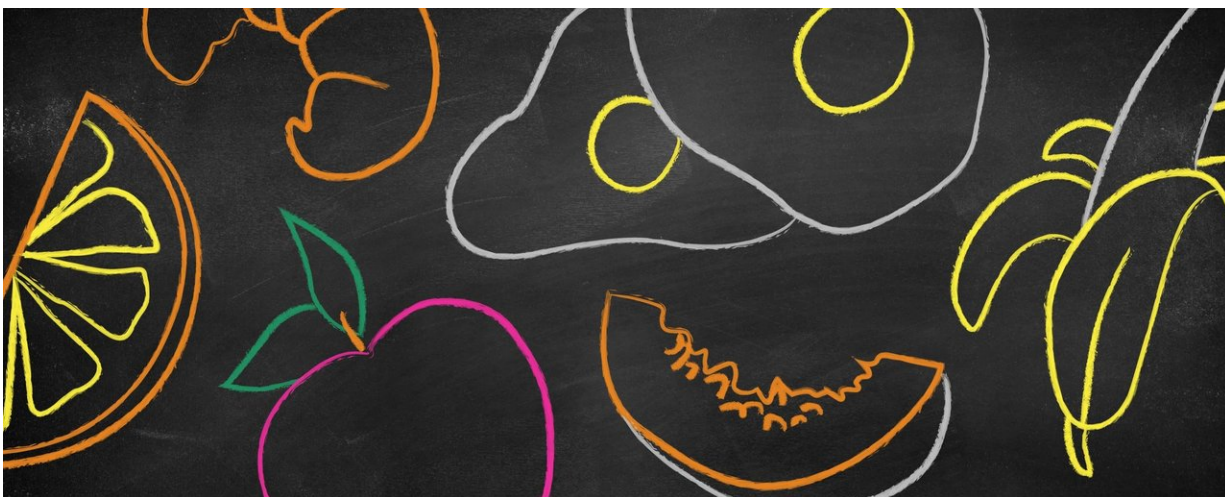


Exploring the connections between nutrition and learning

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Credit: University of Virginia

We all know it's hard to focus when you're hungry. Researchers at the University of Virginia's Curry School of Education are working across several fields to figure out why that is, how much it matters in the classroom and what we can do to make sure all children are well-fed and ready to learn.

"There is pretty solid evidence that [children](#) who are hungry are not able to focus, so they have a low attention span, behavioral issues, discipline issues in the [school](#)," said Sibylle Kranz, an associate professor of

kinesiology and a registered dietitian nutritionist in the Curry School. "Having children who are well-fed and not hungry makes a difference in their individual performance, and also how much they are contributing to or disrupting the classroom situation."

However, finding the most efficient and effective ways to help get children the nutrients they need involves parsing through complex and interconnected issues like poverty, accessibility and nutrition. Ongoing projects across several fields within the Curry School – including developmental psychology, policy and health and wellness – are exploring the many pathways between food and learning outcomes in school-age children.

Here are three ways researchers are diving in.

Developmental Psychology: Food Insecurity and Kindergarten Readiness

One recent study shows that food security – having reliable access to a sufficient amount of food – could affect learning as early as kindergarten. Published in the journal *Child Development* in March, the study found children who experience [food insecurity](#) in early childhood are more likely to start kindergarten less ready than children from homes that are food-secure.

The study looked at a nationally representative data set that measured how often children from low-income households experienced episodes of food insecurity over several years of early childhood. The researchers then compared children's kindergarten readiness – measured through a mix of math and reading tests and teachers' reports of children's skills in areas that lead to classroom success, like curiosity and self-control – for children who were and were not food insecure. It showed that food

insecurity in infancy and toddlerhood predicted lower cognitive and social-emotional skills in kindergarten.

Anna Markowitz, a postdoctoral researcher at the Curry School's EdPolicyWorks research center and a coauthor of the study, said it's important to distinguish food insecurity – which is feeling unsure about whether you will have enough to eat – from hunger. While they often go together, hunger is a physical experience, while food insecurity is psychological.

Markowitz also emphasized that the results are non-causal – that is, it's impossible to know whether or not food insecurity directly causes decreased kindergarten readiness. Particularly for young children, whose well-being is dependent on their parents, tackling food insecurity means diving into parents' well-being and therefore a web of poverty-related factors, including maternal health and mental health, families' general economic security, parenting practices and more.

However, nutrition may also be a significant pathway through which food insecurity can potentially affect children. "If you're a parent who's worried about the quantity of food, unhealthy calories are very cheap and healthy calories are not cheap," Markowitz said. "So that nutrition pathway could certainly be real."

What's clear, Markowitz said, is that a strong link exists between how secure a child's family feels about their ability to provide enough food and how prepared that child is when they enter kindergarten – and that helping young children learn is incredibly important to a host of long-term effects.

"There's a lot of social science research showing the long-term effects of those early skills," Markowitz said. "Children's early skills predict not just labor market attachment and wages, but also whether or not you're

likely to be incarcerated, your marriage, your physical and mental health."

While the problem is complex, the possibility for impactful work in this area is immense. "There is good evidence that kids are more malleable when they're younger, so those early years of life are really important when thinking about interventions," Markowitz said. "There are programs that we know work, and many more opportunities to improve children's lives at home, which is really exciting. If you can start kids off in a good place, you can make a big difference."

Education Policy: 'Nudging' Schools to Adopt Flexible Breakfast Programs

In other cases, resources are already available, but may not be reaching all the children who need them. Researchers from the Curry School and UVA's Department of Economics have partnered with Share Our Strength's No Kid Hungry campaign, a child nutrition advocacy group, and Ideas42, a behavioral design firm, on a study encouraging school districts in six states to adopt flexible [breakfast](#) programs that have been shown to feed more children.

Called "Breakfast After the Bell," the flexible breakfast program was developed by the United States Department of Agriculture to address the large percentage of eligible students across the country who don't eat the free or reduced-price breakfast that their school provides. Breakfast programs are typically underutilized compared to lunch programs, possibly because they require students to arrive at school early, or because of social stigma.

"Breakfast After the Bell" has been shown to increase the percentage of students taking advantage of school breakfast by delivering the food

directly to classrooms on a mobile cart, instead of serving it in the cafeteria.

"In the long term, schools that adopt Breakfast After the Bell and allow kids to take meals to, or eat in, the classroom will see improved behavior, focus and performance from their students, due to kids' better nutrition that results from greater participation in breakfast," said Wendy Bolger, director of program innovation strategy at No Kid Hungry. "Students who can start the day on task because they are not distracted by an empty stomach are more ready to learn."

However, only a small percentage of schools have adopted these programs. "These programs are really effective at increasing the number of students who eat breakfast, but they're only in 20 percent of schools," said Zach Sullivan, a doctoral candidate with the Curry School's Nudge4 lab.

Sullivan said while the programs are inexpensive overall, they still involve some start-up costs, like purchasing a cart or extra trashcans for classrooms. Another hurdle can be developing buy-in from teachers and cafeteria workers, who may need to adjust schedules and routines to accommodate the program.

That's where the work with UVA, No Kid Hungry and Ideas42 comes in. In a large-scale study involving 2,500 elementary schools, researchers are using the theory of behavioral "nudging" – using simple, low-cost tactics to "nudge" someone toward a certain behavior – to encourage schools to switch to a flexible breakfast program.

"The main research question was: Can we use low-cost, scalable outreach to increase the number of schools who are adopting these flexible breakfast strategies?" Sullivan asked.

Researchers sent low-cost mailers to school district decision-makers explaining the benefits of Breakfast After the Bell, varying the messaging to test different persuasive tactics. They also sent follow-up emails and offered grants to cover start-up costs.

"By making salient the low-cost, easy-to-implement effective strategies schools can use to deliver breakfast, and by nudging school leaders with social comparisons of similar schools that have achieved higher participation rates, we hope to meaningfully improve both school nutrition and academic performance," said Ben Castleman, an assistant professor of education and public policy and director of the Nudge4 Solutions Lab.

The breakfast project has been in progress for more than a year, with results expected in 2018. If researchers find the mailers had a positive effect on the number of students eating breakfast, Sullivan said the team plans to compare the results with publicly available student outcome data, like attendance and test scores. Ultimately, they hope to study whether the increased breakfast improves school performance.

"We were so pleased to work with the team at UVA because of their track record and commitment to simple, scalable solutions in education policy," said Bolger, of No Kid Hungry. "Also, we needed a team that would take risks with us and be innovative and flexible – we had other partners drop out because they felt the challenges we were tackling were too hard. The UVA team held on to the vision of improving the lives of at-risk students and were motivated by their desire to apply past successes with social norms messaging to persuade this new audience of school stakeholders to adopt Breakfast After the Bell."

Health and Wellness: Making School Snacks More Nutritious and Filling

In the Curry School's kinesiology program, associate professor Sibylle Kranz is studying school nutrition from a different angle. Instead of looking at whether or how much children are eating in school, she's interested in what they're eating – and whether it's nutritious enough.

"There's a pretty large proportion of kids who just don't have any access to food at home," said Kranz, who is also a certified child nutrition epidemiologist. Not being able to "just whip out something to eat in the middle of their lessons as needed" means children require "nutrient-dense meals and snacks," she said.

Much of Kranz's research has focused on improving the quality of the food that children receive in school by making small changes or substitutions that increase the amount of dietary fiber, with whole grains, fruits, vegetables or protein in school breakfasts and snacks.

So far, the results have been positive. In a study published in the *Journal of Nutrition* in March, Kranz and her colleagues found that serving high-protein and high-dietary fiber breakfasts improved the quality of preschoolers' diets. Kranz said even if children are resistant to new foods at first, they quickly adapt – and significant gains in health measures, such as fiber intake, can be observed even among children who only changed their diets minimally.

"The main premise is that it is possible for us to make small changes to what's served," she said. "Because it's in a child care setting, children are very likely to accept it."

The next step, she said, is studying the link between a better diet and learning outcomes. "Part of what I'm working on now is trying to figure out if kids who feel full longer learn better," she said. "There's a lot of literature on the importance of breakfast, but it's mostly looking at having breakfast versus not having breakfast, but not the level and time

to metabolize the glucose in the bloodstream, or the type of breakfast."

In future research, Kranz plans to examine how nutritionally rich foods high in fiber and protein affect learning outcomes in children. She believes when it comes to improving student learning, it's about quality, not quantity. A more filling breakfast could make a big difference.

At a time when the U.S. struggles to address a growing trend of childhood obesity, improving the nutritional benefits of the food children eat at school has the potential for a range of other health benefits. "It's improving diet quality and thereby improving both learning outcomes and health," Kranz said.

In all of these areas, researchers say they still have much to learn about how nutrition affects learning – and what teachers, parents, administrators and policymakers can do to help. But each new study that sheds light on this complex issue brings us one step closer to ensuring all children have the nutritious [food](#) they need to reach their full potential in the classroom.

Provided by University of Virginia

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