



CHILDHOOD NUTRITION AND BRAIN HEALTH

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Nutrition, Wellness, and the Brain

Week 3

COGNITIVE FUNCTION

Memory

- How well our brain can hold onto information
- Multiple types
 - Short-term
 - Long-term



Mental Flexibility

- How well can our brain accomplish multiple tasks



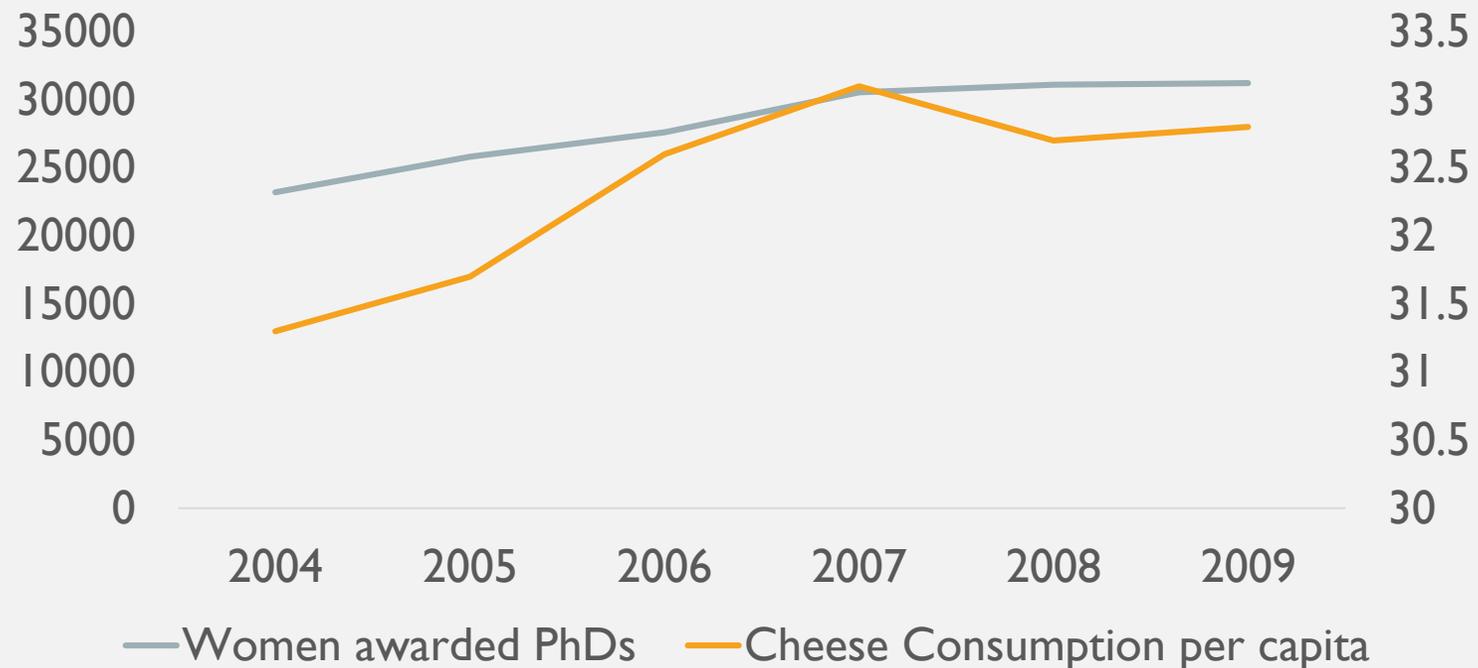
Attention

- How well can our brain ignore irrelevant information and focus on important information



CORRELATION VS. CAUSATION

Cheese consumption causes more women with PhDs?



DIET ASSESSMENT IN NUTRITION RESEARCH

BIOMARKERS

- Blood/Serum/Plasma
- Macular Pigmentation
- Skin carotenoid assessment



SELF REPORT

- 7-day diet records
- Dietary history recall
 - 6 months
 - 1 year



NUTRITION IS RELATED TO COGNITIVE FUNCTION



Carotenoids



Omega-3 Fatty Acids



Fiber



Saturated Fats



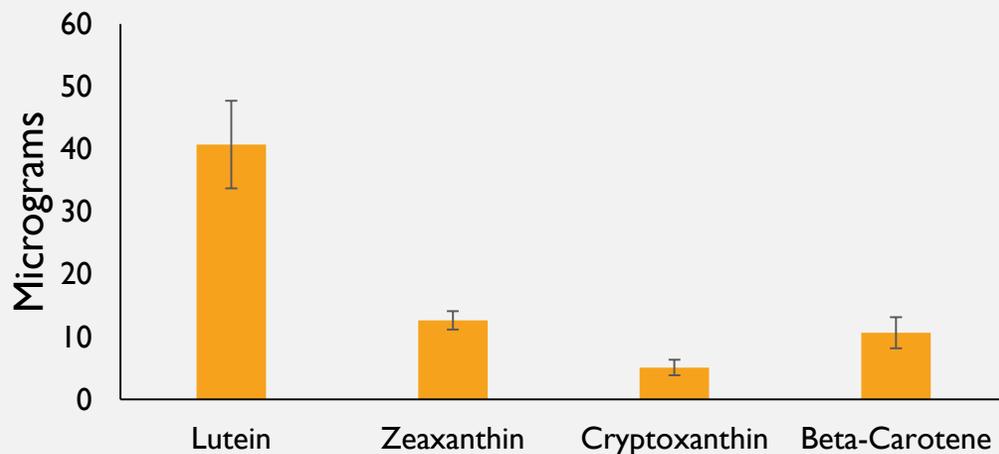
Added Sugars



CAROTENOIDS

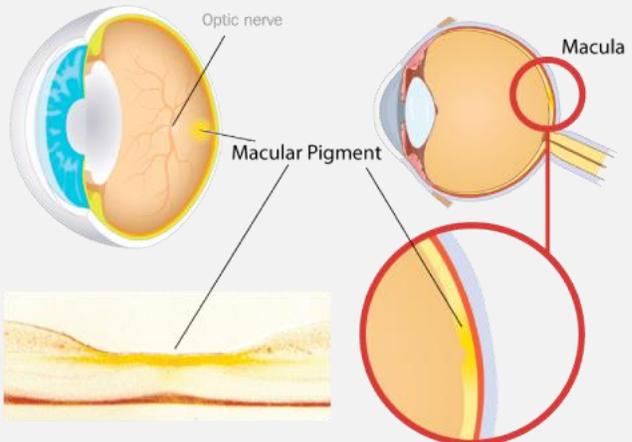
- Plant pigments which our bodies cannot produce on their own
 - Some carotenoids help our bodies create Vitamin A
 - Have antioxidant properties in some regions of our body (eyes)
- Deposit in brain tissue

Carotenoids in Infant Hippocampus¹

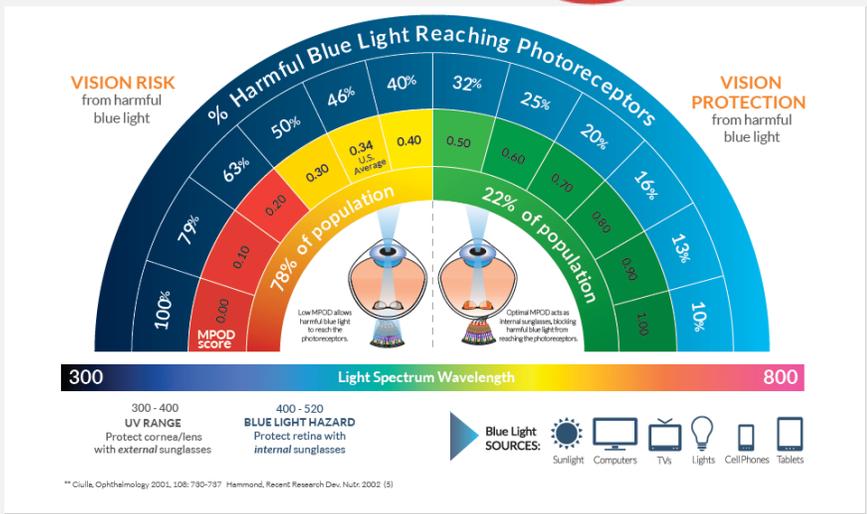




CAROTENOIDS AND COGNITIVE FUNCTION



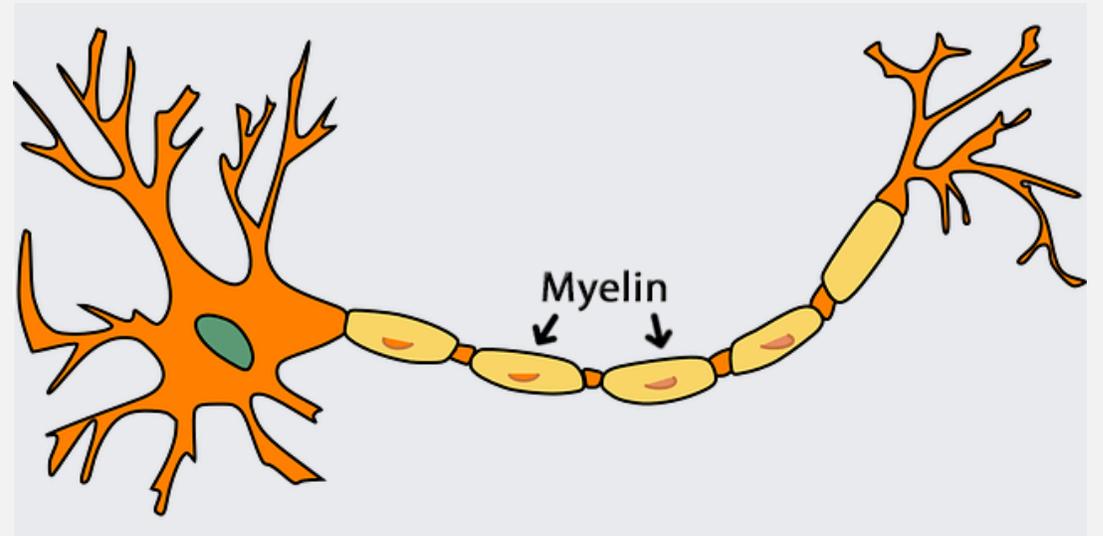
- Carotenoids in the eye are related to...
 - Better memory function³
 - Faster processing speed⁴
 - Improved executive functioning⁴
 - Better academic achievement²





OMEGA-3 FATTY ACIDS

- Omega-3 are healthy fats found in foods like fish, eggs, and oil
- Omega-3 fatty acids are building blocks for the insulation (myelin) of neurons in the brain
- Better insulation of neurons leads to faster processing speeds





SATURATED FATS

- Saturated fats are primarily solid fats found in butter, red and preserved meats, and lard
- Saturated fats can impact how fluid cell membranes in our body are, because of how rigidly they can stack next to each other

* saturated fatty acids



Try to stack these...



NEAT!



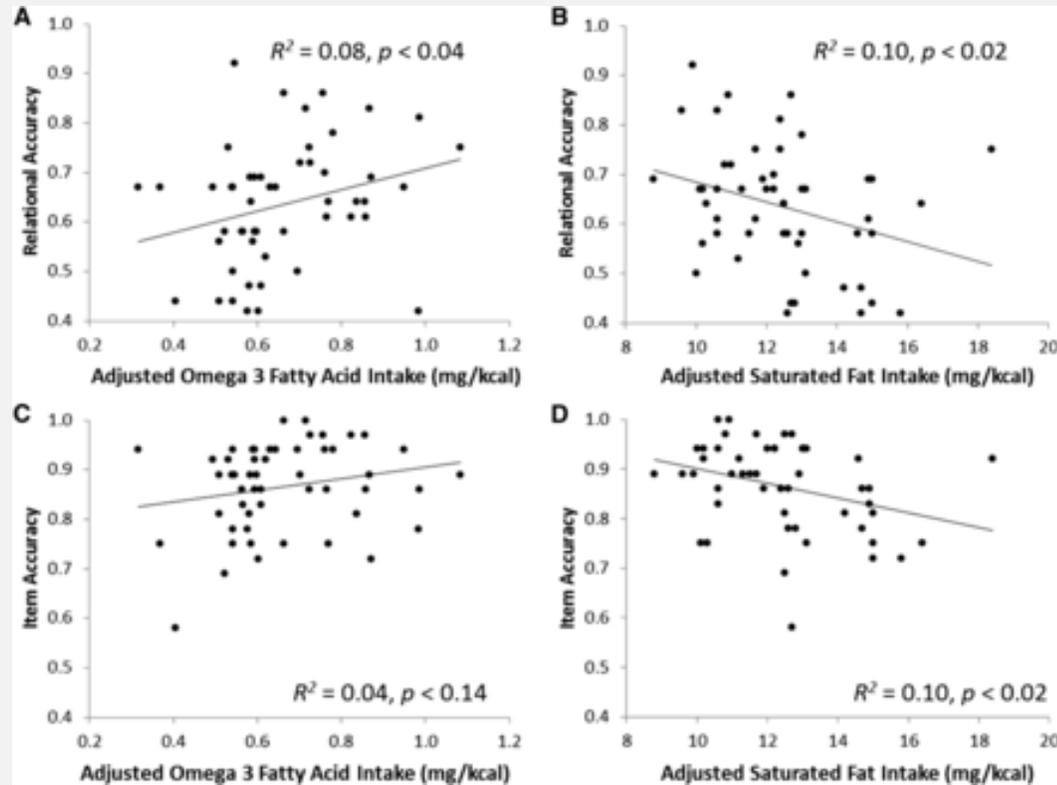
unsaturated fatty acids



NOT AS NEAT!



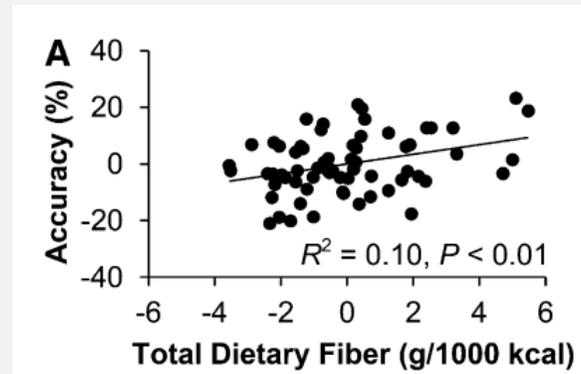
FAT CONSUMPTION AND MEMORY FUNCTION⁵





FIBER

- Carbohydrate which cannot be broken down by the body
- Helps regulate blood sugar and keeps us full longer
- Studies have found that fiber is related to improved attention and cognitive control abilities⁶

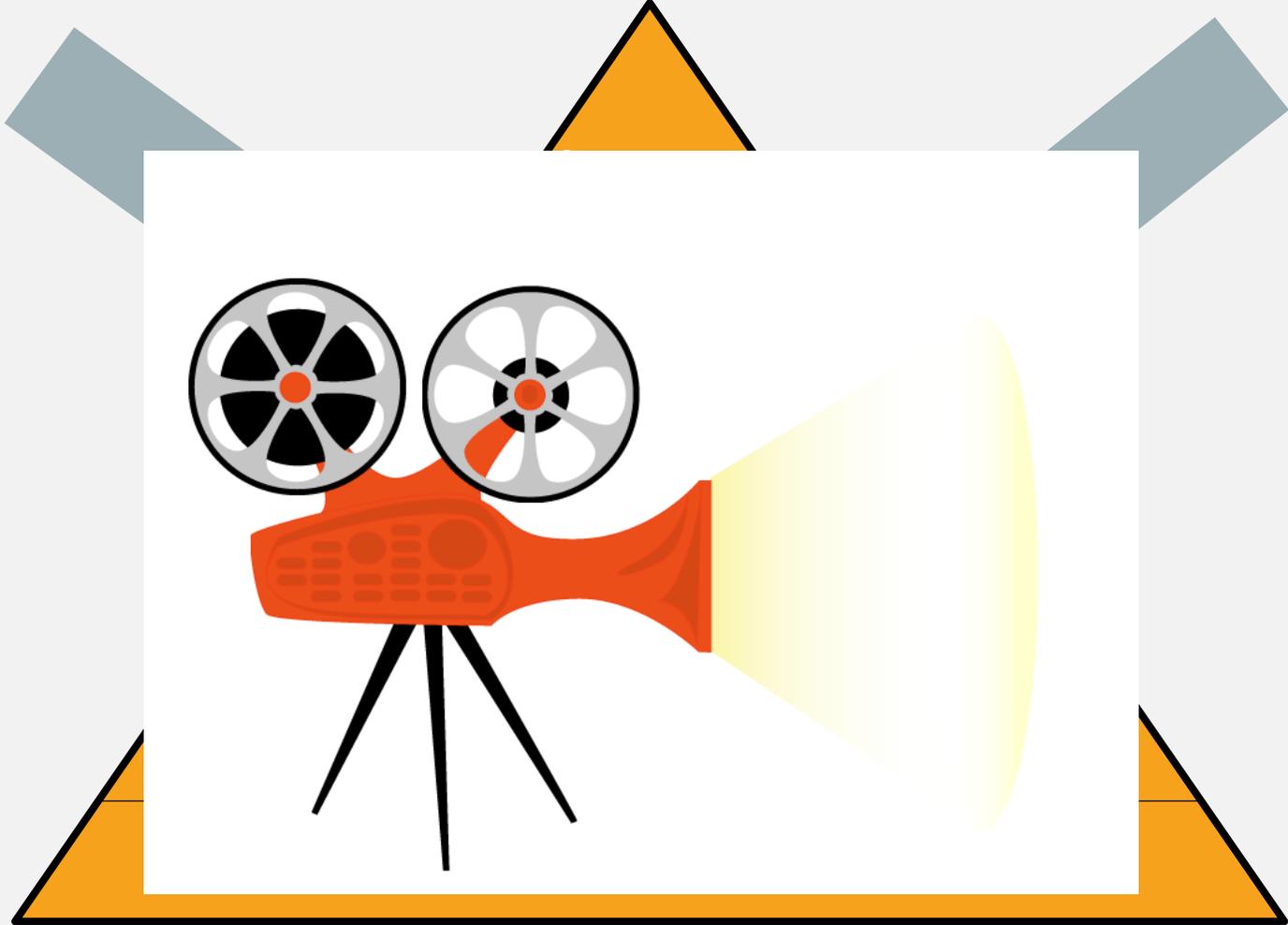


- Higher fiber consumption is found to be associated with better creative thinking abilities⁷



ADDED SUGAR

- Added sugars are prevalent in a variety of processed foods which may or may not contain naturally occurring sugars
- Added sugar refers to sugar being added to a food product, and does not have to do with whether or not the sugar is "natural"
 - Corn Syrup is a commonly used added sugar and is created from starches found in corn
- Added sugars have been related to poorer creative thinking abilities⁸



WATER

- Water is an essential nutrient needed for normal body functioning
- It is estimated that about **50%** of US children are not properly hydrated⁹





Drinking more water improves multitasking ability in children, study finds

Drinking water not only keeps children hydrated, but also increases

OCT 28, 2019 9:30 AM

WATER INTAKE STUDY

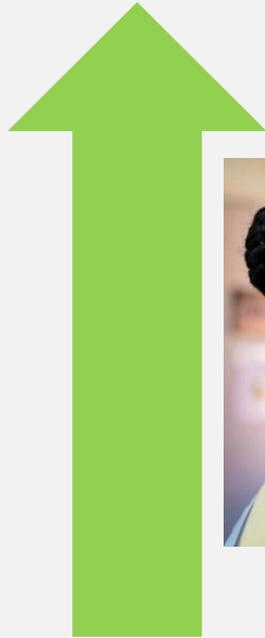
Normal Intake



High Intake 2.5L/day



Low Intake 0.5L/day



BREAKFAST IS THE MOST IMPORTANT MEAL OF THE DAY?

HOW MUCH does nourishment weigh?

Kellogg's RICE KRISPIES

This informal little balancing act is here to show you that food doesn't have to be heavy to be loaded with vitamins, minerals, body-building and energy values. Light as it is on the spoon, Kellogg's Rice Krispies gives you the important nutrition of sun-ripened whole grain rice. Trim young moderns are rediscovering this as a surprising source of nourishment without weight. How about you?

Kellogg's RICE KRISPIES

Small text at bottom: This famous cereal, which has helped nourish generations of children, has proved itself to be going "Snap! Crackle! Pop!" These engaging sounds are the way of reporting that Kellogg's Rice Krispies is the world's simplest cereal, and when you're right down to the bottom of the bowl.

EAT A GOOD BREAKFAST DO A BETTER JOB

Breakfast is the most important meal of the day because the body has been without food for 10 or 12 hours and should be supplied with nourishment for the morning's activities. Nutrition authorities recommend that we get from one-fourth to one-third of our daily food requirements at breakfast. Cereal breakfast Foods are a Basic 7 Food and should be included in your breakfast meal.

The complete protein breakfast that's quick as instant coffee

Four half a cup of milk over a bowlful of Kellogg's Special K—and a complete protein breakfast is ready for your spoon. This unique combination provides essential, complete protein—about 15% of a grownup's daily protein requirement. And tastes so good you'll enjoy it day after day.

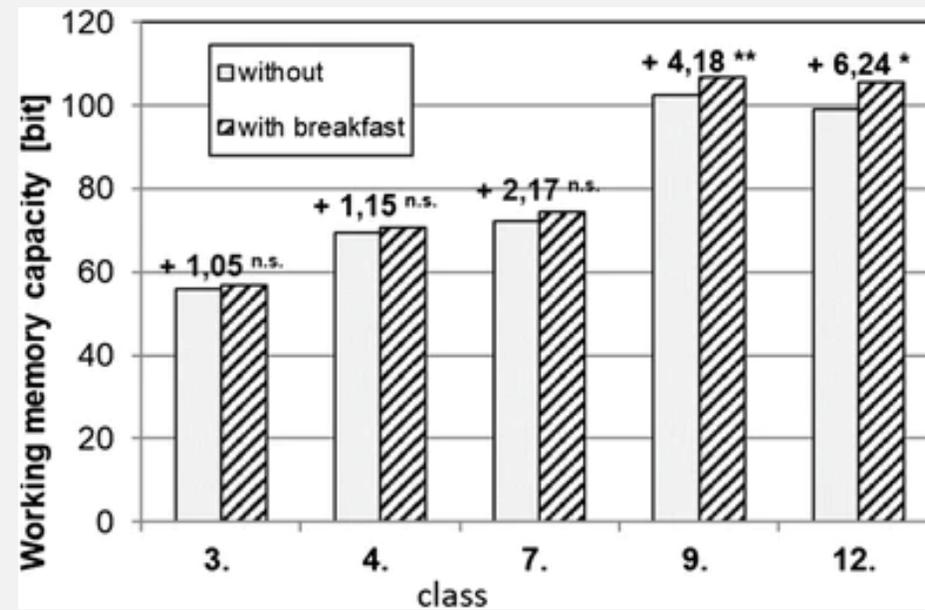
"The best in you each morning"

Kellogg's SPECIAL K

© 1951 by Kellogg Co.

EVIDENCE FOR BREAKFAST AND BRAIN HEALTH

- There is evidence that children who consume breakfast perform better on academic skills¹⁰ and cognitive functions¹¹
- Breakfasts containing whole grains and were preferred to those high in sugars¹⁰



KEY TAKEAWAYS

Nutrition Associations

- Healthy brain functioning in childhood is related to more consumption of...
 - Carotenoids
 - Omega-3 Fatty Acids
 - Fiber
- Poorer brain functioning in childhood is related to higher consumption of...
 - Saturated Fats
 - Added Sugars

Water and Cognition

- Increased water consumption leads to better mental flexibility functioning of the brain

Breakfast Consumption

- The idea that breakfast is the most important meal of the day was started as a food advertising strategy
- There is some evidence that shows breakfast may benefit children's academic abilities

REFERENCES

1. Vishwanathan R, Kuchan MJ, Sen S, Johnson EJ. Lutein and Preterm Infants With Decreased Concentrations of Brain Carotenoids. *J Pediatr Gastroenterol Nutr* 2014;59:659–665.
2. Barnett, S. M., Khan, N. A., Walk, A. M., Raine, L. B., Moulton, C., Cohen, N. J., ... Hillman, C. H. (2018). Macular pigment optical density is positively associated with academic performance among preadolescent children. *Nutritional Neuroscience*, 21(9), 632–640.
3. Hassevoort, K. M., Khazoum, S. E., Walker, J. A., Barnett, S. M., Raine, L. B., Hammond, B. R., ... Cohen, N. J. (2017). Macular Carotenoids, Aerobic Fitness, and Central Adiposity Are Associated Differentially with Hippocampal-Dependent Relational Memory in Preadolescent Children. *Journal of Pediatrics*, 183, 108–114.e1.
4. Saint, S., Renzi-Hammond, L., Khan, N., Hillman, C., Frick, J., & Hammond, B. (2018). The Macular Carotenoids are Associated with Cognitive Function in Preadolescent Children. *Nutrients*, 10(2), 193.
5. Baym CL, Khan NA, Monti JM, et al. Dietary lipids are differentially associated with hippocampal-dependent relational memory in prepubescent children. *Am J Clin Nutr* 2014;99:1026–1032.
6. Khan, N. A., Raine, L. B., Drollette, E. S., Scudder, M. R., Kramer, A. F., & Hillman, C. H. (2015). Dietary Fiber Is Positively Associated with Cognitive Control among Prepubertal Children. *The Journal of Nutrition*, 145(1), 143–149.
7. Hassevoort, K. M., Lin, A. S., Khan, N. A., Hillman, C. H., & Cohen, N. J. (Accepted/In press). Added sugar and dietary fiber consumption are associated with creativity in preadolescent children. *Nutritional Neuroscience*. <https://doi.org/10.1080/1028415X.2018.1558003>
8. Hassevoort, K. M., Lin, A. S., Khan, N. A., Hillman, C. H., & Cohen, N. J. (Accepted/In press). Added sugar and dietary fiber consumption are associated with creativity in preadolescent children. *Nutritional Neuroscience*. <https://doi.org/10.1080/1028415X.2018.1558003>
9. Kenney EL, Long MW, Craddock AL, Gortmaker SL. Prevalence of inadequate hydration among US children and disparities by gender and race/ethnicity: National Health and Nutrition Exam
10. Lauren T. Ptomey, Felicia L. Steger, Matthew M. Schubert, Jaehoon Lee, Erik A. Willis, Debra K. Sullivan, Amanda N. Szabo-Reed, Richard A. Washburn & Joseph E. Donnelly (2016) Breakfast Intake and Composition Is Associated with Superior Academic Achievement in Elementary Schoolchildren, *Journal of the American College of Nutrition*, 35:4, 326-333, DOI: [10.1080/07315724.2015.1048381](https://doi.org/10.1080/07315724.2015.1048381)
11. Zipp, A., Eissing, G. Studies on the influence of breakfast on the mental performance of school children and adolescents. *J Public Health (Berl.)* 27, 103–110 (2019). <https://doi.org/10.1007/s10389-018-0926-4>

QUESTIONS?

