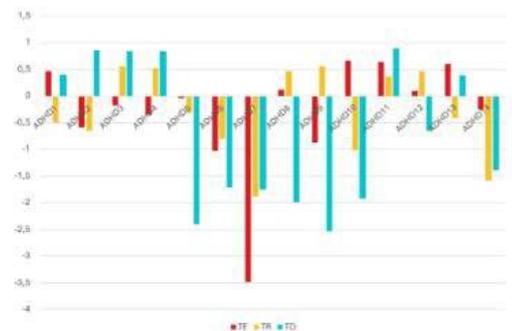
* $p < .05$ e ** $p < .01$

Dyscalculia & Time Processing



Profiles of 3 participants with a diagnosis of Developmental Dyscalculia

ADHD & Time Processing



Profiles of 14 participants with a diagnosis of ADHD

Discussion and conclusions

These preliminary findings suggest a connection between time-processing skills and both mathematical/numerical abilities and attention/hyperactivity-related skills. Moreover, populations with **neurodevelopmental disorders** appear to exhibit **significant difficulties** (Ptacek et al., 2019; Skagerlund & Träff, 2014, 2016), although time-processing profiles **vary considerably** both **within and across diagnoses**. In the future, it would be interesting to explore differences between clinical groups not only quantitatively, but also in a qualitative way (e.g., overestimation and underestimation) (D'Souza et al., 2016).

References

- D'Souza, D., Booth, R., Connolly, M., Happé, F., & Karmiloff-Smith, A. (2016). Rethinking the concepts of "local or global processors": evidence from Williams syndrome, Down syndrome, and Autism Spectrum Disorders. *Developmental Science*, 19(3), 452-468.
- Grondin, S. (2010). Timing and time perception: A review of recent behavioral and neuroscience findings and theoretical directions. *Attention, Perception, & Psychophysics*, 72(3), 561-582.
- Ptacek, R., Weissenberger, S., Braaten, E., Klicperova-Baker, M., Goetz, M., Raboch, J., ... & Stefano, G. B. (2019). Clinical implications of the perception of time in attention deficit hyperactivity disorder (ADHD): A review. *Medical science monitor: international medical journal of experimental and clinical research*, 25, 3918.
- Skagerlund, K., & Träff, U. (2014). Development of magnitude processing in children with developmental dyscalculia: Space, time, and number. *Frontiers in Psychology*, 5, 675.
- Skagerlund, K., & Träff, U. (2016). Processing of space, time, and number contributes to mathematical abilities above and beyond domain-general cognitive abilities. *Journal of Experimental Child Psychology*, 143, 85-101.

"All these notes and proceedings are confidential. You are bound not to communicate or disclose these information and results to any third party".