WHAT'S FOR DINNER, BABY?

UNCG researchers bring research-based strategies to support parents and babies, from infant nutrition to healthy child development

How and what infants eat has profound and long-lasting effects on their health and well-being – including obesity rates and how vulnerable they are to illness and chronic health conditions as they grow older.

Around the world, an estimated 37 million children are obese, as well as a growing share of adolescents and adults.

But many questions remain about the pathways through which feeding and nutrition influence child development. UNCG researchers are leveraging cross-disciplinary expertise to answer those questions and develop evidence-based strategies to improve maternal and child wellbeing.

These scientists are lowering barriers to breastfeeding, improving the safety of donated breast milk for preterm infants, and uncovering which feeding practices lead to infant and child weight gain. And, ultimately, they're improving nutritional outcomes, early life development, and long-term health, here at home and across the globe.

Breaking Down Barriers to Breastfeeding

It's no secret to most parents that breastfeeding is tough. But popular culture tends to present this critical activity as effortless and intuitive – setting some parents up for a surprise when they face barriers, including lack of time, support, and confidence, as well as physical limitations.

Dr. Jasmine DeJesus, an associate professor in psychology, recently experienced difficulties breastfeeding her first child. "I just have one experience with one kid, but it's really opened my mind up: What are the bigger range of experiences?" she asks.

Now, DeJesus and Professor Jigna Dharod in nutrition are leading a $784,369 NIH-funded trial to reduce the barriers Latine parents face when breastfeeding.

It's a needed project with trickle-down impacts that can help address the high obesity rate among U.S. Latine children. Almost half of the adult U.S. Latino population is obese, and infant nutrition serves as the foundation for lifelong health.

Formula feeding is linked to rapid weight gain in infants, which is in turn linked to childhood obesity and to lifelong obesity, the researchers say.

DHAROD, DEJESUS, and grad student Selena Villa with Director Julie Wenzel at the Cone Health MedCenter for Women

In a 2023 study of low-income families, Dharod and DeJesus found that infants who were fed only formula had three times higher risk for rapid weight gain.

STUDENT RESEARCHERS Diana Marcos Rosas and Villa in Dharod's lab

"Infancy is a very important life stage. It's a highly developmental phase, and it's a phase of immense opportunities," Dharod says. "At the same time, any vulnerabilities during this phase can have a lifelong impact."

In their latest investigation, the researchers want to know whether peer counselors and financial compensation can help increase parents' confidence in continuing with breastfeeding.

"Previous literature shows that many times a mother's intentions are to continue with breastfeeding, but they stop," Dharod says. "One of the key predictors of this is low self-efficacy, or confidence, in their ability to breastfeed."

Finances and government policies can also play a role. Through WIC – the U.S. Department of Agriculture's Special Supplemental Nutrition Program for Women, Infants, and Children program – low-income parents can opt into different packages for breastfeeding or formula feeding.

"The monetary value of WIC's breastfeeding package is much lower than the formula assistance package," Dharod says. "With formula assistance, families receive a few hundred dollars' worth of infant formula. Exclusively breastfeeding mothers receive supplemental foods worth about $75."

DeJesus and Dharod designed their trial to provide needed support to parents looking to breastfeed more.

"What's most novel about our approach is to have culturally matched and bilingual peer counselors," says DeJesus. "A peer counselor, especially one who speaks the same language as participants, can provide knowledge that can be helpful in navigating challenges."

Strengths of this project include its community connections and involvement of dedicated UNCG students. "It's possible because we have partnerships in place to reach hard-to-reach populations," Dharod says.

> **Dr. Marjorie Jenkins, Cone Health's system-wide director of nursing research, works closely with the UNCG team.**

"Through this research, we're ultimately changing lives as we discover new ways to make a difference in the communities we serve," Jenkins says.

The researchers say they feel the university's alignment with their work.

"There's a lot of support for community-engaged research at UNCG," DeJesus says.

"I think in other places people feel more stifled – like it'd be more of a risk for them to take on a project like this because their university may not value all the work it takes to cultivate these connections, but we have had this opportunity."

Spanish-speaking undergraduate and graduate students are also part of the research team, translating materials and recruiting mothers.

Selena Villa, a master's student in nutrition on the project, has conducted research with Dharod since she was a sophomore at UNCG.

> ***"I didn't know you could do research like this as an undergraduate, and I was just shocked,"* Villas says.**

Dharod and DeJesus are equally appreciative of the student researchers.

"They can be cultural brokers and help us bridge that gap and build trust," Dharod says. "It's a win-win situation for the research, the student, the community, and UNCG."

The researchers say they hope to build this work into a future larger-scale trial.

"In addition to learning something scientifically, we also have the power to actually help people," DeJesus says.

"That's something that's really exciting to me."

Growing Evidence

In a UNCG study on the psychological, biological, and social factors linked to rapid infant weight gain, researchers followed 299 women and their infants from pregnancy to toddlerhood and found that infant feeding practices associated with obesity, known as obesogenic practices, play a central role.

Examples of obesogenic practices described in their recent Pediatric Obesity paper include watching television while feeding a baby, formula feeding, and supplementing a bottle with additional foods.

> ***"The key take home point is that what and how parents feed their infants in the first 6 months of life has tremendous implications for obesity risk. Moreover, childbearing parents who experience more stress during the prenatal period are particularly likely to engage in these unhealthy practices,"*** **says Dr. Esther Leerkes.**

The Jefferson-Pilot Excellence Professor in human development and family studies served as lead author on the paper. Coauthors included Dr. Cheryl Buehler and graduate student Yu Chen in the same department as well as Safrit-Ennis Distinguished Professor Laurie Wideman in kinesiology and Dr. Lenka Shriver in nutrition.

Infants who gain weight rapidly before the age of two are at a higher risk for childhood obesity.

This set of findings is the most recent publication from UNCG's NIH-funded Infant Growth and Development, or iGrow, study – a $2.8 million longitudinal research program to better understand children's obesity risk by tracking infants' biological and social development from before birth until age two. The first aim of the iGrow study focused on determining the main predictors of infants' rapid weight gain by studying infants from before birth to approximately six months of age.

Researchers recruited 299 pregnant women and measured their physical and psychological health, known as prenatal psychobiological risk.

The researchers discovered obesogenic feeding practices strongly and significantly correlated with infant rapid weight gain, and that mothers' prenatal psychological risk increased the likelihood they would engage in obesogenic feeding.

While the findings highlight the importance of parents reducing obesogenic practices, Leerkes says it is important to understand barriers families may face with infant feeding.

"Parenting a baby is so challenging. Parents are frequently exhausted and overtaxed between family and work commitments and ongoing stressors, and they are presented with lots of information which can be hard to weed through."

Although breastfeeding is recommended to decrease obesity risk, some parents may not have this option due to time constraints, physical limitations, or other systemic level barriers.

"A variety of factors, including cultural and socio-environmental, can make it difficult for some women to breastfeed their babies," says Shriver.

"Our findings show that new parents can still prevent excessive weight gain in the first few months of their child's life even if breastfeeding is not a realistic option for them."

They recommend parents who are bottle feeding stay attuned to their baby, including watching for signs their baby could be full, observing suckling rate, and turning off the television. They also advise parents to avoid adding cereal, juice, or baby food to a bottle and to try not to use a bottle to soothe a baby that is not hungry.

The new publication represents the first set of findings testing one of iGrow's primary aims, and the researchers look forward to many more to come.

With an additional $3 million in NIH funding, the iGrow study recently expanded to include iGrowUP. Now, UNCG researchers are following participants all the way to the age of five, giving them a unique, longitudinal vantage point into obesity risk throughout infancy and early childhood.

Opportunity to Grow

UNCG Senior Jahleen Gourdine has a bright smile, sunflowers on her shirt, and steadfast determination to become a dietitian.

She's the picture of a standout student – excelling in her human nutrition and dietetics major and receiving multiple awards, including the Louise E. Lowe Scholarship. But Gourdine's path to where she is today was bumpy.

Gourdine initially attended college after graduating high school in 2018 but left before receiving her degree.

"I was kind of in this limbo state. I didn't really know what to do with myself," Gourdine says. "But then I found this lifestyle of being vegan and very cautious about our footprint, and it led me down this nutrition path."

Since then, Gourdine has been dedicated to dietetics, accumulating over 1500 hours as a dietary aide and supporting herself through school by working most nights as a registration specialist in the emergency department.

Now she's engaging in undergraduate research focused on childhood obesity for her senior honor's project thesis under the guidance of nutrition professor Dr. Lenka Shriver, one of the leaders on the iGrow study team.

Shriver has a specific interest in children's appetite behaviors and how eating in the absence of hunger – such as snacking on junk food when the child has already had a full meal – can contribute to obesity.

"The studies that exist in older children suggest a positive association between eating in the absence of hunger and weight outcomes, but we really don't have studies looking at toddlers or in longitudinal models," Shriver says.

"There's a lot of work that needs to be done. I'm excited that Jahleen is able to dig deeper into our iGrow data and start looking at this young age."

Gourdine is working with Shriver to analyze which factors, including socio-demographic characteristics and feeding practices, are associated with some toddlers eating more than others in the absence of hunger.

From analyzing data to writing a project abstract, Gourdine says participating in research has been a learning curve.

"Dr. Shriver has pushed me to write better and pay attention to how I'm reading these research papers. I really enjoy that," Gourdine says. "I'm very thankful."

Shriver describes Gourdine as a dedicated, organized, and goal-oriented team member. Over the past year, she says, she's enjoyed watching Gourdine embrace research and grow in her skills. "It's a great example of the role research funding plays in shaping and strengthening our state's workforce."

Gourdine plans to enter a master's program in nutrition. She says she'll carry her training with the iGrow team into her career as a dietitian.

"Being a part of research has shown me the groundwork, evidence, and real people behind those numbers," Gourdine says. "As a dietitian, it makes my recommendations a lot more credible."

WHEN SHE BECAME INTERESTED in nutrition and sustainability, Jahleen Gourdine decided to give college a second try. Now she's graduating with uncommon nutrition research experience and plans to pursue a master's degree.

Donor Milk for Preterm Infants

PERRIN IS ACTIVE IN POLICY efforts to promote safe practices in donor milk banking.

Donated human breast milk, or donor milk, is in high demand. For babies born prematurely to a parent unable to provide breast milk, it can even be a matter of life and death.

These preterm babies are at a high risk for a potentially fatal gut infection, necrotizing enterocolitis, and being fed breast milk can improve their odds. When parents are not yet able or unable to breastfeed, donor milk can be critical.

But, contrary to popular belief, not all breast milk is the same.

"There's millions of very vulnerable babies being fed donor milk, but we don't know what it is nutritionally," says UNCG associate professor of nutrition Maryanne Perrin. "It's not a consistent product, and we don't understand the sources of variation."

In Dr. Perrin's laboratory, she's working to unravel these differences in donor milk: a problem she's well-suited, and arguably the first, to address. Perrin worked as an industrial engineer for years before going back to school for her doctorate in nutrition after having children.

"This is nutrition science, but it's also the industrial engineering processes of making donor milk," Perrin says. "I never imagined finding a field that brought together the first and second halves of my very different careers."

If you thought all donor milk is the same, you're not alone. Perrin says it's a common misconception, even among medical professionals.

While some aspects of breast milk are similar – all have a high level of lactose – other nutrients vary. Mothers' genetic differences contribute to some of the variations, she says. Timing of the donation may also play a role.

"If you're an infant and born preterm, we're pretty sure that your mother's milk is going to be higher in protein than a mother who gave birth at term."

After milk is donated, the storage and pasteurization processes can also cause changes to the milk, such as less fat from container transfers and a decrease in some micronutrients, including Vitamin C.

Perrin is currently collecting and assessing samples from 600 approved milk donors at eight different milk banks from around the world, including the U.S., Kenya, Poland, Chile, and Vietnam, to assess nutrients and bioactive factors and compare samples. The critical work has received $1.4M in funding from the National Institutes of Health.

Her team already has results for over 50 nutrients. Among their preliminary findings, they have discovered donor milk has greater variation in its micronutrients – the vitamins and minerals – compared to its macronutrients – the fat, lactose, and protein.

Perrin and her team plan to use computer modeling to see how milk banks can reduce this variation during the production process. They plan to wrap up and publish this work in the spring.

"This study is important because it is going to establish a very rich reference value for what we can expect the nutrients in donor milk to be. It's a first step," Perrin says.

"If we know what's in donor milk, we can think about how we might change our feeding protocol – such as adding fortifiers to donor milk, to better meet premature infants' nutritional needs."

Donated milk is collected by milk banks for processing and distribution. In 2022, Perrin was tapped to be one of 16 members of a World Health Organization group for establishing and implementing safe and quality human milk banking systems. Perrin, the only U.S. researcher, serves as its co-chair.

By creating consistent standards for milk banking, the global group is helping ensure babies most in need of donor milk receive it safely.

"This is a population that didn't exist 30 years ago – babies that were born around 24 weeks didn't survive," Perrin says. "There's so much work to be done."

by Rachel Damiani