Obesity, addiction, chronic fatigue syndrome, and the mental health impact of an economic recession—these are just a few of the subjects of research studies published by Mailman School faculty over the past year. Here’s a sampling of recent findings that advance public health science and have important implications for policy and practice. More information on these and other studies is available on the School’s website.

### Research Capsules

#### Nicotine ‘Primes’ the Brain for Cocaine Use

Cigarettes and alcohol serve as entry-level drugs that can pave the way for the use of marijuana and then cocaine and other illicit substances. This progression is called the “gateway sequence” of drug use—a long-term research interest of Sociomedical Sciences Professor Denise Kandel, PhD. A study in *Science Translational Medicine* by Kandel, Eric Kandel, MD, Amir Levine, MD, and colleagues provides the first molecular explanation for the gateway sequence. It shows that nicotine causes specific changes in the brain that make it more vulnerable to cocaine addiction—a discovery made by using a novel mouse model. The authors found that pretreatment with nicotine greatly alters the response to cocaine in terms of addiction-related behavior and synaptic plasticity in the striatum, a brain region critical for addiction-related rewards. The relationship between nicotine and cocaine was found to be unidirectional: Nicotine dramatically enhances the response to cocaine, but cocaine has no effect on the response to nicotine.

#### Blood-Thinner Battle Ends in a Tie

Neither aspirin nor warfarin was superior for preventing a combined risk of death, stroke, and cerebral hemorrhage in heart-failure patients with normal heart rhythm, according to a landmark clinical trial published in the *New England Journal of Medicine*.

The ten-year trial was the largest double-blind comparison of these medications for heart failure ever undertaken, following 2,305 patients at 168 study sites in 11 countries. In the head-to-head comparison, the combined risk of death, stroke, and cerebral hemorrhage was 7.47 percent per year for patients taking the blood thinner warfarin, widely known by its brand name, Coumadin, and 7.93 percent per year for those taking aspirin—a difference that is not statistically significant. Clinical Professor of Biostatistics John L.P. “Seamus” Thompson, PhD, was statistical principal investigator for the study; Columbia University Medical Center’s Shunichi Homma, MD, was clinical principal investigator.

#### Penny Soda Tax Promises Payoff in Less Obesity

A penny-per-ounce tax on sugar-sweetened drinks has huge potential to reduce obesity, diabetes, and heart disease, saving more than $17 billion in healthcare costs over ten years, according to a study led by Y. Claire Wang, MD, ScD, assistant professor of Health Policy and Management. Such a tax would also generate about $13 billion a year in revenue. Americans drink more than 13 billion gallons of such beverages a year, making them the largest source of added sugar and excess calories in the American diet. While many states impose a sales tax on soda, experts believe these taxes are too low to impact consumption. The authors estimated that a higher tax of a penny per ounce would cut consumption by 15 percent and thereby reduce the prevalence of obesity, diabetes, and cardiovascular disease. The findings were published in *Health Affairs*. 
Your Brain on Lead

Exposure to lead wreaks havoc in the brain, with consequences that include lower IQ and reduced potential for learning. But the precise mechanism by which lead alters nerve cells in the brain has remained largely unknown. Research led by Tomás R. Guilarte, PhD, Leon Hess Professor and Chair of Environmental Health Sciences, and postdoctoral research scientist Kirstie H. Stansfield, PhD, used high-powered fluorescent microscopy and other advanced techniques to painstakingly chart the varied ways lead inflicts its damage. The paper, published in the journal Toxicological Sciences, provides the first comprehensive working model of the ways in which lead exposure impairs synapse development and function. “Lead attacks the most fundamental aspect of the brain—the synapse. By better understanding the numerous and complex ways this happens, we will be better able to develop therapies that ameliorate the damage,” says Guilarte.

Chronic Fatigue Syndrome Is Not Linked to Suspect Viruses

A multisite blinded study led by W. Ian Lipkin, MD, John Snow Professor of Epidemiology and director of the School’s Center for Infection and Immunity, put to rest the notion that the viruses XMRV (xenotropic murine leukemia virus–related virus) and pMLV (polytropic murine leukemia virus) were behind chronic fatigue syndrome—sometimes called myalgic encephalomyelitis. Two earlier studies had pointed to the viruses as potential culprits, but the findings were not replicated in subsequent studies. Questions lingered, however, because the latter research had not examined a large enough sample of well-characterized patients. To definitively resolve the issue, the new study was commissioned by the National Institute of Allergy and Infectious Diseases and conducted under the auspices of the Center, in partnership with the Centers for Disease Control and Prevention, the Food and Drug Administration, the National Cancer Institute, and NIH Clinical Center of the National Institutes of Health. The research appeared in mBio.

For Young Girls, a Stressful Home Boosts Risk for Obesity

A stressful home life predisposes young girls to early-onset obesity, according to one of the first studies examining obesity risk factors in young children. Interestingly, the study did not find a similar association for boys. Assistant Professor of Epidemiology Shakira Suglia, ScD, and co-investigators looked at 1,605 preschool-aged children, obtaining reports from their mothers on various stressors the children may have experienced at ages 1 to 3, such as intimate-partner violence, substance use, a mother’s depressive symptoms, or a father’s incarceration. At age 5, girls were twice as likely to be obese if their mothers had reported two or more stressors at age 3. “Particularly for girls, when you’re seeing these patients coming in as obese children at age 5, there is probably more going on than what they’re eating and what their physical activity is,” notes Suglia. The results were published in Pediatrics.
When the Economy Slides, Suicides Rise

New evidence on the link between suicide and the economy shows that from 1990 to 2006 the monthly suicide rate in New York City was 29 percent higher at the economic low point in 1992 than at the peak of economic growth in 2000. “Economic hardship can hurt a person’s self-worth and limit the availability of social resources, including mental health care,” observed senior author Sandro Galea, MD, DrPH, Gelman Professor and chair of Epidemiology. White men under the age of 45 were the driving force of the association between economic activity and suicide, according to the study. Galea says that while the reasons are not fully understood, one possible explanation is that white men are in occupations that are more exposed to economic vagaries than those of nonwhites and women.

The results appeared in the American Journal of Epidemiology.

Life Grows Shorter for High School Dropouts

The gap in life expectancy between Americans with higher education and those without a high school diploma is growing wider, according to a study by the MacArthur Foundation Research Network on Aging, which is chaired by John W. Rowe, MD, professor of Health Policy and Management. More shocking still, life expectancy is falling for white men and women without a diploma: Such a woman could expect to live 78 years in 1990, but only 73 years by 2008. White men, meanwhile, lost three years. The biggest gap, however, persists between college-educated whites and blacks who don't complete high school. “Less-educated individuals have not participated in the remarkable gains in life expectancy we’ve seen in those with 12 or more years of education,” says Rowe. “This is not a strategy for success as a society.” Rowe and Dean Linda P. Fried, MD, MPH, were among the coauthors of the paper, which appeared in the journal Health Affairs.

Add Unwanted Pregnancy to Travails of Women in War-Torn Lands

A study led by Therese McGinn, DrPH, associate professor of clinical Population and Family Health, quantified the alarming gap between the desire of women in war-torn areas to limit their childbearing and the availability of resources and knowledge to enable them to do so. The situation leads to unintended pregnancy among women already contending with the stresses of violence and, in many cases, displacement. The researchers surveyed married women at six sites in Sudan, northern Uganda, and Congo. They showed that 30 to 40 percent of the women did not want to have another child in the next two years, and that an additional 12 to 35 percent of the women did not want any more children. Despite these numbers, the portion of women who were using modern contraception was under 4 percent at four of the sites, and 12 percent and 16 percent at the other two sites, where there had been some prior family planning services. Findings were published in the online journal Conflict and Health.