

THE INFLUENCE OF DIGITAL DEVICES ON THE DEVELOPMENT OF COGNITIVE FUNCTIONS IN CHILDREN OF EARLY SCHOOL AGE**Nizomova G., Khozhimatova M.Sh.**<https://doi.org/10.5281/zenodo.19988440>

Early school age (6-7 years) is a critical period for the development of cognitive processes. During this age range, a transition from predominantly visual-figurative thinking to the development of elements of logical and abstract thinking occurs, with the role of voluntary attention and goal-directed activity increasing. Working memory, which ensures the retention and processing of information during problem-solving, actively develops. From a neuropsychological perspective, this age is characterized by intensive maturation of the frontal lobes, particularly the dorsolateral and orbitofrontal regions involved in behavioral regulation, planning, and control. The functional organization of the frontoparietal and frontotemporal networks, which facilitate the integration of sensory information and the formation of semantic processes, becomes more complex. Interhemispheric interactions are completed, which is reflected in the formation of functional asymmetry and lateralization of speech and spatial functions.

The study design included a comprehensive assessment of cognitive functions in early school-age children, taking into account the characteristics of the digital workload and environmental factors.

Inclusion criteria:

- age 6–7 years;
- education in the first grade of a comprehensive school;
- absence of organic damage to the central nervous system;
- absence of diagnosed intellectual disabilities;
- written informed consent of parents (legal representatives).

Exclusion criteria:

- history of epilepsy, cerebral palsy, traumatic brain injury;
- severe hearing and vision impairments;
- severe speech disorders;
- mental disorders;
- taking medications that affect cognitive functions.

All children were divided into groups based on their level of digital stress. To assess digital stress, a structured questionnaire for parents was used, including the following sections:

Average daily screen time (in minutes).

Type of devices used (smartphone, tablet, computer, TV).

The nature of digital content (educational, gaming, multimedia).

Terms of use (independently or under adult supervision).

Time of device use (before bedtime, in the morning, during the day).

The presence of restrictions and regulations for use.

Based on the obtained data, the integral indicator of digital load was calculated.

Depending on the level of digital load, children were divided into groups:

- a group with low digital load;
- a group with moderate digital load;
- a group with a high digital load.

All children underwent a standard clinical and neurological examination with an assessment of:

- level of consciousness and orientation;
- conditions of the cranial nerves;
- muscle tone and strength;
- tendon reflexes;
- coordination of movements;
- the presence of pathological reflexes.

The neurological status of the children examined was within the age norm, allowing the identified cognitive characteristics to be considered functional rather than organically determined. Neuropsychological and psychometric methods adapted for children aged 6–7 were used for a comprehensive cognitive assessment.

A total of 120 early school-age children (6–7 years old) were included in the study, including 62 boys and 58 girls. The average age of the participants was 6.5 ± 0.3 years.

Based on the assessment of the digital load, children were divided into three groups:

Group	Digital load level	Number of children	Average screen time, min/day
I	Low	40	30–60
II	Moderate	40	61–120
III	High	40	121–180+

Boys and girls were distributed evenly between the groups. All children's neurological status was within the age-appropriate range.

High digital workload in children aged 6–7 years is associated with impaired concentration, working memory, logical thinking, speech, and executive functions.

Conclusions: Visual-spatial functions partially compensate for the influence of the digital environment; sleep, physical activity, and the type of content act as mediators of cognitive impairment; the obtained results confirm the study hypothesis, demonstrating differentiated effects of digital load on cognitive functions; the established patterns allow us to develop recommendations for optimizing the use of digital devices in early school-age children.

Literature:

1. Dong HY, Wang LL, Bai M, et al. Screen time is a predictor of cognitive function in children with attention deficit hyperactivity disorder. *Pediatr Res* . 2025;98:1884 –1891. doi:10.1038/s41390 -025040269 — shows a link between screen time and cognitive function in children with ADHD.
2. Vohr BR, Bann CM, Das A, et al. Association of High Screen -Time Use With School-Age Cognitive, Executive Function, and Behavior Outcomes in Extremely Preterm Children. *JAMA Pediatr* . 2021;175(9):e 210962 — High screen time is associated with lower IQ and executive function in 6- to 7-year-old children (EPT population).
3. Madigan et al . (based on reviews in *JAMA Pediatrics* and *Time*) — show that excessive screen time in young children is associated with delays in the development of communication, attention, and social skills.
4. Reynaud E, Vecchierini M -F, Heude B, et al. Sleep and its relation to cognition and behavior in preschool -aged children. *arXiv 2019 - systematic review connections sleep And cognitive development V early age*
5. Nizomova G., Khozhimatova M.Sh. The impact of using electronic gadgets on cognitive functions in school-age children.