

Drinking more water improves multitasking ability in children, study finds

October 29 2019, by Liz Ahlberg Touchstone



Drinking more water improves children's ability to multitask, according to a new study led by Illinois professor Naiman Khan. Credit: Fred Zwicky

Drinking water not only keeps children hydrated, but also increases their ability to multitask, suggests a new study by researchers at the University

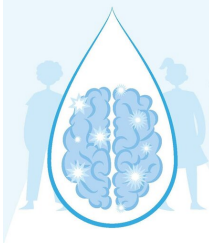
of Illinois and their collaborators.

After [drinking](#) more [water](#) for four days, nine- to 11-year-old [children](#) were more hydrated and had faster reaction times on a task-switching test, the researchers reported in *The Journal of Nutrition*.

"Recent urine biomarker data has indicated that over half of the children in the United States are probably inadequately hydrated," said study leader Naiman Khan, a professor of kinesiology and community health at Illinois. "We've studied dietary effects on children's cognition for a long time, but the opportunity to promote cognitive function in children with [water intake](#) is very important. Children are at a higher risk of involuntary dehydration: They depend on adults to recognize their needs and provide them with water."

Khan's group, in partnership with professor Charles Hillman at Northeastern University, studied 75 children in central Illinois. They compared the children's urinary hydration and cognitive performance at their normal baseline levels, after drinking only half a liter of water a day for four days, and after drinking 2.5 liters of water each day for four days.

"This is the first study to our knowledge that has manipulated water intake over several days and measured changes in cognitive performance among children," Khan said. "It's also one of the first studies to use all the measures of urine hydration that are available, including osmolality, specific gravity and color."



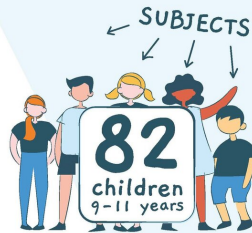
Please, may I have a glass of water?
INCREASED WATER INTAKE IMPROVES COGNITIVE PERFORMANCE IN CHILDREN

CONTEXT

Previous studies have suggested that poor hydration is associated with poorer short-term memory performance in children. Some interventions studies also indicate that providing children with water results in improved memory and visual attention. This study aimed to confirm the effect of modulating water intake on cognitive flexibility (i.e. multitasking) in children while addressing gaps of previous studies.

OBJECTIVES

- 1 Investigate the association between hydration and cognitive flexibility under habitual hydration.
- 2 Investigate the effects of changes in hydration - via a water intake intervention - on cognitive flexibility.

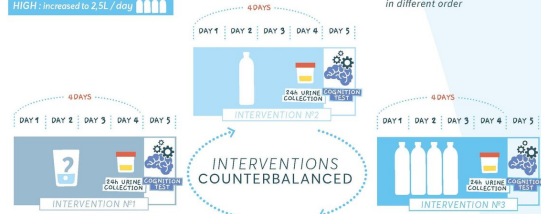


WATER INTAKE

- HABITUAL: no change
- LOW: decreased to 0.5L /day
- HIGH: increased to 2.5L /day

METHODS

The 82 children went through the 3 interventions in different order

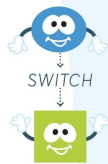


Hydration was assessed by measuring urinary biomarkers (osmolality, color, volume, specific gravity).

HOW TO MEASURE COGNITIVE FLEXIBILITY? A COMPUTERIZED, AGE-ADAPTED, COLOR-SHAPE SWITCH TASK



Participants were first asked to respond to color (e.g. a left thumb press to green and a right thumb press to blue). Next, participants were asked to respond to the shape (e.g., a left thumb press to the square and a right thumb press to the circle).



Then, participants had to flexibly switch between the color and shape tasks based on the direction of the character's arms (with arms up: shape task and arms down: color task). Participants were required to hold both the color and shape rulesets in working memory and flexibly activate the correct ruleset based on the arm cue.

KEY FINDINGS

- Hydration biomarkers confirmed that children's habitual daily intake was relatively low (<1L).
- Children with better habitual hydration exhibited superior cognitive flexibility.
- Increasing water intake to 2.5L significantly improved cognitive flexibility compared to low water intake (0.5L).

WHAT DOES THIS STUDY ADD?

These findings support the benefits of increased water intake for cognitive function and provide insights into the importance of habitual hydration.

This work has relevance for current public health issues given that the majority of children may not drink sufficiently.

Greater cognitive performance in childhood is linked with better academic achievement and higher socioeconomic status in adulthood.

So, keep your kids hydrated!



Naiman A Khan, Daniel B Westfall, Alicia R Jones, Marlee A Sim, Jeanne H Bottin, Erica T Perrier, Charles H Hillman, A 4-d Water Intake Intervention Increases Hydration and Cognitive Flexibility among Preadolescent Children. The Journal of Nutrition, no.206, https://doi.org/10.1093/jn/nwz006 Water contributes to the maintenance of normal cognitive functions (EFSA Journal 2011;9(4):2075)

Credit: University of Illinois at Urbana-Champaign

Children with higher baseline hydration performed better on a task-switching activity designed to measure cognitive flexibility. In addition, the children collectively performed better and had faster reactions on the task-switching test after drinking more water, although they showed no difference on tests designed to measure attention and inhibition.

"Children who were better hydrated tended to have greater ability to multitask and faster reaction times, and children who increased their water intake also increased their ability to multitask," Khan said. "That tells us that the benefits of water may be selective for cognitive processes associated with multitasking."

After drinking more water for several days, the children's hydration improved—as was expected. However, many of the children had the same or only slightly different values in urinary markers of hydration in the low-water condition as they did at their baseline. This indicates that they may be underhydrated in their everyday activities, which is concerning, Hillman said.

"Such findings suggest that childhood health behaviors, such as being properly hydrated, may benefit complex cognitive operations including working memory and cognitive flexibility. Given that these aspects of cognition underlie academic achievement, it is interesting to think about low-cost lifestyle interventions, such as increasing water intake, to benefit cognitive and brain health as well as effective functioning throughout the school day," Hillman said.

Khan said the researchers hope to further explore the relationship between hydration and [cognitive performance](#) in children by using brain imaging in future studies to see which neural networks benefit most from water consumption. They would also like to study [hydration's](#) relationship to other mental tasks.

"The three tasks we studied do not comprehensively tap into all the different cognitive domains—there are others that may be of interest," Khan said.

More information: Naiman A Khan et al. A 4-d Water Intake Intervention Increases Hydration and Cognitive Flexibility among Preadolescent Children, *The Journal of Nutrition* (2019). [DOI: 10.1093/jn/nxz206](#)

Provided by University of Illinois at Urbana-Champaign

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