



Public Health Achievements of the Behavioral And Social Sciences: Improving Health at Home and Abroad

Reducing Tobacco Use

The biggest public health success story of the 20th century may very well be the reduction in tobacco use and smoking-related diseases. Lung cancer is the leading cause of cancer death—accounting for about one-third of all cancer deaths.¹ A well-known risk factor for lung cancer, smoking is also a risk factor for heart disease, chronic bronchitis, emphysema, and gastric ulcers.¹ Behavioral and social sciences research has led to the development of interventions such as increased tobacco taxes and smoking bans in public places; in combination with pharmacological interventions, this has led to declines in smoking rates. The dramatic reductions in male smoking rates from 51.9 percent in 1965 to 23.5 percent in 2009, and from 33.9 percent in 1965 to 17.9 percent in 2009 in female smoking rates,² have played a major role in decreasing death rates for cancer, heart disease, and chronic obstructive pulmonary disorder.³⁻⁵ Without these interventions, more than 45 million Americans might still be smoking,⁶ resulting in thousands of preventable deaths and millions of dollars in excess costs.

Improving Mental Health and Reducing the Burden of Addiction

An estimated 26.2 percent of adults in the U.S., more than 57 million adults, suffer from a diagnosable mental disorder in a given year.^{7,8} Major depression is a leading cause of disability in the United States; however a range of neuropsychiatric disorders, including Alzheimer's disease, schizophrenia, and bipolar disorder, continue to impact tens of millions of Americans each year.^{9,10} Biological, behavioral and social sciences research have made enormous strides in the past 30 years to understand the bio-behavioral mechanisms underlying mental disorders and to develop treatment options. Cost-effective therapies that combine behavioral and pharmacological regimens are now available for depression, anxiety disorders, and alcohol/drug abuse. Current advances help tens of millions of Americans with mental health conditions engage in healthier lifestyles; however those affected with mental health problems do not always receive treatment. In 2008, just over half (58.7 percent) of U.S. adults

with a serious mental illness received treatment for a mental health problem.¹¹ Additional research is needed to determine how to improve access to mental health services and treatments so they may lead healthy, productive lives.

Preventing Diabetes

Diabetes can lead to devastating complications such as heart disease, stroke, blindness, and premature death. Type 2 diabetes is growing at an epidemic rate, with more than 25 million Americans currently affected and 79 million more with pre-diabetes.¹² For many years, scientists believed that medication was the only tool to treat diabetes. A landmark study, the Diabetes Prevention Program, demonstrated that lifestyle interventions—modest changes in dietary intake and regular physical activity to induce weight loss—can reduce the risk of developing type 2 diabetes in high-risk adults by 58 percent, compared to 31 percent reduction with medication alone.¹³ The lifestyle intervention was so successful that a group-based lifestyle intervention was offered to all of the study participants in the next phase of the program. The original effect was quite durable over the long term. The subjects engaged in the lifestyle intervention from the beginning continued to show reduced rates of development of diabetes, compared to those who started the original study in the medication or placebo groups.¹⁴ These findings led to “Small Steps, Big Rewards,” the first national diabetes prevention campaign.

Slowing the HIV/AIDS Epidemic

Thanks to scientific advances in the biological, behavioral, and social sciences, HIV/AIDS in the U.S. is no longer considered the death sentence it was in the past. Whether the focus is to prevent transmission, to encourage testing and early treatment, or to increase adherence to medications, slowing the spread of HIV/AIDS requires understanding and changing attitudes, beliefs and human behavior at the individual, interpersonal, and community levels. Research in the behavioral and social sciences has extended our understanding of decision-making, drug abuse, and sexual behavior, and has resulted in innovative interventions

to modify behaviors and slow the spread of HIV/AIDS. Pharmacological treatment as prevention is also a promising new approach in the battle against HIV/AIDS. Several studies have demonstrated that combination antiretroviral therapy suppresses HIV viral loads in HIV positive individuals so that it is unlikely that they transmit HIV to their uninfected partners.¹⁵⁻¹⁸ Yet behavior continues to play a big role. Early HIV testing, and initiation of and adherence to treatment help ensure that persons during their most infectious period do not transmit HIV. As a result of this research, the number of people infected with HIV each year has dropped from a peak of 150,000 in the early 1980s to 49,273 in 2011,¹⁹ and mother-to-child transmission has fallen 94 percent from its peak in 1992.²⁰⁻²²

Reducing Sudden Infant Death Syndrome (SIDS)

Formerly known as “crib death”, SIDS is one of the leading causes of infant death, claiming the lives of more than 2,000 infants each year in the United States.^{23,24} One of the leading risk factors for SIDS is entirely behavioral – stomach sleeping. Behavioral and social sciences research led to the 1994 “Back to Sleep” campaign to promote infant back sleeping to prevent SIDS. As a result of the Back to Sleep Campaign, back sleeping increased from 13 percent in 1992 to 76 percent in 2006,²⁵ and overall SIDS rates declined by more than 50 percent since recommendations for back-sleeping were instituted in the early 1990s.^{26,27} The new-and-improved “Safe to Sleep” campaign builds on the success of “Back to Sleep” by describing ways that parents and caregivers can reduce the risk of other sleep-related causes of infant death, such as suffocation.²⁸

Promise of the Behavioral and Social Sciences

There is strong evidence that more than half of all deaths in the U.S. can be attributed to behavioral factors such as smoking, poor diet, and physical inactivity which may lead to heart disease, type 2 diabetes, lung disease, and some cancers.^{29,30,31} Even with the dramatic contributions of scientific research to date, much more needs to be done to understand the role of behavioral and social factors in disease and to use that knowledge to improve the nation’s health.

Transforming Health Care

Achieving the triple aims of better care, better health, and lower costs requires continued breakthroughs from behavioral and social sciences research. One focus of study is health care delivery. It is widely recognized that we spend nearly \$750 billion each year on health services that

have little benefit.³² In addition, there is remarkable variation in use and cost of health care across demographically-comparable regions. For example, the costs of end of life care in Los Angeles are up to 80 percent higher than in San Diego, despite essentially no differences in patient outcomes or satisfaction with care.³³ What happens to people is largely a function of provider choice, which often occurs with insufficient patient involvement. New behavioral research may inform policies on provider incentives, organization of health plans, and patient activation in shared medical decision-making. Evidence suggests that patients make good choices when they have the right information. One systematic review found that shared-decision making techniques improved patient knowledge and the patient experience, which included satisfaction, communication, quality of life, and self-efficacy.³⁴ Newer approaches expose patients to the very best outcome evidence and allow them to be more active participants in the decision making process.

The Role of Stress and Emotions on Health

The physiology of emotions has powerful effects on health and disease. One active area of research is stress and cancer. While psychological stress does not appear to cause cancer, long-term stress may affect the progression of the disease. Behavioral stress management interventions have been shown to influence immune function in cancer patients, raising the possibility that these therapies might be useful in battling the disease.³⁵ Similarly, drugs that block the actions of certain stress hormones have shown promise in reducing cancer progression in animal models and may have similar outcomes on certain cancers in humans.^{36,37} Other research focuses on how stress and emotion influence the body’s response to viruses and injury. One study showed that positive feelings of happiness, liveliness and calm were associated with a lower risk of developing an infection and fewer illness symptoms than expected in response to exposure to the cold virus.³⁸ Another found that married couples’ blister wounds healed more slowly following marital discord than after supportive interactions.³⁹ Additional research that integrates the biological, behavioral and social sciences is needed to understand how psychosocial factors influence physiological function and to use that knowledge to develop new interventions to improve health.

Gene-Environment Interplay

The “nature versus nurture” debate has evolved into a much richer exploration of how genetic and environmental factors interact in complex ways to explain traits and health outcomes. The explosion of genetics research has increased the number of tools available to behavioral and social scientists and has expanded the types of questions

that can be addressed. For example, studies in rodents have demonstrated how different parenting styles cause specific changes in gene expression in the brain of their offspring that in turn, dictate how those offspring respond to stress and how to behave when they become parents.⁴⁰ From this type of work, we are beginning to understand how gene-environment interactions are responsible for the intergenerational transmission of parenting behaviors and stress reactivity.⁴⁰ Gene-environment interplay is not limited to rodents. Studies in humans have shown that genes in our immune systems are expressed differently depending on the social context; such gene-environment interplay may explain the effects of loneliness and other psychosocial factors on health and well-being.⁴¹ New efforts to measure the “exposome”, or the totality of an individual’s exposures over the life course — including exposures to the chemical, physical, social and behavioral environments — are critical to our understanding of how genes and environments interact over a lifetime to influence health and disease. This knowledge has the potential to inform prevention and intervention efforts, and to help us design our environments to optimize health.

Understanding Behavior in Real Time and Space

Researchers and clinicians have long relied on patients’ recall of past behavior to understand their symptoms, concerns, and treatment needs. Individuals are asked to describe, for example, how intense their pain is during the day, what they ate in the previous 24 hours, how strong their cravings are to smoke, and on how many days they experienced pain or anxiety in the last month. This information is then used to guide treatment or to shape research questions. The challenge is that recall is often inaccurate, as it only includes what the individual is able and willing to recall. It also fails to measure or take into account the complex interplay of psychological and biological processes that shape behavior and, ultimately, health. Mobile Health (mHealth) involves using mobile phones and sensors to allow individuals to provide multiple reports about their experiences in real-time, real-world settings, as they go about their everyday lives. In addition to an individual’s self-report of his/her mood, behaviors or interactions, mHealth technologies simultaneously allow

for objective measurement of environmental and social factors (using cameras, sensors, microphones, and global positioning systems), as well as biological states, through the use of on-body and implanted sensors. Such mHealth approaches have created exciting opportunities to capture a rich, dynamic picture of people’s experiences – essentially, the ability to move out of the laboratory or doctor’s office and into real life. For example, providing mobile self-management skills feedback to people with type 2 diabetes was more effective in reducing hemoglobin A1c levels (a key indicator of diabetes management) than traditional diabetes care.⁴² mHealth tools have also been used to support adherence to medication regimens in settings around the world,⁴³ as well to promote sustained increases in fruit and vegetable intake and reductions in sedentary behavior.⁴⁴ In addition to interventions, mHealth tools are being developed for real-time tracking of personal air quality,⁴⁵ physiological signs of stress,⁴⁶ illicit drug use,⁴⁷ and emotion.⁴⁸ Thus, mHealth techniques are now being used to study the full range of human behavior and hold enormous potential to inform breakthroughs in behavioral and biomedical treatments and thereby improve health.

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