

The influence of time-of-day and morningness-eveningness in cognitive performance of children and adolescents: Clarifying synchrony and asynchrony effects

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Abstract

Chronotype - a continuum ranging from extreme morning-types to extreme evening-types - is a genetically influenced preference for earlier or later schedules to engage in cognitively/physically demanding tasks. Although scarce, research shows that chronotype inter-individual differences are present in pre-pubertal children since kindergarten and that their performances can be influenced by both chronotype and time-of-day interactions. Synchrony effects are commonly found for cognitive performance, referring to enhanced performances at on-peak (i.e., preferred) times comparing to off-peak times. Asynchrony effects (superior off-peak performance) have also been reported in the literature. Synchrony/asynchrony effects are expected to be found depending on the cognitive underpinnings of different tasks. Some authors defend that synchrony effects occur in tasks involving controlled efforts to process and retrieve information, whereas for perceptually driven tasks, accurate automatic responses are more likely to be produced without being hampered by cognitive control processes at off-peak hours, resulting in asynchrony effects. This hypothesis has not been duly tested, nor has it been explored to any extent in children. Considering that executive control is known to develop from childhood to adolescence and that post-pubertal children exhibit a significant shift in

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their time-of-day preferences, we intend to systematically probe the associations between cognitive processes, time-of-day, and chronotype in non-pubertal (3rd grade) and pubertal (8th grade) children. We will conduct individual neuropsychological assessment sessions targeting memory, language, and attention/executive functions using selected tests from a battery validated from 5 to 15 years old following a 2x2 between-subjects design. We aim for a fine-grained probing of the controlled/automatic processes dichotomy and its cognitive underpinnings, while examining the changes in cognitive performance linked to puberty-related shifts in time-of-day preferences. The first author has been awarded a PhD scholarship (reference 2020.05326.BD), supported by the FCT – Fundação para a Ciência e a Tecnologia (Portuguese Foundation for Science and Technology).

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