

UNC researchers explore the genetic,
environmental and individual components
of obesity and weigh in with solutions

Overcoming Obesity

BY EMILY J. SMITH

It's no secret that the United States has a weight problem. Sixty-five percent of American adults are either overweight or obese according to the latest National Health and Nutrition Examination Survey (NHANES).

What's more, the problem is getting worse. While just 23 percent of the U.S. adult population was considered obese during the 1988-94 NHANES survey, that figure rose to 30 percent during the most recent survey between 1999 and 2002.

Children and youth seem to be particularly at risk, with 16 percent of young people ages 6 to 19 being overweight today — a figure triple that of 25 years ago.

These figures are disturbing, particularly among youth, since children and adolescents who struggle with weight are at greater risk of being overweight as adults. And weight problems during any stage of one's life increase one's risk for numerous serious health conditions including type 2 diabetes, stroke, coronary heart disease, hypertension, gallbladder disease, osteoarthritis, sleep apnea, and breast, colon, and endometrial cancers.

"The situation is complex and because of this, the UNC School of Public Health is

tackling the problem from multiple interdisciplinary angles including exploring the genetic, environmental and individual components of obesity and testing interventions to overcome the problem," says Dr. Barry Popkin, a professor of nutrition at the UNC Schools of Public Health and Medicine and a fellow at UNC's Carolina Population Center.

The School's obesity work includes:

- ◆ *Interventions to increase activity levels among youth;*
- ◆ *Laboratory studies exploring the obesity predisposition of genes;*
- ◆ *Evaluations of the effectiveness of workplace weight-loss programs;*
- ◆ *The development of "toolkits" to help primary care physicians counsel parents about children's weight;*
- ◆ *Studies exploring how obesity impairs immune response;*
- ◆ *Development and evaluation of Internet-based weight-loss programs;*
- ◆ *And investigations into the ways that the environment affects physical activity and access to healthy foods.*

"Over the past several decades, we've seen wide-ranging shifts in both diet and activity levels within every sector of the U.S. population. Consequently, interventions are needed at all levels of society to reduce obesity and help Americans become healthier," says Popkin, who heads the UNC Interdisciplinary Obesity Center (IDOC), founded last year on the Carolina campus with funding from the National Institutes of Health (NIH). The grant is part of NIH's "Roadmap for Medical Research," an initiative focused on transforming the nation's medical research capabilities and speeding the movement of medical and health discoveries from research to practice. The new Center brings together 75 faculty members from 23 departments and seven UNC schools. Thirty-one of the Center's faculty are from the School of Public Health.

"IDOC allows faculty to make new connections with other faculty across campus," says Popkin. "This has resulted in numerous new interdisciplinary research projects."

The following examples show the range of faculty and departments involved in approaching this issue from many perspectives.

PHOTO BY CHRIS WALTHALL, PEDNET.

PHOTO: A young student at West Boulevard Elementary School in Columbia, Mo., enjoys a healthy snack after walking about a half-mile to school as part of "Walk-to-School Day." Columbia is one of 25 U.S. communities participating in the UNC School of Public Health's Active Living by Design Program.

Middle school girls from Sierra Middle School and Esperero Canyon Middle School in Tucson, Ariz., participate in the "Trial of Activity in Adolescent Girls" - or TAAG study. The study is testing an intervention to reduce the age-related decline in physical activity known to occur among middle-school-age girls.

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Reaching youth: School researchers find ways to help teens create healthy habits

Finding ways to reach youth and nurture healthy habits is essential to overcome the obesity epidemic, researchers agree. For this reason, numerous multidisciplinary School studies — including the "Trial of Activity in Adolescent Girls." — focus on reaching this population. This NIH-funded study, known as "TAAG," is testing an intervention to reduce the age-related decline in physical activity known to occur among middle-school-age girls.

"We are working with 3,600 girls in grades six through eight in 36 middle-schools across the country," says Dr. June Stevens, professor of nutrition at the School of Public Health and TAAG's principal investigator. "We conducted surveys to find out what physical activities the girls liked. Later, we brought in people from each community who could offer activity classes at the schools such as kick-boxing, volleyball, aerobic dance, basketball and flag teams. Social marketing was conducted at all the schools to promote physical activity as

something 'cool.' Our goal has been to focus on environmental-level interventions such as the aforementioned group activities and marketing efforts to produce change rather than individual-level interventions."

"Accelerometers" are used to test the girls' activity levels. These are similar to pedometers, except they measure both the amount and the intensity of most movements. The girls wear them for a week prior to starting the intervention, and then for a week two years post-intervention.

"So whether they're running for a bus or sitting still at a desk, the device is recording their movements," Stevens says. It is expected that TAAG will reduce by half the age-related decline in physical activity that normally takes place among girls this age. Study results are expected in 2007. ♦



Get Kids in Action challenges 5 million U.S. school children to “Get 60” everyday

Get Kids in Action is another program to create healthy habits in youth that School researchers have been instrumental in developing. The project — a partnership between the School of Public Health, the UNC Department of Athletics, and The Gatorade Co. — is identifying and implementing proven solutions to increase physical activity in children and decrease obesity in the United States.

Numerous studies and programs fall under this project’s umbrella, including “Get 60,” a program that will bring student-athletes from more than 25 U.S. universities into elementary-school classrooms this spring to inspire children to make physical activity part of their daily routine. The goal is to “Get 60” minutes of physical activity a day. Student-athletes will lead kids in weekly physical activity sessions and help them log their activities onto “Activity Trackers” supplied by either classroom teachers or available on the Get Kids in Action Web site (at www.getkidsinaction.org).

“What’s unique about Get 60 is that student-athletes develop an ongoing mentoring relationship with children over the six weeks which seems to provide increased motivation for children to get more physical activity, which is key to addressing the epidemic of overweight,” said Dr. Dianne Ward, the director of research for Get Kids in Action

and Carter have worked with media to publicize the program and to challenge 5 million U.S. kids to “Get 60” every day.

Preliminary research results have found that the classroom-based program works. Pilot-testing in two North Carolina elementary schools last year showed that 82 percent of the children participating in the six-week program reported achieving 60 minutes of daily physical activity at the end of the program, compared to just 14 percent of the kids at the program’s beginning.

The “Get 60” program will bring student-athletes from more than 25 U.S. universities into elementary school classrooms this spring.

and professor of nutrition at the UNC School of Public Health.

To broaden the reach of Get 60, three national champion athletes have adopted the program and are assisting in its national expansion: Mia Hamm (UNC alum, U.S. Olympic gold medalist and World Cup soccer star), Jennie Finch (U.S. Olympic gold medalist and Chicago Bandits softball star), and Vince Carter (UNC alum, U.S. Olympic gold medalist, NBA All-Star and New Jersey Nets basketball star). Children can use the Get 60 Web site at www.getkidsinaction.org to select one of these national champions to serve as their own personal mentor and to complete their own activity trackers.

Hamm, Finch

Get Kids in Action’s research is coordinated through “Linking Interventions for Children” or “LINC” — the project’s research arm. LINC researchers (which include faculty and staff from the UNC School of Medicine) are studying strategies that physicians, community groups and families can use to help children make wise food choices and become more physically active. One study, for example, is investigating the effectiveness of photo-equipped cell phones in assisting parents to measure their children’s diets. Kids involved with the study take pictures of their plates of food at the beginning and end of each meal, thus creating a record of how much was eaten. Another LINC study is developing objective measures of TV viewing time; and a third is testing the effectiveness of the “Dance Dance Revolution” video game in increasing activity levels among children.

“We are studying the problem from all angles to find places where successful interventions can be put in place,” Ward says. ♦



PHOTOS BY LISA KATZ

N.C. school children participate in “Get 60,” a recent “Get Kids in Action” pilot project pairing UNC student athletes with elementary schools for six weeks to inspire children to get 60 minutes of daily physical activity.

Targeting primary care physicians: UNC researchers arm physicians with skills to confront the country's growing childhood obesity problem

The School of Public Health is reaching out to kids through pediatric and family medicine primary care providers.

“Primary care providers are in a key position to identify children who are either overweight or at risk for weight problems and intervene directly via counseling or by offering parents links to existing community resources,” says Dr. Alice Ammerman, associate professor of nutrition and the principal investigator of an NIH-funded study aimed at developing and testing interventions designed to train and equip pediatricians, family practitioners, and their office staff to use their influence to combat the obesity problem.

The project is a collaboration with researchers from the UNC School of Medicine, UNC School of Nursing, UNC College of Arts and Sciences, North Carolina State University, Research Triangle Institute, North Carolina Department of Health and Human Services, and AccessCare. The pilot work for this research was conducted through the School's LINC project.

Among other things, the study is developing toolkits for providers and case managers to assist them with behavior risk assessment and communication when discussing physical activity and nutrition with parents. The kits will include strategies for using Body Mass Index (BMI) to identify children who may be at risk for weight problems. BMI is an indirect measure of body fatness calculated from a child's height, weight, age and sex. Also included are brief assessment and counseling guides that target key lifestyle behaviors associated with obesity in children.

“I think a lot of providers are afraid of offending parents when talking to them about their child's weight,” Ammerman says. “Using a color-coded BMI tool gets around that and allows physicians to talk to parents about weight in a more factual and less threatening way, and the counseling tools provide concrete and practical ideas on how to achieve and maintain a healthy weight.”

Later stages of the study will explore ways that providers can influence local policies impacting obesity including school nutrition

and exercise policies and city planning policies influencing placement of trails, parks and sidewalks in communities. The five-year study, which runs through 2010, will be working with 24 pediatric practices serving lower-income families in primarily rural areas of North Carolina.

“While providers are viewed as influential leaders in their communities, they often lack the tools, training and support needed to mount either practice-based or community-level interventions to fight obesity and consequently lack confidence that they can help combat this growing epidemic,” Ammerman says. “It is our hope that we can provide them with some of the necessary tools to do so.” ♦



PHOTO BY EMILY SMITH

PHOTO: (left to right) UNC physicians Dr. Ross Kuhner and Dr. Eliana M. Perrin council Millie Dunbar Gregory and her 5-year-old daughter Edwina about exercise and nutritious eating options.

UNC-developed interactive nutrition curriculum now used by 134 medical schools worldwide

“Nutrition in Medicine” — a nutrition program for medical school students developed by Dr. Steven Zeisel, UNC nutrition professor, and a team of researchers from the UNC Department of Nutrition — has made the move from CD-ROM to the Internet, allowing more medical students to learn how nutrition affects health and disease, and providing a way for instructors to more easily add and update materials.

The curriculum, which has been available on CD-ROM since 1998, consists of 11 major topics: pediatric overweight; sports nutrition; and nutrition and cancer, all now available online at <http://www.nutritioninmedicine.org/>, and nutrition and metabolic stress; diabetes and weight management; maternal and infant nutrition; nutrition and growth; nutrition for the second half of life; dietary supplements and fortified foods; nutritional anemias; and diet, obesity and cardiovascular disease; all presently available on CD-ROM and scheduled to become available online by spring 2007. Users must register to access the online modules.

UNC School of Public Health researchers are working with Medeor Interactive, Inc., to make course material available as continuing education for physicians and other health professionals. The curriculum is presently used by 95 U.S. medical and osteopathic schools and 39 international schools.

In the Lab: UNC researchers search for “fat” genes, identify connection between obesity and immune response to influenza

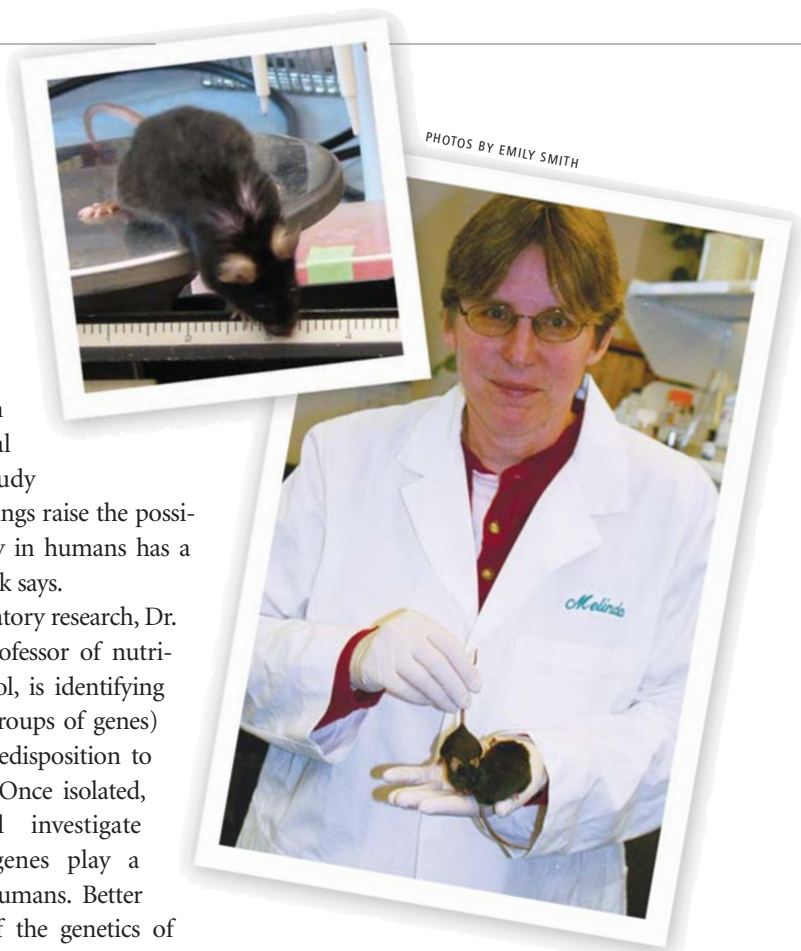
The School’s obesity research extends beyond the field and into the laboratory where UNC researchers are exploring both the genetic causes of weight problems and the increased disease risks that may result from excess pounds.

One example is a first-of-its-kind study examining the effects of obesity on the immune response to influenza infection directed by Dr. Melinda Beck, professor of nutrition at the UNC School of Public Health and professor of pediatrics in the UNC School of Medicine.

Study results, presented at a scientific meeting of the American Society of Nutrition in spring 2005, found that diet-induced obesity reduced laboratory mice’s ability to turn on elements of their immune system needed for controlling influenza infection. Obese mice were 10 times more likely to die when infected with

the flu virus than mice of normal weight, the study found. Such findings raise the possibility that obesity in humans has a similar effect, Beck says.

In other laboratory research, Dr. Daniel Pomp, professor of nutrition at the School, is identifying key genes (and groups of genes) that influence predisposition to obesity in mice. Once isolated, researchers will investigate whether such genes play a similar role in humans. Better understanding of the genetics of obesity could allow scientists to develop new diagnostic and obesity-management tools, including drugs to block or alter the products of obesity-related genes. ♦



PHOTOS BY EMILY SMITH

Dr. Melinda Beck is researching the effects of obesity on the immune response to influenza infection in mice. Her research has found that the heavier mice have less capacity to fight the virus than normal-sized mice.

UNC researchers test community and workplace initiatives designed to promote healthy lifestyles



PHOTO BY KRISTEN FRANSEN

A Seattle elementary school student carries her food tray to a table. To accommodate a culturally diverse student body, a Seattle elementary school participating in UNC’s Healthy Eating by Design community partnership has introduced healthy traditional and ethnic cuisines into their school cafeteria.

The U.S. obesity problem is not one that’s easily solved. Individuals and communities are up against the mainstays of modern society. We live in neighborhoods bound by roads that are unwalkable. We drive even short distances to go to school, work or shop. We eat foods sweetened by inexpensive (but fattening) high-fructose corn syrup. We sit for most of our working and leisure days, and our schools sell snack foods and soft drinks, cut physical education and recess times, and only irregularly offer nutrition education. Although we all know these things are bad for us, there are very strong forces that keep them in play.

“We’ve got a long way to go to turn this problem around,” Popkin says. “Essentially, our country is in the same place politically in

regard to obesity that we were in the 1950’s and ’60’s when we first began to think about the need for tobacco control in the U.S. There’s a lot of work to do. Many initiatives will need to focus on the physical, social and economic environment.”

Numerous School studies and projects are taking on the challenge of changing our environment. Active Living by Design is one of those. Program staff involved with this project, which is funded by the Robert Wood Johnson Foundation, are providing technical assistance to 25 U.S. communities to improve community design, transportation options, and trail and park accessibility — all features that influence the physical activity levels of community residents. In addition to addressing changes in the physical environment, Active Living by Design community partnerships focus on policy changes as well as programs and promotional activities. The idea is that integrating these “5Ps” in one

place can create the opportunities and social support necessary to help people make physical activity part of their daily routines.

Additionally, last spring, Active Living by Design launched its “Healthy Eating by Design” pilot program by awarding grants of \$50,000 to 12 of its 25 community partnerships to increase access to healthy foods and opportunities for healthy eating for children in low-income communities and schools.

“One unique aspect of this program is that it focuses on healthy eating from an environmental and policy perspective,” says Sarah Strunk, director of Active Living by Design. “A variety of studies confirm that families who live in low-income communities are less likely to have access to affordable and nutritious food. Research has shown, for example, that low-income communities have more fast-food restaurants and fewer accessible supermarkets and farmer’s markets than higher-income communities.”

The Healthy Eating by Design project is helping communities, many of which are low income, to apply the Active Living by Design 5P model to approaches that provide affordable, healthy and appealing foods in the places where children live, learn, and play. Healthy Eating by Design project initiatives include developing farmer’s markets and community gardens; limiting the availability of unhealthy food for purchase in neighborhood stores and restaurants; and developing healthy eating policies and guidelines for school snack programs, vending machines and after-school programs.

“A school principal in one of our Healthy Eating by Design communities has implemented a school policy that discourages teachers and other school personnel from walking around campus carrying or eating unhealthy foods like soda and chips,” Strunk says.

The grantees’ 18-month Healthy Eating by Design pilot projects run through December 2006.

The work environment is another arena that School researchers are changing. In a new \$1.3 million study funded by the Centers for Disease Control and Prevention (CDC), School researchers are investigating

how workplaces can be improved to support those trying to lose weight.

The study, known as “North Carolina WAY to Health Project,” is working with 1,100 employees in 15 North Carolina community colleges to test three different approaches that may assist employees who want to lose weight. “WAY” is an acronym for “Worksite Activities for You.”

“More than 60 percent of U.S. adults over age 18 are employed and spend a great deal of their waking

Study participants are randomly assigned to one of three program conditions. The first is an environment-only program called the Winners’ Circle Dining Program, which attempts to increase access to healthy foods at work. The second adds a state-of-the-art Web-based weight-loss program to the “Winners’ Circle.” The Web-based program was developed by Dr. Deb Tate, assistant professor of nutrition and health behavior and health education at the School. The third program condition offers both the

Winner’s Circle program and the Web-based program along with cash incentives for those who lose weight and maintain the weight loss over a 12-month study period.

“If we find effective weight-loss strategies, we will work with our partners to disseminate them to other interested employers across the state,” Linnan says.



Elementary school students in Columbus, Mo., participate in “Walk-to-School Day” organized by the PedNet Coalition, a Columbia-area bike-ped advocacy and promotion group.

“One unique aspect of the Healthy Eating by Design program is that it focuses on healthy eating from an environmental and policy perspective”

hours at work,” says Dr. Laura Linnan, the study’s principal investigator and an associate professor of health behavior and health education at the School. “Offering work-place health promotion programs — including weight-loss programs — makes sense, however employers need to have some idea about what programs are effective. Our study addresses this important gap in knowledge.”

Collaborative partners in the study include the N.C. Community College System, Research Triangle Institute, the N.C. Department of Health and Human Services, N.C. Prevention Partners, Blue Cross Blue Shield of North Carolina and the State of North Carolina Teachers and State Employees Comprehensive Major Medical Plan. ■

Anne Menkens contributed to this report.