

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Description of Behavioral and Social Sciences Research

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Table of Contents

Executive Summary	1
Introduction	2
Background	2
<u>How is Behavioral and Social Sciences Research Defined at NIH?</u>	3
<u>What Do the Terms “Behavioral” and “Social” Mean?</u>	3
<u>What are the Core Areas of Behavioral and Social Sciences Research?</u>	4
What is the Role of Basic or Fundamental Research in the Behavioral and Social Sciences?.....	4
What is the Role of Clinical Research in the Behavioral and Social Sciences?.....	7
<u>What are Some Adjunct Areas of Behavioral and Social Sciences Research?</u>	9
What Has NIH Accomplished To Date?	11
<u>Behavioral and Social Science Funding at each Institute and Center</u>	12
<u>Trans-NIH Behavioral and Social Science Training Activities</u>	13
<u>Overview of Behavioral and Social Sciences Research at each Institute and Center</u>	13

National Cancer Institute.....	13
National Heart, Lung, and Blood Institute.....	17
National Institute of Dental and Craniofacial Research.....	20
National Institute of Diabetes and Digestive and Kidney Diseases.....	23
National Institute of Neurological Disorders and Stroke.....	26
National Institute of Allergy and Infectious Diseases.....	28
National Institute of General Medical Sciences.....	31
National Institute of Child Health and Human Development.....	32
National Eye Institute.....	36
National Institute of Environmental Health Sciences.....	38
National Institute on Aging.....	41
National Institute of Arthritis and Musculoskeletal and Skin Diseases.....	44
National Institute on Deafness and Other Communication Disorders.....	46
National Institute of Mental Health.....	47
National Institute on Drug Abuse.....	50
National Institute on Alcohol Abuse and Alcoholism.....	52
National Institute of Nursing Research.....	55
National Human Genome Research Institute.....	58
National Center for Research Resources.....	58
John E. Fogarty International Center.....	60
National Library of Medicine.....	62
Warren Grant Magnuson Clinical Center.....	64

What Conclusions Can We Draw?.....	65
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Description of Behavioral and Social Sciences Research

Executive Summary

In Senate Report No. 106-166, the Committee on Appropriations requested that the National Institutes of Health (NIH) describe its work in the behavioral and social sciences. The NIH Office of Behavioral and Social Sciences Research (OBSSR) compiled this report in response to that request.

The Senate expressed concern that behavioral science has not been fully incorporated into the public health mission of NIH. Therefore, they requested a detailed description of behavioral and social sciences at NIH, along with a breakdown by institute and center of funding and training activities in this field.

To understand what constitutes behavioral and social sciences research at NIH, we have provided a detailed definition in the *Background* section. It is divided into two parts: Core Areas of Research and Adjunct Areas. Examples of research topics and their implications are provided for each category.

A behavioral and social sciences research funding chart is located in the *Accomplishments* section, followed by a description of trans-NIH behavioral and social science training activities. The chart provides the amount of behavioral and social science research funded by each NIH institute and center from fiscal year (FY) 1996 through FY 2000. The estimated total of behavioral and social sciences research funded at NIH for FY 2000 is \$1,776,700,000.

The creation of a working definition of behavioral and social science research, the consistent utilization of this definition by all of the institutes and centers, and the annual budget reporting by each of the institutes and centers via the NIH Office of the Budget, permit a better assessment of the role of behavioral and social science research in accomplishing our mission. Although the amount of funding has varied across the institutes and centers, most show a steady increase over the past five years. To guide the NIH in its future funding of behavioral and social sciences research, the NIH Office of Behavioral and Social Sciences Research has contracted with the National Academy of Sciences (NAS) to identify research priorities in this area.

Description of Behavioral and Social Sciences Research

Introduction

In its report on the fiscal year (FY) 2000 budget for the Department of Health and Human Services, the Senate Committee on Appropriations stated:

“There is a growing public awareness of the behavioral and underpinnings of disease. Heart disease, lung cancer, liver disease, AIDS, suicide, developmental disabilities, and many neurological and cognitive disorders can be attributed directly or indirectly to unhealthy behavior. Yet NIH has never fully incorporated behavioral research as part of its core public health mission. The Committee urges the NIH to provide a detailed description of NIH’s ongoing work in the behavioral sciences, including a breakdown by Institute, and funds within each Institute of research and training activities included in NIH’s behavioral and social science portfolio.” (Senate Report No. 106-166, page 174)

The NIH Office of Behavioral and Social Sciences Research has prepared the following report in response to the above request.

Background

The NIH mission is to fund and conduct research that will result in an improvement in health. For the past five years, the Office of Behavioral and Social Sciences Research (OBSSR), which is located in the Office of the Director, has served to stimulate the growth of the behavioral and social sciences at the NIH. Although behavioral research has a long funding history at the NIH, we have become increasingly aware of its vital importance to our overall mission. Behavioral and social factors are important contributors to health and illness and frequently interact with biological factors to influence health outcomes. They also represent critical avenues for treatment and prevention.

When Congress created the OBSSR, it mandated that a standard definition of behavioral and social sciences research be established. This definition was to be used to assess and monitor funding for behavioral and social sciences research at all of the NIH Institutes and Centers. Heretofore, there had been no single definition of the field that could be used to assess and monitor NIH support of the behavioral and social sciences across all NIH Institutes and Centers.

How is Behavioral and Social Science Research Defined at NIH?

Behavioral and social sciences research is a large, multifaceted field, encompassing a wide array of disciplines. The field employs a variety of methodological approaches including: surveys and questionnaires, interviews, randomized clinical trials, direct observation, physiological manipulations and recording, descriptive methods, laboratory and field experiments, standardized tests, economic analyses, statistical modeling, ethnography, and evaluation. Yet, behavioral and social sciences research is not restricted to a set of disciplines or methodological approaches. Instead, the field is defined by substantive areas of research that transcend disciplinary and methodological boundaries. In addition, several key cross-cutting themes characterize social and behavioral sciences research. These include: an emphasis on theory-driven research; the search for general principles of behavioral and social functioning; the importance ascribed to a developmental, life span perspective; an emphasis on individual variation, and variation across sociodemographic categories such as gender, age, and sociocultural status; and a focus on both the social and biological context of behavior.

Behavioral and social science research funded at the NIH can best be understood by dividing it into two sections: Core Areas of Research, and Adjunct Areas of Research. The core areas of research are further divided into basic or fundamental research and clinical research. (The basic and clinical research distinction serves more of an organizational function for purposes of this definition, rather than representing firm boundaries within the field.) Indeed, many studies have both basic and clinical components. Moreover, basic and clinical research is often complementary. Basic research frequently provides the foundation for subsequent clinical research, and clinical research often influences the direction of basic research. Adjunct areas of behavioral and social sciences research include many types of neurobiological research and some research on pharmacologic interventions--areas that have implications for, and are often influenced by, behavioral research.

What do the terms “behavioral” and “social” mean?

For purposes of this definition, the term "behavioral" refers to overt actions; to underlying psychological processes such as cognition, emotion, temperament, and motivation; and to biobehavioral interactions. The term "social" encompasses sociocultural, socioeconomic, and sociodemographic status; to biosocial interactions; and to the various levels of social context from small groups to complex cultural systems societal influences.

What are the Core Areas of Behavioral and Social Sciences Research?

The core areas of behavioral and social sciences research are those that have a major and explicit focus on the understanding of behavioral or social processes, or on the use of these processes to predict or influence health outcomes or health risk factors. These core areas of research are divided into basic (or fundamental) research and clinical research.

What is the Role of Basic or Fundamental Research in the Behavioral and Social Sciences?

Basic research in the behavioral and social sciences is designed to further our understanding of behavioral and social functioning. As is the case for basic research in the biomedical sciences, basic behavioral and social sciences research does not address disease outcomes per se, but is designed to provide essential knowledge necessary for better prediction, prevention, and control of illnesses.

Basic behavioral and social research is divided into three categories: (A) research on behavioral and social processes; (B) biopsychosocial research; and (C) research on the development of behavioral or social procedures for measurement, analysis, and classification.

A. Research on behavioral and social processes involves the study of human or animal functioning at the level of the individual, small group, institution, organization, or community. At the individual level, this research may involve the study of behavioral factors such as cognition, memory, language, perception, personality, emotion, motivation, and others. At higher levels of aggregation, it includes the study of social variables such as the structure and dynamics of small groups (e.g. couples, families, work groups, etc.); institutions and organizations (e.g. schools, religious organizations, etc.); communities (defined by geography or common interest); and larger demographic, political, economic, and cultural systems. Research on behavioral and social processes also includes the study of the interactions within and between these two levels of aggregation, such as the influence of sociocultural factors on cognitive processes or emotional responses. Finally, this research also includes the study of environmental factors such as climate, noise, environmental hazards, and residential environments and their effects on behavioral and social functioning.

Examples of research topics and their implications that are or could be funded by NIH Institutes and Centers include:

- Sensation and perception
(Implications: neurological disorders and disorders associated with vision, hearing, taste and smell)
- Emotion and motivation
(Implications: depression, anxiety, schizophrenia, conduct disorders, normal psychological development, eating disorders, obesity, addictions, sleep disturbances, behavioral and cognitive treatments)
- Vulnerability and resilience
(Implications: psychopathology, violence, effects of child abuse and neglect)
- Attention, learning and memory
(Implications: attention deficit disorders, learning disabilities, Alzheimer's disease and other dementias, cognitive rehabilitation, education)
- Language development
(Implications: communication disorders, learning disabilities)
- Social influences and social cognition
(Implications: all-cause mortality, psychopathology, behavioral and cognitive treatments)
- Family processes and social networks
(Implications: domestic violence, divorce, child abuse, psychopathology, all-cause mortality, child development, aging)
- Sociocultural and environmental processes
(Implications: better understanding of social, cultural, and environmental antecedents to mental and physical illnesses)

B. Biopsychosocial research (also known as biobehavioral or biosocial research) involves the study of the interactions of biological factors with behavioral or social variables and how they affect each other (i.e., the study of bidirectional multilevel relationships).

Examples of research topics and their implications that are or could be funded by the institutes include:

- Behavior genetics

(Implications: addictions, psychopathology, heart disease, gene expression, cancer risk, diabetes, oral health)

- Behavioral and cognitive neurosciences

(Implications: effects of brain injury, neurodegenerative diseases, learning disabilities, dementia, addictions, sleep disorders, schizophrenia, neurological development, and plasticity)

- Psychoneuroimmunology

(Implications: stress effects on health, AIDS, dental problems, infections)

- Psychopharmacology

(Implications: addictions, psychopathology, brain disorders, drug treatments)

- Behavioral cardiology

(Implications: cardiovascular diseases, stroke, hypertension)

C. Research on the development of procedures for measurement, analysis, and classification involves the development and refinement of procedures for measuring and analyzing behavior, psychological functioning, or the social environment. This research is designed to develop research tools that could be used in other areas of behavioral and social sciences or in biomedical research.

Examples of research topics in the area include:

- Statistical modeling techniques
- Memory assessment
- Behavioral observation procedures
- Psychometric analysis self-report instruments Qualitative and ethnographic methods
- Neuropsychological assessment
- Psychophysiological methods
- Pain Assessment
- Instruments for determining dietary intake
- Assessment of *medical adherence*

What is the Role of Clinical Research in the Behavioral and Social Sciences?

Clinical research in the behavioral and social sciences is designed to predict or influence health outcomes, risks or protective factors. It is also concerned with the impact of illness or risk for illness on behavioral or social functioning. Clinical research is divided into five categories: (A) research on the identification and understanding of behavioral and social risk and protective factors associated with the onset and course of illness, and with health conditions; (B) research on the effects of illness or physical condition on behavioral and social functioning; (C) treatment outcomes research; (D) research on health promotion and disease prevention; and (E) research on institutional and organizational influences on health.

A. Research on the identification and understanding of behavioral and social risk and protective factors associated with the onset and course of illness, and with health conditions, examines the association of specific behavioral and social factors with mental and physical health outcomes, and the mechanisms that explain these associations. It is concerned with behavioral and social factors that may be health-damaging (risk factors) or health-promoting (protective factors).

Examples of research topics in this area include the study of such risk and protective factors as:

- Smoking
- Dietary practices
- Physical inactivity
- Stress
- Substance abuse
- Social support
- Cultural practices
- Socioeconomic status

B. Research on the effects of illness or physical condition on behavioral and social functioning.

Examples of research topics includes such areas as:

- Psychological and social consequences of genetic testing

- Behavioral correlates of head injury across developmental stages
- Emotional and social consequences of HIV infection or cancer
- Coping responses associated with chronic pain syndromes
- Effects of illness on economic status
- Coping with loss of function due to disability

C. Treatment outcomes research involves the design and evaluation of behavioral and social interventions to treat mental and physical illnesses, or interventions designed to ameliorate the effects of illness on behavioral or social functioning. This area also includes research on behavioral and social rehabilitation procedures.

Examples of research topics in this area include:

- Cognitive or behavioral interventions for anxiety disorders and depression
- Strategies to reduce arthritis pain
- Interventions for restoring behavioral and brain functioning following head injury
- Lifestyle (dietary change, exercise, stress reduction) approaches to reversing coronary atherosclerosis
- Procedures to enhance adherence to medical interventions

D. Research on health promotion and disease prevention involves the design, implementation, and evaluation of behavioral and social interventions to prevent the occurrence, recurrence, or progression of illness, symptoms, risk factors, or health problems. Health promotion also consists of evaluating procedures that facilitate optimal health functioning.

Examples of research topics in this area include:

- The design and evaluation of programs to discourage adolescent smoking
- Approaches to increase physical activity in the elderly
- Interventions to alter dietary intake to promote health
- Family interventions to prevent injuries in children
- Teaching parenting skills to prevent sudden infant death syndrome
- Mass media interventions to promote health knowledge

- Promoting the use of condoms to prevent sexually transmitted diseases

E. Research on institutional and organizational influences on health includes studies of the organization of and access to health care, its effectiveness in real world settings (i.e., health services research), its cost efficiency, and its social and cultural acceptability. It also involves research on macro-economic phenomena (e.g. business cycles), community and neighborhood organization and the structure and functioning of families, and how these variables influence the consumption and choice of health care, and decision-making concerning health procedures. Finally, this category includes research on how successful approaches to the organization and delivery of health services can be translated into public policy.

Examples of research topics in this area include:

- The impact of providing inpatient smokers with information and brief counseling from nursing staff
- The accessibility of rural dental health care facilities for migrant workers
- The cost-effectiveness of occupational safety interventions
- The use of schools as sites for the delivery of mental health services
- The effects of capitation on health care utilization
- The effects of ethnicity and gender on referral for mental health services
- The association of health provider behavior to patient adherence to medical treatments

Adjunct Areas of Behavioral and Social Sciences Research

Adjunct behavioral and social sciences research are determined by two sets of criteria. First, these research areas do not have a major and explicit focus on the understanding of behavioral or social processes, or the use of these factors to predict or influence health outcomes or health risk factors. That is, these projects cannot be categorized as basic or clinical behavioral and social sciences research. Second, adjunct behavioral and social sciences research does include studies that have clearly articulated implications for either understanding behavioral or social processes (in the case of some basic biological research), or that utilize behavioral and social factors as critical outcome variables (in the case of behavior-relevant pharmacologic studies).

The inclusion of adjunct research areas in this definition is an acknowledgment that there are scientific domains outside of the core areas of behavioral and social sciences where (a) the findings have clear implications for understanding behavioral and social processes, or (b) the research is an outgrowth of prior behavioral or social sciences research. Although it could be argued that these adjunct areas are really in the "biomedical" research domains, they nevertheless represent research topics that are inextricably linked to the behavioral and social sciences. Adjunct behavioral and social sciences research is divided into two categories: (A) Behavior-relevant basic biological research, and (B) Behavior-relevant pharmacologic intervention studies.

A. Behavior-relevant basic biological research involves studies where the understanding of behavioral and social process is a clearly articulated goal. Although these studies focus solely in the biological level of analysis (i.e., no behavioral or social measures are taken) they are designed explicitly to provide a better understanding of basic behavioral, social, or biopsychosocial processes (see section I.A. and I.B.), and typically involve independent variables known to be important to behavioral or social functioning. These types of biological studies are often designed to assist in identifying biological mechanisms that mediate associations between behavioral and social factors with health outcomes. Specifically excluded from this category is research that focuses solely on biological mechanisms underlying clinical problems that have behavioral components (e.g. depression, schizophrenia). That is, to be included in this category, the research must address basic behavioral, social, or biopsychosocial processes.

Examples of research topics in this area include:

- Studies of neural plasticity designed to improve understanding of behavioral or cognitive development
- Studies of the sympathetic nervous system designed to better understand stress/health relationships
- Studies of brain regions potentially involved in emotion
- Studies of endocrine/immune system interactions designed to enhance understanding of psychoneuroimmunological associations

B. Behavior-relevant pharmacologic intervention studies include those studies that evaluate drug treatment for mental or physical health problems, where a behavioral or social dependent variable is used (e.g. anxiety, depression, drinking

behavior, smoking, etc.) These types of pharmacologic intervention studies have clearly benefitted from behavioral and social sciences research, especially with respect to measurement of outcomes. This research is relevant to the behavioral and social sciences not only because behavioral and social outcomes variables are used, but because it facilitates an understanding of the biological mechanisms underlying those processes.

Examples of research topics in this area includes:

- Effects of chemotherapeutic treatments on quality of life
- Psychopharmacologic treatments for anxiety and depression
- Side effects of drug treatments on medical compliance
- Pharmacologic approaches to nicotine addiction

What Has NIH Accomplished to Date?

The following funding chart applies the definition above to calculate the amount of funding of behavioral and social sciences research for the fiscal years 1996-2000. As you will see, a steady increase has occurred over the past five years, although institutes vary in the amount of behavioral and social science research they fund.

NATIONAL INSTITUTES OF HEALTH

Behavioral and Social Sciences Research Funding

(Dollars in millions)

Participating ICs	FY 1996 Actual	FY 1997 Actual	FY 1998 Actual	FY 1999 Actual	FY 2000 Estimate
NCI	\$169.6	\$179.8	\$153.5	\$172.7	\$191.3
NHLBI	101.4	106.4	113.9	130.3	145.3
NIDCR	10.9	12.8	13.1	14.8	16.8
NIDDK	28.0	26.4	28.3	32.2	36.9
NINDS	36.1	36.5	36.1	41.9	46.1
NIAMD	7.3	8.4	9.5	11.5	12.9
NICHD	115.6	125.6	135.7	154.5	176.4
NEI	21.4	23.0	30.9	40.5	46.3
NIEHS	7.0	7.4	7.6	8.3	9.0
NIA	69.6	78.0	83.7	86.7	99.8
NIAMS	0.0	10.1	8.2	13.7	15.6
NIDCD	46.6	50.1	46.9	57.2	65.7
NIMH	223.2	241.9	251.6	286.0	326.4
NIDA	206.4	226.0	238.0	259.8	292.0
NIAAA	106.0	128.8	142.7	141.1	160.0
NINR	35.5	38.3	38.4	56.7	63.6
NHGRI	7.9	8.3	4.0	5.5	4.4
NCRR	27.8	29.6	33.8	41.0	46.1
FIC	1.5	2.2	2.2	3.0	3.4
NLM	0.4	0.6	0.1	0.0	0.0
OD	2.2	2.4	2.0	11.5	18.9
NIH *	1,224.6	1,342.6	1,380.2	1,569.0	1,776.7

*May not add due to rounding.

Trans-NIH Behavioral and Social Sciences Training Activities

OBSSR has a continuing commitment to increasing NIH support for behavioral and social sciences training. Over the past three years, OBSSR has provided over \$1.5 million in training support by focusing the OBSSR portion of the Office of the Director Research Enhancement Award Program (REAP) on individual fellowships and institutional training programs. OBSSR, in conjunction with the National Institute of Mental Health, the National Institute on Aging, and the National Institute of Nursing Research, has supported an Institute of Medicine project examining the need for and means of facilitating interdisciplinary training. This report, which will be available in FY 2000, will provide recommendations for NIH on how to facilitate interdisciplinary training. Recently, OBSSR has established a trans-NIH working group to examine the state of NIH behavioral and social sciences training support and determine areas that provide the greatest opportunities. The group will take a broad perspective on training, including the consideration of opportunities at various levels, from training for predoctoral students through training for established investigators.

In addition, OBSSR has supported research to foster interdisciplinary collaborations among the various fields concerned with health research in the hope that these collaborations will result in a better understanding of biological, behavioral, and social interactions that ultimately determine health and illness. In 1998 OBSSR organized a trans-NIH RFA and sought proposals for workshops that would provide training for junior investigators interested in the integration of different fields of social and behavioral sciences research and/or the integration of these areas with more biological levels of analyses. Ten workshops were funded under this RFA; because of its success, another RFA was issued for FY 1999 and six awards were made.

Overview of Behavioral and Social Sciences Research by Institute and Center

National Cancer Institute (NCI)

History

The Division of Cancer Control and Population Sciences (DCCPS) was created in 1997. The Behavioral Research Program was formed at that time as one of the three (now four) fundamental components of the new Division. This is the first time that behavioral research was recognized as one of the foundations of cancer

control. One of our core principles is the integration of epidemiology, behavioral research and survivorship research. The Associate Director for Behavioral Research is one of the senior leaders of the Division. Robert T. Croyle, Ph.D., a Princeton-educated health psychologist with a strong record of basic and applied research, was recruited as the first Associate Director.

Mission

The Behavioral Research Program (BRP) initiates, supports and evaluates a comprehensive program of behavioral research ranging from basic behavioral research to research on the development, testing and dissemination of disease prevention and health promotion interventions in areas such as tobacco use, cancer screening, dietary behavior and sun protection. The goal is to increase the breadth, depth and quality of cancer prevention and control behavioral science.

Institute-wide Leadership

The Behavioral Research Program plays a central role in both establishing and implementing the Institute's research agenda for several critical areas, including tobacco control, cancer communications, health disparities and underserved populations, cancer screening, sun exposure, and diet, weight and physical activity. In November 1998, the NCI released the *Tobacco Research Implementation Plan: Priorities for Tobacco Research Beyond the Year 2000*, the first-ever comprehensive analysis of the Institute's tobacco control research portfolio. The report offers a core-set of tobacco-related cancer research opportunities that were established through a consensus-building process by more than two dozen leading scientists and experts from within and outside the NIH. This report paved the way for the selection of Tobacco and Tobacco-Related Cancers as an extraordinary opportunity for investment as noted in NCI's bypass budget -- *The Nation's Investment for Cancer Research: A Budget Proposal for Fiscal Year 2001*. Several high priority research initiatives are already underway as part of this opportunity (see list); most are behavioral research.

The NCI also selected Cancer Communications, a topic grounded in behavioral research, as the second of three new extraordinary opportunities. The goals of this investment are to accelerate reductions in the U.S. cancer burden through the use of cancer communications; integrate cancer communications into the cancer

continuum so that it is an accepted and practiced component of quality care, and; increase the demand for, access to, and use of cancer communications by diverse populations including the public, high-risk persons, underserved and disabled populations, children, patients, survivors, and health professionals. Several of the objectives are being led by the Behavioral Research Program's Health Communication and Informatics Branch, including the development of a national triennial survey to monitor information needs and national trends related to cancer communications. The branch will also release an RFA to create centers of excellence in cancer communications with funding anticipated in FY'01.

Program Accomplishments

The NCI has committed substantial resources, both personnel and fiscal, to the BRP. Through successful recruitments, the NCI has increased, strengthened and broadened behavioral science expertise on its staff, and will continue to do so. In the short time since the creation of the BRP, program staff have initiated a significant number of critical funding opportunities for new and established behavioral science investigators (Requests for Applications, Program Announcements, Supplements, and Career Development Awards). Many of these are listed below. In addition, the NCI has strengthened its outreach to professional organizations in behavioral science as well as increasing its involvement in trans-NIH behavioral science activities.

- ***Transdisciplinary Tobacco Use Research Centers RFA:*** Beginning FY 2000, seven centers will focus on a range of issues from biological and behavioral factors concerning determinants and treatment of tobacco use and nicotine addiction to prevention of tobacco use among youth of diverse cultures. This is jointly managed with the National Institute on Drug Abuse, with an additional large investment by the Robert Wood Johnson Foundation.
- ***Research in State and Community Tobacco Control Interventions RFA:*** Projected funding for up to 12 applications to conduct community-based research on policy and media interventions.
- ***Review and Analysis of Tobacco Industry Documents Program Announcement:*** To facilitate a systematic, comprehensive analysis and evaluation of scientific and marketing documents from the tobacco industry that will help researchers develop strategies to reduce tobacco use.
- ***Innovative Cancer Control Initiatives in Cancer Centers Supplement:*** 11

centers are currently funded to establish a cadre of junior cancer control investigators who have not previously received RO1 funding. The intent is to train these investigators to conduct cancer control research and to enable them to successfully compete for RO1 grant funding.

- ***Centers for Mind/Body Interactions and Health RFA***: NCI is funding one P50 Centers grant as part of a multi-center initiative and partnership with the NIH Office of Behavioral and Social Sciences Research (OBSSR).
- ***Administrative Supplements to Cancer Centers for Support of Family Research***: NCI funded ten grants in order to identify the problems cancer causes for families and develop pilot interventions to help families cope with the burden caused by cancer.
- ***Basic Biobehavioral Research on Cancer Related Behaviors RFA: Through the first issuance, eight applications were funded.*** Recently, this initiative was revised and reissued to target a broader applicant pool and to encourage proposals in diverse areas of cancer-related behavior.
- ***Small Grants Program for Behavioral Research in Cancer Control (RO3)***: Designed to aid and facilitate the growth of a nationwide cohort of new investigators with a high level of research expertise in behavioral cancer control research.
- ***Exploratory Grants for Behavioral Research in Cancer Control (R21)***: To encourage pilot projects or feasibility studies to support creative, novel, high risk/high payoff research that may produce innovative advances in science.
- ***Health Communication in Cancer Control RFA***: Five grants were funded to communicate genetic test results to families, tailor communications for colorectal cancer screening, develop innovative nutrition. communications for Latina women, conduct cultural tailoring for cancer prevention in black women, and create computerized symptom report-consult information for cancer patients.
- ***NCI's Media Technology/Health Communication SBIR Grant Program***: to develop, implement, and test the effectiveness of new or existing models of behavior modification or informational/ educational applications to reduce the risk of cancer or promote the health of cancer survivors.
- ***Making Quality Count for Consumers and Patients***: NCI will partner with the Agency for Healthcare Research and Quality (AHRQ) to fund research grants that facilitate consumer and patient use of information about quality

health care decisions with a focus on vulnerable populations.

Training

The NCI has expanded substantially opportunities for training for behavioral scientists with cancer-related interests, to provide behavioral scientists with funding opportunities throughout their careers. NCI's new R25 Cancer Education and Career Development Program supports the development of interdisciplinary training programs that provide behavioral scientists with the necessary knowledge and skills to conduct cancer-related research. NCI supports the newly revised K23 Mentored Research Career Development award, which is open to clinical psychologists and other clinically oriented behavioral scientists. This mechanism is complemented by the NCI's K07 Career Development Award in Cancer Prevention, Control, and Population Sciences, that is now being marketed directly to behavioral scientists through advertisements in relevant publications. Behavioral scientists who have completed their doctoral training and mentored experience are eligible for the new NCI K22 Transition Award, which provides support to investigators who are moving from a mentored to an independent research position. This award is expected to increase opportunities for behavioral scientists who are seeking faculty positions at our nation's leading cancer research institutions.

National Heart, Lung, and Blood Institute (NHLBI)

The National Heart, Lung, and Blood Institute has long been cognizant of the important role that behavioral and lifestyle factors play in heart, lung, and blood diseases and has maintained a vigorous program of research and training to utilize the behavioral sciences for improved management and prevention of disease. The following highlights provide an overview of some of the work under way.

Observational Studies have been the source of much of the progress in understanding the influence of psychosocial factors in cardiovascular diseases. Psychosocial factors and their interactions with biological risk factors are being studied in several major epidemiological studies. For example, the Framingham and Jackson Heart Studies are important sources of information about changing patterns of smoking, eating, and physical activity habits and how these influence health. The CARDIA study is designed to help understand how cardiovascular

disease risk factors change during the critical years of transition from adolescence through young adulthood and middle age, including minorities and individuals from a range of socioeconomic strata, while The Family Heart Study provides data on the extent to which risk factors and their combination explain familial aggregation of heart disease. Finally, the Subclinical Cardiovascular Disease Study employs the most sophisticated technology available to study relationships between newly identified and established risk factors and diagnosis of heart disease at its earliest stage. Together, these studies are a rich source of information about the role of lifestyle, stress, social support, and other behavioral factors and how these interact with biological systems in health and illness.

Design of Effective Behavioral Interventions for Prevention and Treatment of disease is the ultimate goal of the Institute's behavioral research efforts. The National Cholesterol, High Blood Pressure, and Asthma Education Programs and the Obesity Education Initiative are examples of putting the results of behavioral research into practice. Extensive efforts are being made to develop new interventions. Non-pharmacological treatment of high blood pressure, the most prevalent risk factor for heart disease, has been a high priority for many years and seeks improved weight loss, physical activity, and nutrition programs. Methods of the successful Dietary Approaches to Stop Hypertension (DASH) feeding study are being tested in the field through PREMIER: Lifestyle Interventions for Blood Pressure Control. Results will teach us the best way to apply nutrition education programs in everyday life for the general population. This is a difficult challenge, since sustained health behavior change is one of the most vexing problems facing the behavioral research community. The NHLBI convened a special Conference on Maintenance of Behavior Change to tackle this issue and in 1999 was the largest contributor to a trans-NIH effort, Innovative Approaches to Behavior Change, to fund a series of project grants devoted to developing behavior theory-based interventions for clusters of risk factors. The Institute is also completing interventions for the last of the more than two thousand patients enrolled in a clinical trial for depressed heart attack victims. This study (Enhancing Recovery in Coronary Heart Disease) will teach us much about managing depression and social isolation, two very common conditions in cardiovascular disease patients.

Efforts to develop interventions are not limited to the adult population. Several ongoing studies target school-aged children and adolescents. The Child and Adolescent Trial of Cardiovascular Health (CATCH) targeted school food service

modifications, enhanced physical education, classroom health curricula, and family education to test methods for preventing cardiovascular diseases at the earliest possible ages. The NHLBI now funds a number of school-based prevention studies, which address cardiovascular health behaviors and risk factors in pre-schoolers to college-age young adults. Finally, the Institute maintains an active and vigorous research program for developing smoking cessation, weight loss, and exercise programs for all segments of the population and in all age groups, including those in whom exercise capacity is impaired.

Socioeconomic Status (SES) has been shown to be one of the most important influences on health status and the basis for many of the well-documented disparities in health in various segments of the population. The Institute is actively evaluating data from nationally represented databases such as the National Longitudinal Mortality Study to document the magnitude and changes in time of health disparities and behavioral risk factors. In addition, data collection is being conducted for international comparisons of the complex factors driving such disparities, and many of the prevention and treatment research studies described earlier target minority groups. The Institute recently convened a Working Group on Early Life Influences on Health to evaluate psychosocial factors acting on mothers and children that may contribute to health disparities.

Studies of Mechanisms which underlie behavioral influences on health lay the foundation for potential interventions or improved medical care. The Institute supports five major program project and research center grants devoted to behavioral research, as well as a number of individual grants on topics such as gene-behavior interactions, mental stress, and brain structures involved in coordinating behavioral demands and cardiovascular function. For example, the psychological traits of anger and hostility may be markers for increased risk of mental stress ischemia. Researchers are using sophisticated brain scanning techniques to identify anatomical areas which are active during mental stress. By increasing the accuracy of assessing relationships between emotion and ischemia better treatments can be devised for vulnerable individuals.

The full compendium of the Institute's training programs is available to behavioral scientists, many of whom are recipients of support and participate in the Institute's efforts to identify training needs for the successful implementation

of its mission. The NHLBI supported seven institutional behavioral medicine training grants in FY 99.

National Institute of Dental and Craniofacial Research (NIDCR)

NIDCR invested \$14.6 million in FY 1999 in behavioral and social science research, with an additional \$3.2 million supporting projects with substantial behavioral content. Modest support (\$0.25 million) was provided for behavioral and social sciences research training. In addition, several outstanding young dentists who received doctoral training in behavioral sciences through NIDCR's support are now participating in NIDCR research career development programs. These individuals have already become highly competitive scientifically and have successfully secured grant support from NIDCR as well as other NIH Institutes.

During FY 1999, two NIH Offices provided supplementary support for oral health-related behavioral and social science research. The Office of Behavioral and Social Science Research (OBSSR) provided an additional \$2.2 million which allowed NIDCR to: 1) establish a Center for Stress and Wound Healing at Ohio State University; and 2) plan two research workshops. NIH's Center for Complementary and Alternative Medicine also funded (\$1.5 million) a Craniofacial Complementary and Alternative Medicine Center, which includes behavioral studies and behavioral measures.

These NIDCR and NIH investments indicate the recognition that many craniofacial diseases (e.g., dental caries, periodontal diseases, oral cancers) are significantly influenced by personal behaviors, such as hygiene practices, dietary choices, or tobacco and alcohol use. Also, the relatively accessible oral cavity provides excellent opportunities for non-invasive biobehavioral studies of tissue response to psychosocial stressors or environmental changes.

NIDCR supports both basic behavioral and social science research and applied health promotion/behavioral intervention research. Significant areas of research supported in FY 1999 are summarized below:

Assessing behavioral and social effects of craniofacial diseases and oral

treatments - NIDCR supports research evaluating the impacts of poor oral health on quality of life, particularly in older populations, children, and socioeconomically disadvantaged populations. Improved measurement of the effects oral health or its absence has on functioning can provide useful tools for evaluating the actual benefits of new treatments, as experienced by the patient. Ongoing studies are also evaluating the psychosocial benefits of orthognathic surgery and personal characteristics that influence satisfaction with surgical outcomes.

Stress and tissue response - Studies of oral mucosal wound healing are determining the effects of transient, predicable stressors, such as academic examinations, and other more sustained stressful conditions on the body's capability for tissue repair. Neuroimmunological processes mediating the body's response to stressors are also being studied, as are psychosocial and environmental factors that influence the speed and quality of wound healing.

Tobacco prevention/cessation interventions - Ongoing intervention studies are testing dental office-based strategies for informing adolescents about health risks of tobacco use, preventing high-risk youth from initiating tobacco use, and providing cessation programs to youth who use tobacco. Both smoked and spit tobacco have harmful oral, as well as systemic, health effects. Dentistry may be poised to make important contributions to tobacco prevention/cessation efforts if effective office-based interventions are developed that can be readily incorporated into regular dental care.

Behavioral risk factors for chronic pain disability - Research NIDCR supports has demonstrated that costs of treatment and risks of long-term disability can be reduced by including behavioral approaches in the treatment provided to patients whose social or personal characteristics place them at higher risk of falling within the 10 – 20 percent of patients who develop long term pain disability. Tailoring treatments based on both physical/clinical variables and psychosocial characteristics has been shown to improve long-term outcomes and reduce disability.

Behavioral therapies in pain treatment - NIDCR supports research evaluating the

effects of various behavioral interventions (educational, biofeedback, cognitive-behavioral) in reducing persisting pain in the jaw and face (TMJ pain). Other studies are evaluating synergistic effects of combining clinical and educational-behavioral approaches to accelerate recovery and reduce health care costs.

Disparities in oral health and perceived need for care - Community-based studies are evaluating how recent immigrants, socioeconomically disadvantaged individuals, and other groups with poorer than typical oral health status differ in their self-care practices, attitudes regarding the need for dental care, and expectations regarding the likelihood and value of maintaining their teeth over a lifetime. In addition, access to oral health care and patterns of use are receiving study. Intervention research to improve oral health in specific groups must rest on accurate knowledge regarding health values and needs, as perceived within different communities, as well as knowledge about processes through which individual, community, and health care system changes can lead to improved prevention of oral diseases and improved oral health status.

Clinical decision-making - NIDCR supports studies focused on understanding how modifying approaches and sources for delivering new information and providing feedback influences clinicians' treatment practices and clinical decisions. These studies aim to develop effective interventions to improve the quality of clinical decision-making and to accelerate integration of new scientific findings into practice.

NIDCR has been an active collaborator in trans-NIH behavioral and social science research initiatives. During FY 1999 NIDCR co-sponsored five Requests for Applications (RFA) and Program Announcements (PA) addressing behavioral and social science research topics. NIDCR staff also contributed to the development of two additional trans-NIH behavioral research initiatives: (RFA: Adherence to Pharmacological Regimens; and RFA: Research on Child Neglect) to be funded in FY 2000. In addition, NIDCR collaborated with NIDDK in conducting workshops defining oral health promotion and behavioral research needs relevant to improving the detection and treatment of diabetes.

The National Institute of Diabetes and Digestive and Kidney Diseases

(NIDDK)

The NIDDK has lead responsibility for a number of chronic diseases with behavioral and social aspects to their etiology, pathogenesis, treatment, and prevention. The following reviews the areas covered by the NIDDK.

A. Diabetes

1. Behavioral and translation research

a. Diabetes Research and Training Centers, Demonstration and Education Components. The NIDDK has provided long term support to six Diabetes Research and Training Centers. In addition to serving as a focus for diabetes research and training, these centers include a mandatory demonstration and education (D&E) component. This component conducts behavioral research that spans the range from risk-taking behavior in adolescence to health provider behavior as influenced by physician patient communications skills. There is also a focus on translation research in moving scientific advances in prevention and treatment to the public.

As an example, the NIDDK-sponsored Diabetes Control and Complications Trial, completed in June 1994, demonstrated that intensive glycemic control prevents or delays the development and progression of diabetes-related complications in persons with insulin-dependent diabetes. This study was designed as an efficacy trial and barrier translatability was inherent in the trial design. The D&E investigators worked to develop a translation blue print for addressing these issues. The document the investigators produced reviewed behavioral issues and needed research and barriers to implementation, and recommended the creation of a National Diabetes Education Program (NDEP). The NIDDK has since implemented the NDEP. Behavioral researchers from the diabetes centers program were instrumental in its development.

b. Diabetes Prevention Program. Behavioral research is a main focus of the Diabetes Prevention Program (DPP). The DPP is a national multicenter clinical trial attempting to prevent or delay the onset of type 2 diabetes in populations at risk for this condition. The trial is comparing an intensive behavioral lifestyle intervention (exercise and diet changes) with drug intervention, compared with a control group of participants. Approximately 3,000 patients have been recruited into the trial. Minority populations are disproportionately affected by type 2 diabetes, and comprise nearly one-half of

those participating in the DPP. Four of the Institute's Diabetes Research and Training Centers are participating in the trial. These centers, together with other behavioral investigators within the study, were instrumental in designing the lifestyle intervention, follow-up protocol, recruitment and now retention and adherence approaches.

In recognition of the importance of understanding why some people succeed and some fail in adhering to treatment protocols, a substantive plan was developed for the DPP to monitor the characteristics of individuals in the trial, and was implemented with support from the NIH Office of Behavioral and Social Sciences Research. This plan includes monitoring of mood, general adjustment, stress, family functioning, social resources, and key aspects of intervention support throughout the trial. The study will continue through the end of the DPP in the year 2002 and should provide major insights into personality and behavioral factors that contribute to successful adherence to various treatment regimens, and will likely have value to areas beyond diabetes.

2. Psychosocial and behavioral aspects of diabetes

The NIDDK research portfolio also includes a number of R01 grants that focus primarily on psychosocial aspects of diabetes. These include:

- behavioral weight loss as a treatment for type 2 diabetes
- investigations of depression in newly-diagnosed type 1 diabetics
- behavior therapy for families of diabetics
- family contexts of outcomes in diabetic adolescents
- examination of psychiatric disorder in adults with diabetes
- cognitive strategy processes in diabetic children

To extend the breadth of the behavioral research program in diabetes a conference entitled "Behavioral Science Research in Diabetes" was held on November 18-19, 1999, on the NIH campus. The objectives of this meeting were to determine the current status of behavioral science research for both diabetes as well as for other chronic diseases, and to develop an agenda for future research based on expert opinion. The meeting attendees and speakers represented both the diabetes research community as well as behavioral researchers from other chronic disease

areas. The meeting overview and outcomes will appear as a series of reports in the journal *Diabetes Care*.

B. Obesity

The NIDDK obesity and eating disorders research portfolio recognizes obesity as a complex disorder that includes genetic, environmental as well as behavioral components. Behavioral research grants supported by the institute include studies of appetite behavior, eating patterns, determinants of energy intake and physical activity, and lifestyle modification for weight loss and weight maintenance. Recent new grants awarded in the result of an NIDDK initiative entitled “Innovative Approaches to the Prevention of Obesity” involve a mentor-based approach to long-term weight loss, and the effect of active play on obese at-risk toddlers.

The NIDDK recently launched a long-term, multicenter clinical trial, the “Study of Health Outcomes of Weight Loss” (SHOW) in obese patients with type 2 diabetes. This large, multicenter trial is designed to study if interventions to produce sustained weight loss in obese individuals with type 2 diabetes will improve health. The NIDDK expects that the SHOW trial will include participants from a range of minority populations--those with the greatest risk for developing type 2 diabetes. The Institute also is planning ancillary studies in conjunction with the SHOW trial, which may include the participation of other NIH and federal components.

C. Women's Urological Disorders

The NIDDK is supporting a study that examines psychosocial risk factors for urinary tract infections (UTIs) among college women, including behaviors prior and subsequent to initial UTI infection in those with and without recurrences. Another study is examining how menopause and associated use of supplemental estrogen modifies the relationships between health behavior, bacterial virulence factors, and risk of UTI among white and non-white women aged 40-65.

National Institute of Neurological Disorders and Stroke (NINDS)

The mission of the National Institute of Neurological Disorders and Stroke (NINDS) is to reduce the burden of neurological disorders by conducting and supporting research on the normal and diseased nervous system. To this end, NINDS supports a broad portfolio of both basic and clinical behavioral and social science research and training. This includes basic studies of the neural bases of cognition and behavior, and clinical studies of the adverse effects of neurological disease on cognitive and behavioral functioning, along with the development of behavioral interventions designed to ameliorate the symptoms of some neurological disorders.

A major portion of the NINDS behavioral and social science research portfolio consists of cognitive and behavioral neuroscience research aimed at understanding the neural bases of a variety of cognitive and behavioral processes. These include studies of sensation and perception (e.g., visual, auditory, somatosensory), attention, motor behavior and movement, learning and memory, language abilities (both reading and writing), and higher cognitive processes (i.e., decision-making ability). These studies are being done on a variety of levels, from the molecular and cellular to the physiological and systems level. For example, the molecular and cellular bases of learning and memory are being studied in several animal model systems. At the physiological and systems level, the neural bases of perception and attention are being studied in animal models by measuring changes in brain electrical activity as the animal performs behavioral tasks that require it to shift its attention from one task to another.

The development of powerful new imaging technologies such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) is giving researchers the extraordinary ability to study the neural bases of a variety of cognitive processes in humans in real time. For example, researchers are using these techniques to study normal language development and how this development is altered in children with reading disabilities such as dyslexia. Other researchers are using these techniques to study differences in brain activity between normal individuals and brain lesion patients in order to gain a better understanding of the neural bases of language, face recognition, and decision-making ability, among other processes.

In addition to basic behavioral research, NINDS also supports a number of clinical behavioral studies on the adverse effects of neurological disorders on behavioral and cognitive functioning. For example, a number of studies are investigating the adverse effects of childhood neurological disorders such as epilepsy, autism, neurofibromatosis, and hydrocephaly on cognitive and behavioral development. Other studies are looking at the adverse effects of stroke, traumatic brain injury, chronic pain and headache on cognition, attention, mood, and other behaviors. These studies should aid researchers in developing effective interventions to ameliorate, and ultimately reverse the adverse cognitive and behavioral effects of these disorders.

NINDS also supports research aimed at the development and evaluation of behavioral and social interventions designed to ameliorate the symptoms of some neurological disorders. Examples of these interventions include a psychosocial intervention to increase functional recovery from stroke, a cognitive behavior therapy intervention for the treatment of chronic pain, and stress management techniques to treat chronic tension headaches.

In terms of training activities, NINDS supports a number of training and career awards in the area of cognitive/behavioral neuroscience. These include individual pre- and post-doctoral National Research Service Awards (NRSAs), Independent Scientist Awards, and Mentored Clinical Scientist Development awards. In addition, behavioral neuroscience projects are among those being supported as part of the Specialized Neuroscience Research Program (SNRP) at the Morehouse School of Medicine in Atlanta. The NINDS SNRP program is designed to assist minority medical and graduate schools to develop state-of-the-art basic and clinical neuroscience programs.

National Institute of Allergy and Infectious Diseases (NIAID)

NIAID supports an extensive portfolio of behavioral and social sciences research within its three extramural research divisions, which encompasses adherence to therapeutic regimens or preventive interventions, behavioral factors that influence the risk and/or transmission of asthma, allergic diseases, sexually transmitted diseases, HIV/AIDS, and other infectious diseases, as well as the behavioral factors that increase organ donation. Specific research programs are highlighted

below.

Division of AIDS (DAIDS):

The Division of AIDS supports domestic and international studies that evaluate behavioral interventions to prevent the sexual, parenteral, and perinatal transmission of HIV. To date, the majority of the behavioral studies have been conducted through the HIV Network for Prevention Trials (HIVNET). In early 2000, a new initiative, the HIV Prevention Trials Network, will be funded to support large-scale randomized, controlled trials of promising biomedical and behavioral strategies for the prevention of HIV transmission among at-risk adult and pediatric populations. In addition to other prevention strategies, the network will support community outreach and educational efforts in preparation for HIV prevention trials, studies of factors affecting acceptability of and adherence to prevention modalities, and socio-cultural factors related to implementation of successful prevention strategies.

In addition, studies within the Adult AIDS Clinical Trials Group, Pediatric AIDS Clinical Trials Group and the Community Program for Clinical Research on AIDS are examining adherence/compliance to therapeutic regimens and other behavioral issues that impact quality of life and the clinical management of HIV-infected people.

Division of Microbiology and Infectious Diseases (DMID):

Prevention and control strategies for infectious diseases focus on blocking transmission, identifying and treating cases, and interrupting progression of disease. Behavioral research can help prevent and control disease by: changing behaviors to prevent exposure; increasing acceptance of vaccines in both child and adult populations; promoting health behaviors leading to diagnosis of infection; and improving adherence to treatment regimens.

The most active area of behavioral research is within the Sexually Transmitted Diseases (STD) Branch and is supported through seven multi-disciplinary STD Cooperative Research Centers (STD CRCs) as well as individual (R01 and U01)

behavioral research projects. This intervention-oriented research is directed at prevention of STDs in a variety of populations. Studies are ongoing in high-risk adolescent populations, STD clinic populations, minority women, and patients in HMOs and in rural populations. Some of the objectives include characterization of the differences in rural versus urban social networks; identification of sexual partner networks that contribute to the spread of STDs; improvement of STD education programs for clinicians; and development of effective screening instruments to identify high-risk patients in clinical settings. In the recently awarded STD CRCs, behavioral research projects focus on adolescents and social networks as communities in which STDs are transmitted.

Division of Allergy, Immunology and Transplantation (DAIT)

The objective of DAIT's behavioral research is to translate information produced by biomedical research in immunological and allergic conditions into changes in behavior leading to improved prevention techniques, early diagnosis, and treatment particularly among minority communities.

DAIT supports behavioral research in asthma, allergic diseases, organ donation, and in the evaluation of community outreach projects and other demonstration and education projects. A significant portion of DAIT's behavioral research portfolio involves asthma research. For example, the National Cooperative Inner City Asthma Study (NCICAS) identified behavioral risk factors for asthma morbidity among inner-city minority children. It further evaluated the effectiveness of an asthma counselor in reducing asthma morbidity in this population using educational and behavioral interventions.

Another important study in asthma research is currently underway; the Inner City Asthma Study (ICAS) which will build on the experiences of NCICAS, with a greater emphasis on environmental and behavioral interventions. The Demonstration and Education research projects reflect DAIT's emphasis on studies that specifically attempt to understand and to reduce, through behavioral change, the high asthma morbidity found in minority communities.

NIAID also supported three research programs aimed at increasing organ donation through a number of educational and behavioral interventions. These are being

evaluated for their effect on potential donors, hospital staff and the community at large. These interventions include: (i) assessments of knowledge about the attitudes toward donation and changes in attitude due to specific interventions; (ii) a variety of printed educational materials designed to raise awareness about the needs for and value of transplantation and organ donation; and (iii) the development and evaluation of behavior models focused on stages of readiness for decision-making around health care issues.

Adherence to immunosuppressive drug regimens including investigation of racial and ethnic influences on adherence is also being examined. Research is also underway to assess factors that prevent or promote adherence in asthma management and in the treatment regimens for tuberculosis.

Training in Behavioral and Social Sciences Research

NIAID provides training and career development for researchers in behavioral and social sciences through the following:

- National Research Service Awards
 - Institutional Research Training Grants (T32s): to develop or enhance research training opportunities for individuals, selected by the institution, who are training for careers in specified areas of biomedical and behavioral research. The purpose of the NRSA program is to help ensure that a diverse and highly trained workforce is available to assume leadership roles related to the Nation's biomedical and behavioral research agenda.
 - Postdoctoral Fellowships (F32s): to help ensure that highly trained scientists will be available in adequate numbers and in appropriate research areas to carry out the Nation's biomedical and behavioral research agenda.
 - Individual Predoctoral Fellowships for Minority Students or Students with Disabilities (F31): to support research training leading to the Ph.D. or equivalent research degree; the combined M.D./Ph.D. degree; or other combined professional

doctorate/research Ph.D. degrees in the biomedical or behavioral sciences.

- Career Development Awards (K series): supports basic and/or clinical biomedical and behavioral research at several stages (mentored, independent, and senior)

NIAID also supports the development of young minority scientists interested in behavioral and social sciences, through the Research Supplements for Underrepresented Minorities. These supplements support high school, undergraduate, medical and graduate students, as well as postdoctoral scientists, by providing additional funding on existing NIAID grants.

National Institute of General Medical Sciences (NIGMS)

The mission of the National Institute of General Medical Sciences (NIGMS) is to support research and research training in the basic biomedical sciences. Almost 90 percent of the budget of these programs goes toward the support of investigator-initiated research. The projects supported by the NIGMS are in the most basic and fundamental areas of biomedical science and provide the foundation for subsequent disease-targeted studies supported by the other components of the NIH. Through its Minority Opportunities in Research Division, NIGMS also administers several programs to increase the research capacities at minority-serving institutions and increase the representation of minorities in biomedical and behavioral science careers.

Included among NIGMS's basic research portfolio are studies of biobehavioral mechanisms. Pharmacological studies are supported to determine behavioral sensitivity to neurotransmitters, central nervous system receptors, and neurotoxins, and to identify the basis of individual differences in these responses. Other supported studies use broad multidisciplinary approaches involving molecular biology, biochemistry, biophysics, morphology, physiology, and psychology to study mechanisms such as: the genetic determinants of neural and hormonal control of circadian behavior; the release of neuropeptides and their influence on behavioral states; genetic factors that affect behavior plasticity

(development, learning, and motivation); and studies to elucidate the cellular mechanisms associated with long-term sensitization and learning. In addition to research project grants in these areas, behavioral and social science research on a wide variety of topics is conducted in subprojects supported through the NIGMS Minority Biomedical Research Support (MBRS) Program.

Some research training in the behavioral and social sciences is supported through NIGMS's Medical Scientist Training Program (a training program leading to the combined M.D.-Ph.D. degree) and the Institute's MBRS and Minority Access to Research Careers programs. All of these programs solicit applications for research training support in a broad range of disciplines, including the behavioral and social sciences.

In the context of NIGMS's broad mission to support basic biomedical research and research training, the behavioral and social science projects supported by NIGMS constitute a small fraction of the Institute's total portfolio. In FY 1994, NIGMS stopped the collection and reporting of detailed budget information on such small subdivisions of the NIGMS programs. However, periodic analyses of the portfolio suggest that total research support by NIGMS in the behavioral and social sciences is approximately 0.5% of our research budget, which in FY99 would amount to approximately \$5.1 million.

National Institute of Child Health and Human Development (NICHD)

In FY 1999, the NICHD supported over 1000 projects and subprojects in the behavioral and social sciences. Listed below are highlights of the Institute's diverse portfolio, which includes new and continuing research and research training activities.

In *maternal and infant health research*, the NICHD supports a broad range of studies to ensure that mothers have safe pregnancies and that babies are born healthy and able to reach their full potential. Examples of studies in this area include:

- research on how various maternal behaviors (e.g., exercise and nutrition)

influence pregnancy outcomes

- research and interventions to prevent Sudden Infant Death Syndrome through modification of maternal behaviors in placing their infants to sleep on their backs
- interventions to improve parenting skills among high risk mothers
- interventions to prevent adolescent pregnancy
- studies of fatal and nonfatal injuries among infants and young children
- research on the determinants of lack of age appropriate immunizations
- studies of racial and neighborhood disparities in infant health
- interventions to prevent smoking in pregnant women

In ***child development and behavior research***, the Institute supports studies on behavioral and biobehavioral processes involved in development and learning from infancy to maturity. Examples of projects include:

- studies concerning the early development of math, language, and visual perception skills
- comparative studies of normal behavioral, cognitive, social-emotional, and physiological development in humans and in non-human primates
- research on early assessment and intervention for individuals with developmental disabilities
- studies of the role of family structure on the optimal development of disabled family members
- research on variations in cognitive, language, and motor development in Down Syndrome and other types of mental retardation
- effects of day care on child development from infancy to middle childhood
- research on how neglect affects the social, behavioral, and psychological development of children
- studies of racial discrimination's effect on adolescent development
- research on the effect of marital conflict and divorce on child development

- research on the psychosocial antecedents of aggression in childhood
- research to prevent and remediate learning and reading disabilities such as attention deficit/hyperactivity disorder and dyslexia
- neuroimaging studies to link regions in the brain with specific behaviors and cognitive functions over the course of development
- behavioral interventions in children to prevent chronic disease such as osteoporosis, obesity, atherosclerosis, and diabetes later in life
- studies to increase safety of teen driving and prevent underage drinking and driving
- interventions to prevent alcohol use, drug abuse, and other problem behaviors in youth
- institutional training grants in mental retardation and developmental disabilities, psycholinguistics, and developmental psychology
- multidisciplinary research centers and networks addressing autism and mind/body interactions

In *population research*, the NICHD supports a variety of studies to understand the social, behavioral, and demographic factors affecting population change, the functioning and well being of families, and health related behaviors. Examples of projects include:

- Add Health, a national, longitudinal study that has collected an unprecedented range of information on the social context of adolescents' health promoting and risk behaviors
- a broad range of data collection activities to study behavioral, health, and social trends, including the National Longitudinal Survey of Youth and the Federal Interagency Forum on Child and Family Statistics
- analyses of single motherhood and the societal effects of teenage childbearing
- analyses of the impact of welfare reform, child support reform, and adoption on child well-being
- studies of fathers' roles in family formation and parenting

- research on the effect of family socioeconomic status on child well-being
- studies of how acculturation affects health care outcomes in various immigrant populations
- institutional training programs in demography and population research

In ***HIV/AIDS research***, the Institute supports behavioral studies to prevent the transmission of HIV in infants, mothers, couples, and adolescents and to understand the risk taking behaviors that lead to HIV infection. Examples of studies include:

- the Adolescent Medicine HIV/AIDS Network (AMHARN), which is developing and testing interventions to reduce or eliminate risk behaviors that lead to HIV transmission in youth
- research on how sociocultural differences influence HIV risk behaviors
- studies of the acceptability of using various barrier methods for disease prevention
- studies to validate newly developed HIV interventions for high-risk youth in variety of settings from suburbs to multicultural communities in inner cities
- interventions to prevent HIV transmission in culturally diverse adult couples
- abstinence interventions to prevent HIV/STD transmission in youth

In ***medical rehabilitation research***, the Institute supports studies to develop the scientific knowledge needed to promote the health, productivity, independence, and quality of life of people with disabilities. Examples of projects in this area include:

- studies of psychosocial support and education for family caregivers of individuals with brain injury
- projects specifically targeted to improving health promotion of women with disabilities

- research on occupational therapy for children with sensory disorders
- studies of memory retention in children with spina bifida

National Eye Institute (NEI)

In 1968, the Congress established the National Eye Institute (NEI) to conduct and support research, training, health information dissemination, and other programs with respect to blinding eye diseases, visual disorders, mechanisms of visual function, preservation of sight, and the special health problems and requirements of the blind. Although seldom fatal, eye diseases cause suffering, disability, and loss of productivity for millions of people in this country and throughout the world. The most pronounced effects of diseases of the eye and disorders of vision are on an individual's quality of life. They affect the ability to act independently, recognize family and friends, read, drive a car, and perform a host of other activities that we consider routine daily tasks.

Our ability to perform these tasks under neurosensory control is one of the most fundamental and critical of our human abilities and one that has been an important area of NEI-sponsored research. Much of this work has concentrated on the visual/oculomotor system that controls sensory-motor coordination. By understanding how visual system neurons convey complex messages, scientists can explore how physical and behavioral components of the message contribute to higher visual cognitive functions like perception, attention, and memory. This information is vital to our understanding of visual system deficits and in developing visual prosthetic devices to compensate for other visual system defects or blindness. A number of advances have occurred in this area of research over the past year.

- Researchers supported by the NEI recently studied how the decision to focus the eyes on one of two targets begins with the sighting of both targets (sensory input) and ends with the coordinated movement of the eyes to focus on one target (motor outcome). The milliseconds between sensory input and motor output are more than a simple "knee jerk" reflex response as once thought. Primates trained to respond to visual cues demonstrate that anticipation of a reward, based on past experience, or the relative size of the reward associated with the target greatly influences

target selection. The decision-making process is correlated with the increased firing of neurons in the sensory-motor processing area of the central nervous system. This provides an important framework to model and understand the neurophysiological basis of visual-guided behaviors.

- Other scientists have shown that as we move through the environment, we experience highly stereotyped patterns of visual motion, called optic flow. Their studies of eye movements indicate that our brains are able to process optic flow information very rapidly, permitting automatic adjustments of gaze without the subject having to think about it. These behaviors use sensory-motor linkages that are known to involve particular regions of the cerebral cortex and are helping us to understand how the cortex processes visual information.
- NEI intramural investigators have also determined that the human visual system distinguishes between the motion of objects in the world about us and the motion that results because we ourselves move about in that world. An area of the cerebral cortex of the monkey, whose motion perception is very similar to that of humans, has been identified, which is particularly appropriate for seeing the motion of objects because neurons in this area both differentiate the object from its surround and they separate objects moving at different distances from the observer. Because previous experiments had identified areas related to motion generated by observer motion, researchers now believe that both types of motion (object and observer) might be represented in different areas of cerebral cortex.

The NEI is also supporting the Age-related Eye Diseases Study (AREDS), which is designed to assess the clinical course, prognosis, and risk factors of age-related macular degeneration (AMD) and cataract. Among the risk factors being studied are lifestyle and behavioral factors associated with dietary deficiencies, smoking, drugs, and sunlight exposure. The AREDS also has a clinical trial component that will evaluate, in randomized clinical trials, the effects of pharmacologic doses of (1) antioxidants and zinc on the progression of AMD and (2) antioxidants on the development and progression of lens opacities.

The NEI recently launched a Low Vision Education Program to provide communities nationwide with materials and technical support to increase awareness of local low vision services and resources. Low vision is broadly defined as a visual impairment, not corrected by standard glasses, contact lenses, medicine, or surgery, that interferes with the ability to perform everyday activities. While lost vision usually cannot be restored, this program will help people learn to make the most of the vision that remains. The Low Vision Education Program will include a multimedia public service campaign and a traveling exhibit that will be displayed in shopping malls around the country.

The National Institute of Environmental Health Sciences (NIEHS)

The NIEHS strives to reduce the burden of human illness and dysfunction from environmental causes through a multidisciplinary biomedical research program, prevention and intervention efforts, and a communication strategy that encompasses training, education, technology transfer, and community outreach. Because of the desire of the public for research about health risks of exposure to physical and chemical agents, NIEHS is playing an increasingly important role in numerous public health issues.

Over the last five years, the NIEHS has developed translational research programs to help address environmental public health issues. The Institute's activities share the following objectives: 1) To improve understanding of how environmental factors affect human health. 2) To develop better means of preventing environmentally related health problems. 3) To promote partnerships among scientists, health care providers, and community members. NIEHS' Division of Extramural Research and Training supports several translational research activities, which include environmental health science education, NIEHS Center Community Outreach and Education, Environmental Justice, Community-Based Prevention/Intervention Research and the Children's Environmental Health and Disease Prevention Research Centers.

NIEHS has partnered with EPA and CDC to create eight Children's Environmental Health and Disease Prevention Research Centers. The Centers will encourage multidisciplinary interactions among basic, clinical, and behavioral scientists to facilitate research programs that address the environmental contributions of children's health and disease. Each of the centers will maintain an intervention component and will focus on asthma and other respiratory diseases,

intellectual development, and growth development.

NIEHS supports a number of studies with behavioral/neurocognitive endpoints, studying the effects of environmental agents such as tobacco smoke, lead exposure, polychlorinated biphenyls, and mercury on such outcomes as IQ and cognitive development, ADHD, and delinquency.

NIEHS supports twenty-six center grants, including Developmental Centers, Environmental Health Sciences Centers, and Marine and Freshwater Biology Centers. The Centers grant is a program of core facility support for institutions having a group of investigators conducting multidisciplinary research in environmental health science. Each Center is required to develop community outreach and education programs. The objective of the COEP is translation of research of results into knowledge applied to public health. Appropriate activities include continuing professional education, disease prevention programs, education (primary, secondary, and/or college), information dissemination, and community issue programs, public awareness seminars, etc. As part of this effort, each NIEHS Center defines the community and/or region that it serves and develops productive outreach efforts that are specifically designed to address the environmental health concerns of that particular community. Additionally, NIEHS currently supports nine community-based prevention/intervention research (CB/PIR) grants and twelve environmental justice grants. Both of these grant programs link members of the community (directly affected by adverse environmental health conditions) with researchers and health care providers. The Environmental Justice program was recently re-announced and new awards are expected in FY 1999. The CB/PIR program is co-sponsored by the NIH Office of Behavioral and Social Sciences Research (OBSSR) and the National Institute for Nursing Research (NINR). OBSSR supports annual meetings financially, and NINR provides support for one CBPIR grant. A conference report entitled "Advancing the Community-Driven Research Agenda" is available.

Prospective partnerships with NINR, NIDCR, and NICHD are underway on a program announcement addressing low birth weight babies in minority populations. NIEHS, NCI and NIA are partners on a program announcement on Age, Ethnicity, and Prostate Cancer. Additionally, NIEHS is partnering with NHLBI, NIA, NIMH and NICHD on a PA on Socioeconomic Status and Health

Across Life Course. NIEHS also is collaborating with NIAID on a Cooperative Inner-City Study to Reduce Asthma Severity in Children.

NIEHS has been the primary force in developing awareness about the importance of disease susceptibility, including childhood susceptibility and susceptibilities arising from socioeconomic status, in defining the effects of environmental agents. Within the Healthy People 2010 framework and the Department's efforts to reduce/eliminate health disparities in racial and ethnic groups, NIEHS has initiated research on the relationship of poverty and environmental pollution to natural health disparities. NIEHS also convened a series of regional workshops on Health Disparities, held in Oakland, CA, Chicago, IL and Baltimore, MD. NIEHS held a concept forum on Health Disparities and Socioeconomic Status (SES) to explore ways in which NIEHS, in partnership with other NIH OD Offices, Institutes and Centers, can effectively address this important health issue. The purpose of the meeting was to set the stage and to generate interest in a larger trans-NIH multidisciplinary conference that was held in September 1999.

National Institute on Aging (NIA)

NIA supports basic and clinical behavioral and social research to improve the health and quality of life of older Americans, to understand principles of and strategies for healthy aging processes, and to reduce health disparities among older persons and populations. Behavioral and social research is supported across several NIA extramural Programs, with the Behavioral and Social Research Program the focal point, and is also conducted by NIA's intramural research program. NIA behavioral and social science research and training activities include support of regular research grants, career development awards, training grants, meeting support, interagency agreements, and contracts. The NIA also is an organizing and active member of the Federal Forum on Aging-Related Statistics, established to improve statistical data on the older population that are produced and used by federal agencies.

Research to Improve Health and Quality of Life of Older People. NIA-sponsored research focuses on the prevention or reduction of age-related diseases, including Alzheimer's Disease and selected geriatric conditions, on understanding observed disability declines in the older population and developing strategies for

maintaining health and function.

Recent findings from the National Long-Term Care Survey demonstrated a dramatic and unexpected reduction in disability rates among older persons, countering widely held views that old-age disability would become a pandemic. This finding has led to increased efforts to investigate the causes of the disability decline (including internationally), to improve measurement of the burden of illness, and to estimate the economic impact of improved health.

Several major studies are supported on cognitive, physical, sensory, and behavioral functioning. For example, the ROYBAL Centers are translating basic behavioral and social research into practical interventions to promote independence, activity, and productivity in later life. Foci include computer skills, driving, exercise, caregiving, and nursing home care. The ACTIVE clinical trial is investigating whether interventions to improve memory, reasoning, or speed of processing can improve instrumental activities of daily living and promote independence in older adults, and NIA is beginning an initiative on higher order cognitive functioning, including financial and medical decision making.

The Women's Health and Aging Study is providing a detailed understanding of the causes and course of physical disability. The REACH study investigates the effects of stress on the health and functioning of family caregivers with the goal of finding ways to better cope with the burdens of caring for AD patients. Basic research addresses the role of other factors such as diet, not smoking, and exercise as well as the role of neurotrophic factors, steroid hormones in maintaining neuronal integrity and neural circuitry. Recent exercise research has, for example, found that even light to moderate physical activity, such as walking, can attenuate age-related decline in some cognitive skills, especially for those functions associated with frontal regions of the brain, and that strength training exercises combined with motivational sessions can improve physical functioning in frail elders. The related Health ABC study is trying to determine how body weight, muscle mass, fat, and bone affect muscle strength, endurance, and physical function.

Research to Understand Healthy Aging Processes. Ongoing NIA-sponsored

research is working toward unlocking the secrets of aging, health and longevity, including biological, genetic, environmental, psychological, and lifestyle factors. NIA supports basic research on population issues, including forecasting the size of the elderly population, life expectancy, and active life expectancy, monitoring the impact of global population aging on the burden of chronic disease and disability, and understanding the retirement process and its relationship to old age health and economic well-being. For example, the 10 Centers on Demography of Aging focus on these issues and are in the forefront of developing the needed data infrastructure for studying these topics. An example of data infrastructure is the longitudinal Health and Retirement Study which is collecting data on the antecedents and consequences of retirement and on the combined economic and health circumstances of people as they age.

NIA supports basic research on understanding behavioral and biological changes that occur with normal cognitive and brain aging and with neurodegenerative disorders such as Alzheimer's Disease. New findings this year have increased our understanding of the nature and quality of cognitive function in elders and the mechanisms that underlie this, using new methods such as brain imaging and molecular strategies. NIA supports research on understanding the types of behavioral symptoms associated with the progression of Alzheimer's disease. Research is investigating how personality traits change with age, their relationship to health and mortality, and the contributions of genes, heritability and environment on cognition and personality in old age. A number of projects address the behavioral consequences of age-related changes in movement and perception, including hearing and smell; studies have found that the decline in speech understanding in older individuals under conditions of background noise is related to both changes in the periphery and in the central nervous system auditory pathway. Other projects seek to identify what factors are responsible for successful hearing aid use in the elderly. Sleep complaints are prevalent in elderly individuals, more particularly in AD patients, and can have severe behavioral consequences. NIA addresses sleep physiology and circadian rhythms in the elderly and in AD patients, particularly the biological mechanisms underlying changes in sleep patterns with age and disease. Interventions such as using a high technology behavioral training program and a multifaceted behavioral intervention are being evaluated in different elderly populations.

Research to Reduce Health Disparities among Older Persons and Populations.

Ongoing NIA research aims to improve active life expectancy and health status for older minority individuals; understand health differences associated with race, ethnicity, gender, environment, socioeconomic status, geography, and culture; and monitor health, economic status, and life quality of elders in order to inform policy debates. The RCMAR Center Program is dedicated to increasing the number of researchers (especially minority), studying older minority populations and increasing minority participation in clinical and behavioral research. NIA also supports basic and clinical studies of special populations, such as the Honolulu-Asia Aging Study, a longitudinal epidemiologic investigation of older Japanese-American men in Hawaii focusing on the development and progression of dementia, Parkinson's disease, and on patterns of stability or decline in cognitive, physical, and sensory functioning. The Mexican Health and Aging Study will allow an assessment of the durability of the purported health advantage of migrants.

Other NIA research aims to understand the causes of the striking and well-documented relationship between socioeconomic status, health, and longevity. While health behaviors and access to medical care explain some individual health outcomes, research has suggested that long-term impacts of early childhood, the cumulative effects of prolonged exposures to individual stressful events, or reactions to macro-societal factors such as rising levels of income inequality play a role. For example, NIA sponsors research on the causal direction of this relationship and recent findings show that economic resources appear to impact health outcomes most strongly prior to middle age, with relationship changing direction in old age, with illness events resulting in reductions in wealth. NIA research also focuses on the significant impact of job conditions on health and survival.

National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)

The diseases within the mandate of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) are among the most chronic and costly affecting our Nation, and the Institute is committed to bettering the quality of life for people suffering from these diseases. NIAMS researchers have developed a number of ways to assess health status quantitatively, such as the Arthritis Impact Measurement Scales and the Health Assessment Questionnaire,

and have used these quality-of-life instruments to demonstrate, for instance, that a sustained program of telephone contacts with trained nonmedical interviewers can improve physical health and reduce pain in patients with osteoarthritis, and a dance-based aerobic exercise program for people with rheumatoid arthritis can reduce joint pain, swelling, and depression. NIAMS grantees are now working on developing a health status measure for patients with skin disease.

One of the Institute's priorities is the study of how people adapt to and cope with chronic disease. Repeatedly, NIAMS research has shown that the concept of self-efficacy is key to managing chronic disease. Enhancing a patient's belief or confidence that he or she can achieve a specific behavior or state of knowledge will improve that person's quality of life. Originally this finding was verified with arthritis patients. Since then, it has been applied to patients with other diseases, most recently, to patients with lupus. The Institute is also funding research aimed at developing education programs for physicians and other health professionals who treat patients with chronic diseases in which self-management plays a major role.

NIAMS is currently supporting research on innovative approaches to disease prevention through behavior change. One such project is comparing two health promotion models to provide an understanding of how, and under what conditions, behavior change can occur and be maintained. An area in which change in behavior has been shown to bear significantly on health outcomes is osteoporosis. Institute scientists are exploring the effects of diet and exercise on bone density in both women and men. It is now recognized that men develop osteoporosis and osteoporotic fractures about a decade later than women do. With the decline in premature cardiovascular mortality in men, fractures later in life are becoming an increasingly important cause of morbidity and mortality in older men. NIAMS has recently launched a large epidemiologic study involving men over age 65 to determine risk factors for the development of fractures.

Another major public health problem is work-related illnesses and injuries to the skin and musculoskeletal system. The Institute has had a long history of supporting research in this area. NIAMS and other NIH components joined forces in a collaborative request for applications (RFA) with the National Institute of Occupational Safety and Health (a component of CDC) to increase knowledge of

the pathophysiology, diagnosis, treatment, and prevention of work-related musculoskeletal and skin disorders such as low-back injury and occupational irritant dermatitis. Eight million dollars in awards have been made by the participating institutes, representing the largest single infusion of funding ever by the Federal Government to support extramural occupational safety and health research.

Fibromyalgia, a chronic disorder characterized by widespread musculoskeletal pain, fatigue, and tenderness in localized areas of the neck, spine, shoulders, and hips, is also of major concern to the Institute. Scientists are currently studying the effects of two of the most promising nonpharmacologic interventions for fibromyalgia: cognitive behavior therapy and physical exercise training. If these interventions prove beneficial, the researchers plan to evaluate the combination of therapies in patients with other rheumatic diseases in which pain is a key factor. Most recently, NIAMS has funded a number of grants with behavioral and social sciences research aspects in response to an RFA on basic and clinical research on fibromyalgia. Among these are behavioral insomnia therapy for fibromyalgia patients, and employment and health status in women with fibromyalgia.

Recognizing that in chronic disease, the patient is often the principal caregiver, the Institute will continue to pursue its goal of improving health by conducting and supporting not only high-quality basic and clinical investigations, but also promising research in the area of behavioral and social sciences, including professional and patient education, epidemiology, and health services. For example, the Institute recently announced a new program to support Multidisciplinary Clinical Research Centers in arthritis, musculoskeletal disorders, and skin diseases; behavioral and social sciences research is one of the areas of emphasis for this initiative.

National Institute on Deafness and Other Communication Disorders (NIDCD)

The mission of the National Institute on Deafness and Other Communication Disorders (NIDCD) is to conduct and support research and training in the normal and disordered processes of hearing, balance, taste, smell, voice, speech, and language. The NIDCD achieves its mission through a wide range of research

performed in its own laboratories, a program of research grants, individual and institutional research training awards, career development awards, center grants, cooperative clinical trials, and contracts to public and private research institutions and organizations. Accordingly, the NIDCD devotes a considerable proportion of its resources to research relevant to the behavioral and social sciences as defined by the Office of Behavioral and Social Sciences Research (OBSSR) at the National Institutes of Health (NIH).

In particular, the NIDCD conducts and supports research and research training that is related to disease prevention and health promotion and that addresses the special biomedical and behavioral problems of individuals who have communication impairments or disorders. Research supported by the NIDCD includes basic and clinical studies in each of the mission areas of the Institute. Studies evaluate normal and disordered communication across the lifespan; clinical and applied behavioral medicine; language and communication; cognition and perception; normal and disordered motor function.

National Institute of Mental Health (NIMH)

The mission of the National Institute of Mental Health (NIMH) is to diminish the burden of mental illness and AIDS through research and research training in basic neuroscience, behavioral science, and genetics. The institute is comprised of three extramural research divisions: Division of Mental Disorders Behavioral Research and AIDS (DMDBA); Division of Neuroscience and Basic Behavioral Science (DNBBS); and the Division of Services and Intervention Research (DSIR). Behavioral science research and research training is supported by each of the Divisions. In addition the Office for Special Populations (OSP) coordinates, develops, and administers research and research training in basic and applied social and behavioral science concerning the mental health needs of women and minority populations.

DMDBA supports research and research training related to behavioral, developmental, epidemiologic and intervention development studies on the causes, prevention, and treatment of mental and behavioral disorders and HIV/AIDS. The Division is comprised of three research branches with each supporting behavioral research.

- **Developmental Psychopathology and Prevention Research Branch** focuses on: risk/protective factor identification; early social, emotional, and cognitive developmental processes leading to psychopathology or resilience; early manifestations and course of psychopathology in childhood and adolescence; and the translation of risk and developmental research into new prevention, early intervention, and treatment strategies.
- **Adult Psychopathology and Prevention Branch** focuses on: developing preventive interventions for psychopathology over the course of adult life based on epidemiologic and clinical research; refining nosologic definitions, assessment, and diagnosis of adult psychopathology and disability and related behaviors and outcomes; and, clarifying the relations among psychological, biological, social, cultural, and environmental factors involved in adult mental health, illness, and disability.
- **Health and Behavioral Science Research Branch** focuses on general medical illnesses and behavior and their relationship to mental disorders. Emphasis is on the mechanisms and processes linking medical and mental illnesses (i.e., comorbidity) and the development and the testing of early interventions; factors that influence adherence to treatment, cross-cutting behavior change relevant to two or more medical disorders, therapeutic alliance, and help-seeking behavior; and cognitive and decision-making factors that influence the choice of treatment or mental health services, acceptance or denial of illness, stigma, and services utilization for both physical and mental illness.

Also within DMDBA is the **Center for Mental Health Research on AIDS**. The Center supports behavioral science research and training in developing and testing behavior-change and prevention strategies to reduce the further spread of HIV and other sexually transmitted diseases (STDs); conducting interventions to prevent the consequences of HIV infection; identifying and addressing the behavioral issues in vaccine trials; identifying the role of couples, families, and communities in preventing and adapting to HIV/STDs; defining the clinical phenomena of HIV-related neuropsychological and neuropsychiatric disorders; and improving mental health services relevant to HIV infection and people with severe mental illness.

DNBBS supports research and research training in the areas of basic and clinical neuroscience, genetics, therapeutics development, and basic behavioral science. The Division is comprised of five research branches, with two branches supporting behavioral research and training.

- **Behavioral Science Research Branch** focuses on the basic behavioral mechanisms that underlie behavioral functioning and development across the lifespan. This includes research on: behavioral regulation and homeostasis, including sleep, reproduction, ingestion, and thermoregulation; cognition, including perception, action, attention, memory, learning, knowledge, reasoning, and language; emotional processes in emotion, mood, and motivation; personality processes (e.g., individual differences, traits, self and self-processes) and social cognition (e.g., social decision making, attitudes, persuasion, impression formation, stereotypes, and group processes).
- **Behavioral and Integrative Neuroscience Research Branch** supports research on the brain mechanisms underlying cognition and behavior. This includes research on the functional organization of brain systems and how behavior maps onto the brain and how systems responsible for coordinating internal states (e.g., neural circuitry, circadian rhythms, neuroendocrine systems) are changed by external environmental events and situations. Also, supported are studies investigating the brain mechanisms underlying cognitive processes, such as learning, perception, and reasoning.

DSIR supports research and research training in prevention, treatment interventions, services research and clinical epidemiology. Behavioral science research is supported in each of the three research branches.

- **Adult and Geriatric Treatment and Preventive Intervention Research Branch** focuses on treatment, prevention, and rehabilitation of mental disorders in adults, including older persons. Preventive and treatment interventions may include pharmacologic approaches, psychotherapeutic,

behavioral, and psychosocial treatments.

- **Child and Adolescent Treatment and Preventive Intervention Research Branch** focuses on treatment, prevention, and rehabilitation of mental disorders in children and adolescents. Preventive and treatment interventions may include pharmacologic approaches, psychotherapeutic, behavioral, and psychosocial treatments.
- **Services Research and Clinical Epidemiology Branch** supports research on the organization, delivery and financing of mental health services; interventions to improve the quality and outcomes of treatment and rehabilitative services; clinical epidemiology of brain disorders; and, dissemination research that includes examination of psychological and social factors influencing decision-making by consumers, practitioners, and health-care delivery systems, and identification of psychosocial factors that influence the delivery of and adherence to mental health treatments by consumers and providers.

National Institute on Drug Abuse (NIDA)

Basic Behavioral and Social Processes

NIDA supports both human and animal basic research on how behavioral and cognitive factors underlie, or can lead to, drug addictions. Examples include how people make decisions; the impact of early experiences (for example, things they learned, early exposure to drugs or stressful life experiences, feelings of craving leading to drug relapse, or economic factors). Studies that look at the effects of drugs on behavior and that determine the potential abusability of drugs are also supported. NIDA also supports research that will lead to a better understanding of risky behavior, generally, such as research on self-control or impulsivity. Studies on social factors, such as peers, schools and family as they influence the development of drug abuse are also supported.

Biobehavioral Factors Research

NIDA also supports a number of projects that consider potential stages of

drug involvement (initiation, escalation, resistance to drug involvement and escalation, continuation, discontinuation, relapse, and recovery from drug abuse and addiction) from a biological and genetics perspective to account for individual differences in vulnerability to drug abuse.

Improving Measurement, Analysis and Classification

NIDA's program in this area includes research directed toward improving the precision and efficiency of epidemiological (survey) studies; developing assessment protocols for use in general populations; developing new sampling, surveillance, culturally appropriate data collection methods; and refining statistical tools to analyze survey data.

Identifying and Understanding Vulnerability to Substance Abuse

NIDA supports a number of studies exploring the origins of and pathways to drug abuse from a variety of perspectives. Factors that predispose and protect an individual from drug abuse, from initial use through different stages of drug involvement, is essential to successfully preventing and treating drug abuse.

Research on the Effects of Illness on Physical Condition, Behavioral and Social Functioning

NIDA has a large portfolio of research on the consequences of drug abuse, ranging from basic studies on how drugs affect the ability to sense and perceive things, to how drugs affect higher cognitive abilities such as planning and organizing. Research is also supported that examines the effects of AIDS on cognitive and behavioral abilities in drug abusers.

Treatment Outcomes Research

The Behavioral Therapies Development Program (BTDP) was established to develop new, and enhance existing, behavioral therapies for drug abuse and addiction and for AIDS risk reduction.

Research on Health Promotion and Disease Prevention

The health promotion and disease prevention portfolio of NIDA funds studies that examine what works, for whom, and under what conditions. Programs are developed and tested for a variety of populations and contexts. These studies try to gain a thorough understanding of how to enact programs in settings with low access or other difficult factors. Prevention services research projects use a variety of methods to describe the organization, management, and financing of health care systems. It is important that such studies focus on program elements that produce successful outcomes.

Research on Institutional and Organizational Influences on Health

NIDA's portfolio in this area consists of health services research on drug abuse treatment, with a focus on the quality, cost, access, outcomes, and cost-effectiveness of care for drug abuse and addiction disorders, and how these are influenced by the organization, financing, and management of drug abuse treatment.

Training in the Behavioral and Social Sciences

NIDA supports the training of behavioral and social sciences researchers at various stages of their careers through a variety of funding mechanisms. These include the National Research Service Awards for pre- and postdoctoral fellows, career development awards that support a period of mentored training for young scientists, and a recently developed program, the B/START (Behavioral Science Track Awards for Rapid Transition).

The B/START program offers fast-track small grants to newly independent behavioral scientists through rapid review and funding decisions of applications. Research applications are encouraged across a wide variety of behavioral factors in drug abuse, including neurocognitive, cognitive and perceptual processes, psychosocial, and more broadly motivational, social and community factors in drug abuse. Given the role that drug abuse plays in HIV/AIDS transmission, studies applying basic behavioral science models and methods to address this issue are especially encouraged.

In 1999 a series of workshops were organized and held at seven national scientific

conferences (“Early Career Pathways”) to aid new investigators in applying for research grants, learning about topics in drug addiction research, and getting information about training opportunities.

National Institute on Alcohol Abuse and Alcoholism (NIAAA)

NIAAA's large portfolio of behavioral and social science research (BSSR) and training grants is supported in each of its extramural Divisions; BSSR studies also are part of its Intramural program. The importance of behavioral and social science research follows from the fact that alcohol consumption is a socially defined behavior that has major health-related consequences, including alcoholism, and that many interventions to treat and prevent the medical, psychological, social, legal, and economic consequences of alcohol-related problems also are behavioral or social.

Alcohol epidemiology seeks to identify and explain factors that shape the distribution of alcohol use, abuse, and dependence and their consequences in various populations. Current research includes: a) studies of methodological improvements in measurement of alcohol consumption and related problems, including studies of long-term changes in drinking norms, contexts, and cultural influences on alcohol consumption and development of classification systems and diagnostic instruments; b) studies of the adverse consequences (e.g., morbidity and mortality) of alcohol consumption, including unintentional and intentional injuries, cirrhosis, sexually transmitted diseases, and comorbid psychiatric disorders, as well as potential benefits of moderate drinking; c) consumption patterns and problems of special populations, including women, racial/ethnic minorities, the elderly, and youth and their families.

Basic behavioral research includes studies of addiction and other neuroadaptive behaviors in both animal models and humans. The former studies focus largely on neural mechanisms of sensitization, tolerance, dependence, withdrawal, relapse, and the reinforcing and hedonic effects of alcohol that can lead to alcohol-seeking behavior and excessive drinking. Animal models also have been constructed to study innate neural and behavioral traits as well as the acute and chronic effects of alcohol on behaviors, such as learning, memory, and aggression. For example, four studies investigate environmental factors in an operant

reinforcement paradigm to evaluate the reinforcing efficacy of ethanol alone versus multiple reinforcers that differ in taste. A new area of animal studies focuses on studies of adolescents, since early alcohol exposure correlates with the development of alcoholism in adulthood. Human studies include grants that examine a) the consequences of acute and chronic alcohol use on cognitive and other behavior, including structural changes associated with behavioral deficits, using imaging technologies; b) the neural mechanisms of alcohol-motivated behaviors, such as craving; and c) the consequences of brain damage and cognitive and motor dysfunction in chronic alcoholics and Korsakoff patients, using neurocognitive and/or MRI techniques.

Health services research on alcohol addresses utilization, outcomes, and costs of care, and the effects of managed care and other developments in the organization and financing of services for alcohol treatment and prevention. Two new RFAs have stimulated research on the cost of alcoholism treatment and on secondary analysis of existing health services data sets.

Treatment-related research includes evaluations of various behavioral interventions alone and in combination with pharmacotherapies. New behavioral initiatives included 14 studies of the role of tobacco dependence in the treatment of alcoholism, based on evidence that alcohol and tobacco consumption and abuse are closely linked. These grants include eight clinical studies and six human laboratory studies that evaluate variables, such as affect modulation. An RFA issued jointly in FY 1998 by NIAAA and CSAT/SAMHSA for research on Treatment for Adolescent Alcohol Abuse and Alcoholism resulted in funding of 14 new grants by the end of FY 1999. These 10 clinical studies and four questionnaire development projects together provide opportunities to identify effective interventions for adolescent alcohol problems (family therapy, cognitive behavioral therapy, brief motivational enhancement therapy, and self-guided change) among diverse groups of adolescents (high school students, juvenile delinquents and street youth, as well as minority youth).

Prevention research includes both pre-intervention and intervention studies. Areas of emphasis include: a) fetal alcohol syndrome, including seven applications funded in 1999 under an RFA; b) studies of natural experiments and policy studies, including evaluations of changes in the price of alcohol, mandatory

training for alcohol servers, laws to deter alcohol-impaired driving, and five policy-relevant studies on the impact of alcohol advertising on initiation and patterns of drinking among youth; c) tests of preventive interventions delivered by primary-care physicians; and d) community-wide interventions. A major emphasis is preventing alcohol abuse among youth. Research includes five studies funded under an RFA (cofunded with the CSAP/SAMHSA and DOE), to develop and test environmental and policy approaches to preventing college alcohol problems; interventions focused on younger children and their families through media messages, schools, and whole communities; and studies concerned with adolescent development, cognition, and alcohol use that make comparisons across ethnic groups. Studies of alcohol-related injuries address alcohol-related violence in families, gangs, and bars and adjacent areas; and drinking and driving, including two studies funded in FY 1999 under an RFA to encourage tests of interventions to reduce DUI recidivism. Other behavioral research support expanded efforts to stimulate tests of interventions to prevent HIV exposure and transmission among alcohol users and abusers and alcoholics. Finally, there are several grants on behavioral genetics.

BSSR figures prominently in the NIAAA Centers program, with 10 of the 15 Centers having at least 10 percent of funds devoted to behavioral research and in the training budget, since well over half of the 30 training grants are focused on BSSR studies. In the Division of Intramural Research, both the clinical studies and the genetics research program address behavioral issues. BSSR spending on research grants and centers in FY 1999 was \$141.1 million.

National Institute of Nursing Research (NINR)

The National Institute of Nursing Research (NINR) supports clinical and basic research to establish a scientific basis for the care of individuals across the life span. According to its broad mandate, the Institute seeks to understand and ease the symptoms of acute and chronic illness, to prevent or delay the onset of disease or disability or slow its progression, and to find effective approaches to achieving and sustaining good health. NINR's research extends to problems encountered by patients, families, and caregivers, emphasizes the special needs of at-risk and underserved populations, and addresses problems throughout the lifespan. Consistent with its broad mandate, NINR supports numerous research studies and research training projects relating to behavioral and social sciences research.

Highlights of projects that specifically address the influence of behavior on health and disease include the following:

Heart Disease. NINR researchers are studying ways of preventing heart disease through risk assessment and interventions in children. An NINR investigator has shown that an intervention with knowledge/attitude information and a physical activity program reduced cholesterol and body fat in elementary school children at high risk for the development of cardiovascular (CV) disease. She is continuing this work to determine the dose of activity needed to prevent obesity and other CV risk factors. Another investigator is studying CV risk factors in preschool children in order to describe specific risk factors associated with cardiovascular disease and to identify appropriate outcome measures. NINR also supports research to explain and reduce patients' delay in seeking treatment for acute myocardial infarction (AMI), specifically testing an educational intervention to facilitate identification of an AMI in a culturally diverse, at-risk population.

AIDS. NINR supports a variety of behavioral research projects aimed at prevention of AIDS, particularly in vulnerable populations such as infants, adolescents, minorities, and women. One investigator is testing the effectiveness of two behavioral interventions designed to decrease perinatal transmission of HIV in African-American women. Another project is testing an education program aimed at preventing HIV in Latina and African-American adolescent mothers (a particularly at-risk group). Additional studies on prevention in adolescent populations include: an evaluation of the effectiveness of a culturally-specific intervention in increasing HIV prevention behaviors for inner city Hispanic women; and development of a culturally-appropriate adolescent AIDS prevention program for the presently understudied Pacific Islander community.

Suicide Prevention. NINR investigators are exploring several aspects of suicide prevention, including validating a comprehensive measure of suicide potential for adolescents, testing a preventive intervention program for suicide-vulnerable youth and their parents, and testing a suicide prevention program specifically designed for rural Native American adolescents (a particularly vulnerable group). Suicide is a leading cause of death among youth aged 15 to 19 years, and these studies will increase our understanding of behavioral and social risk factors, as well as appropriate interventions.

Childhood Conduct Disorders. To address the increasing problem of children's behavioral and conduct problems, NINR-supported researchers are testing comprehensive community or school-based intervention programs for a variety of populations. The studies include testing an intervention program for families with school-aged children with oppositional defiance and conduct disorders, investigating the effectiveness of a comprehensive, community-based video intervention for low-income minority parents and daycare teachers of toddlers (2-3 years old) who are at increased risk for behavior problems, and determining the effectiveness of a temperament-based, preventive intervention for inner city minority school-age children in the first and second grade.

Health Promotion and Disease Prevention. A number of NINR investigators are exploring the behavioral antecedents of effective health promotion and disease prevention. Examples include: identifying determinants of health promoting behaviors among adolescents; testing a smoking prevention/cessation program for employed adolescents; testing a nurse-managed, lay-led tobacco cessation intervention in rural Appalachia; and testing the effectiveness of a home-based, moderate intensity walking program in improving physical fitness and exercise behavior for midlife women. In addition, NINR supports two Core Centers grants focused on expanding interdisciplinary research in the area of health promotion and risk reduction in special populations, such as racial and minority groups, women and children, people living in poverty, and those with disabilities.

Behavioral Interventions to Manage Symptoms. NINR supports many investigators seeking to determine effective behavioral interventions to manage symptoms of chronic illness, for patients and their families/caregivers. One investigator has found an Arthritis Self-Management Program for Spanish-speaking populations is effective in improving exercise and general health, and decreasing pain and disability. The PI is currently expanding this intervention to three other chronic disease populations. Another study found that an intensive intervention plus coping skills training improved quality of life and metabolic control for diabetic youth aged 13-20. The PI is continuing this work to determine sustainability of the outcomes over a longer period of time, and the effectiveness of this intervention in pre-adolescents. Several studies focus on the assessment and management of pain in a variety of populations, including determining how sex hormones mediate gender differences in pain relief and developing tools to objectively assess pain in infants and nonverbal children. Other studies include

testing a home-based nursing intervention targeting inner-city children with asthma, and exploring the symptoms of fatigue, pain, and sleep disturbances during radiation therapy for oncology outpatients.

National Human Genome Research Institute (NHGRI)

The NHGRI Division of Extramural Research's Ethical, Legal and Social Implications of Human Genetics Research (ELSI) Research Program funded a number of research grants in FY 1999 that are behavioral and social sciences research. Some of these grants were part of the Cancer Genetics Studies Consortium, a group of grants funded initially in FY 1994 to examine the psychosocial and clinical impact of using gene-based diagnostic tests in families with heritable forms of breast, ovarian, and colon cancer; assess public knowledge and attitudes about genetic testing for cancer risks; and gather information needed to establish clinical protocols for the optimum use of these risk assessment technologies in the future. In addition to the consortium grants, NHGRI also funded a number of projects looking at genetic testing for specific diseases or disorders, such as Alzheimer disease, hemophilia A, and a number of connective tissue disorders (Marfan, chondrodyplasia, and epidermolysis bullosa). These grants are multifaceted and include assessments of knowledge and attitudes toward genetic testing, interest in and demand for testing, the impact of testing on individuals and their families, and the development of effective strategies for educating people and health care providers about the benefits, risks, and limitations of genetic testing. Also funded were a number of projects designed to examine how individuals from diverse racial, ethnic and socio-economic groups view and are affected by genetic information and technologies, such as prenatal screening and diagnosis.

The NHGRI's Division of Intramural Research is also funding behavioral and social sciences research. One behavioral research study is designed to examine the "dishevelled" gene family in mice. The study of this organism will provide a model for study of aspects of several human psychiatric disorders including autism, schizophrenia, and Tourette syndrome.

National Center for Research Resources (NCRR)

The National Center for Research Resources (NCRR) supports health and behavior research through its funding of multidisciplinary resources for PHS-supported researchers. These resources include sophisticated instrumentation and technology, appropriate animal and nonanimal models, flexible support mechanisms to handle emerging scientific opportunities, highly trained staff, and cost-effective clinical settings for translating research findings to the patient. This broad range of NCRR-supported resources permits the integration of behavioral and biological approaches into basic and clinical investigations.

The NCRR contributes a significant portion of its budget to health and behavior research. Shifts in the Center's resources and funding are driven by the demands of PHS-sponsored investigators. Thus, the NCRR's future directions will be influenced by forthcoming activities undertaken by other NIH and PHS components to meet the goals of Healthy People 2010, and other NIH initiatives such as, health disparities research.

Described below are the four NCRR areas highlighting key Biomedical Technology, Clinical Research, Comparative Medicine and Research Infrastructure areas of research resource support related to health and behavior. To continue the current level of support for these initiatives—and for the rest of the NCRR's broad-based support for resources for health and behavior research—the Center's budget levels are projected to grow from \$41.04 million in FY99 to \$46.07 million in FY00.

A number of NCRR activities aim to reduce health disparities among women, minorities, and people of low socioeconomic status. These efforts are supported through the Research Infrastructure and Clinical Research areas and include the recruitment of these populations into clinical trials and supporting surveillance and intervention programs to promote behavior changes that improve health. Better representation of underserved populations in clinical trials, especially AIDS, clinical trials, is being sought through collaborative efforts of two NCRR programs: the Research Centers in Minority Institutions Program and the General Clinical Research Centers Program. In addition, primarily through these two networks of centers, the NCRR supports research on lifestyle choices and risk factor interactions for a range of diseases, including AIDS, studies on ways to improve adherence to treatment regimens, and programs to prevent unintended pregnancies and the transmission of sexually transmitted diseases.

Through support of Comparative Medicine research which involves nonhuman

primates, a wealth of knowledge has been gained about the acquisition of language and the cognitive abilities underlying learning and memory. The NCCR's Regional Primate Research Centers Program will continue comparative biobehavioral studies on a range of topics, many of which correlate directly to improvements in the teaching of language and cognitive skills to severely and profoundly mentally retarded children and young adults. Examples of research topics include defining the requisites to language, counting, and complex learning, new methods of assessing speech comprehension, imitation learning models, and the neurobehavioral and cognitive factors associated with the development of symbol-based communication skills.

Behavioral factors play a critical role in health and effective functioning. The Biomedical Technology area provides opportunities to explore the individual differences in brain structure, particularly in the elderly, through research using noninvasive techniques for brain imaging. Imaging and spectroscopy for mapping brain function, blood flow, and metabolism are included in research using magnetic resonance and multimodality imaging. Further development of these techniques will allow refined analysis of brain structure and activity to permit correlation with behavioral, cognitive, sensory, or other measures of brain function. Future opportunities could include uses for monitoring various disease states as well as the effects of drugs and other interventions on outcome.

An example of how the NCCR supports behavioral research is the influence of behavior on depression and hypertension. Studies are designed to determine the relationship of serotonergic dysfunction, cognitive dysfunction, the role of estrogen and stress, exercise training, corticosteroid dysregulation, and glucocorticoid feedback effects on ATCH secretion in depressed patients. Additional studies examine the effect of depression on coronary heart disease, and the effect of early adverse life events, and exaggerated platelet reactivity in major depression. Researchers are studying the effect of behavior and exercise on hypertension, and the biomechanics of blood pressure regulation. All four NCCR areas contribute to this research.

John E. Fogarty International Center (FIC)

The Fogarty International Center (FIC) for Advanced Study in the Health Sciences of the National Institutes of Health (NIH) was established by executive order and congressional action in 1968 to advance health through international scientific cooperation and to serve as the organizational locus for NIH international activities. The mission of the FIC is to improve the health of the people of the United States and other nations through international cooperation, research, and

research training in the biomedical and behavioral sciences.

The FIC fosters research partnerships between U.S. scientists and foreign counterparts through research and training grants, fellowships, exchange awards, and international agreements. In FY 1999, the FIC supported a variety of projects in the behavioral and social sciences through several international research and training programs. These programs focus on global health priorities including HIV/AIDS, emerging and re-emerging infectious diseases, and population issues. In addition, behavioral and social science efforts were supported through a small grant program, the Fogarty International Research Collaboration Award.

Under the AIDS International Training and Research Program (AITRP), scientists are trained to address the global HIV/AIDS epidemic through participation in international collaborative research projects. Examples of behavioral and social sciences research training supported through AITRP institutional grants include research as related to HIV/AIDS and nutritional deficiencies, behavior modification strategies to prevent HIV transmission, and risk factors for HIV transmission for specific populations in developing countries.

Examples of projects related to behavioral and social sciences research and training under the AITRP include:

U.S. and Belizean scientists studied and promoted HIV/AIDS risk reduction behaviors among adolescents in Belize by using an innovative approach for peer education. Following monitoring and evaluation, the Peer Evaluation Program of Belize is expected to become a vital part of a comprehensive HIV/AIDS health education and outreach program targeted to adolescents in Belize.

U.S. and Thai scientists conducted a regional workshop in Thailand to examine cost-effectiveness and other features of HIV prevention/intervention programs. Participants from Thailand, India, Indonesia, Cambodia, and Nepal attended the one-week training, where participants were trained in the use of behavioral survey data to estimate the cost-effectiveness of HIV prevention programs.

Scientists from the United States and Botswana collaborated to study three villages near Gaborone to determine the feasibility of behavioral modification paradigms to prevent infant infections through breast milk. HIV-infected mothers were monitored to determine compliance in using AZT syrup

prophylaxis and formula bottle feeding of infants rather than breastfeeding to reduce HIV transmission.

Scientists from the United States and the Philippines, while collaborating in longitudinal studies on health and nutrition, studied Filipino adolescent sexual behaviors, family planning decision-making processes, and the needs for adolescent health services in Metro Cebu. The team developed a program related to parent-child communication, maternal behavior and community influences on adolescent girls.

Relevant studies conducted with support of other FIC programs include:

Scientists from the U.S. and China studied the effects of social change on family functioning and its consequence for the physical and psychological health of elderly people living in Anhui Province, China. This study compared the economic, structural, and normative changes in China and their impact on the elderly at-risk of psychological distress and physical impairment. The results of this study contribute to a better understanding of rapid social and economic changes in contemporary China, and enhance the studies being conducted in the United States on the effects of social change on family functioning and well-being of older people.

Scientists from the United States and Turkey collaborated to study dental care delivery in Turkey, including patient compliance and psychological and behavioral aspects of orthodontics in this population. The results of this study increase our understanding of specialized care, including orthodontics, are adopted within populations and provide insights that are useful for effective public health and prevention policymaking decisions.

FIC-supported trainees conducted studies at the World Health Organization's Nursing and Midwifery Collaborating Centers in Botswana, Brazil, Chile, Columbia, Malawi, and Thailand on primary health care and community interventions for maternal and child health, AIDS prevention and breast cancer rehabilitation.

National Library of Medicine (NLM)

NLM believes that access to health-related information can have important health benefits, and that research into ways of improving information access for health care providers, patients, and families can have a positive impact on health

behaviors.

NLM has historically focused its services and products on an audience of health professionals and biomedical scientists. With widespread deployment of computers and telecommunications, the time is now right for NLM to provide access to health information that is useful both to the general public and to practitioners who need information outside their particular field of expertise. The managed care environment is pushing members of the public to take responsibility for their health by becoming well-informed patients. Increasingly members of the public and health professionals turn to the Internet for information, where there are already thousands of health-related Web sites, including many with inaccurate, out-of-date, or misleading information. As the world's largest medical library, NLM has a responsibility to develop technologies and information systems that meet the public's interest in accurate, current, and understandable health information. NLM is partnering with federal agencies, voluntary health organizations, and others to identify gaps, arrange for development of understandable content, and help the public make effective use of electronic health information. NLM will also promote research on ways that information services can improve personal health care decisions and outcomes.

To serve these new users more effectively, in 1998, NLM launched the MEDLINEplus web site, which provides access to a rich array of full-text consumer health information on major diseases and conditions in addition to pre-formulated MEDLINE searches. MEDLINEplus is for anyone with a medical question. Both health professionals and consumers can depend on it for accurate, current, medical information. This new service provides access to extensive information about specific diseases and conditions and also has links to consumer health information from the National Institutes of Health, clearinghouses, dictionaries, lists of hospitals and physicians, health information in Spanish and other languages, and clinical trials. MEDLINEplus is being improved based on user feedback, advice from expert advisory panels, and usability testing. NLM is also working to create an easy-to-use database containing information about clinical trials (both Federal and non-Federal) for experimental treatments for serious diseases and conditions.

More specifically, with regard to encouraging adherence to patient/treatment outcomes, NLM is collaborating with the NHLBI in the National Heart Attack Alert Program. NLM projects seek to explore the use of medical informatics as an approach to reducing or eliminating some or all of the obstacles hindering the utilization of therapies known to improve survival rates of acute heart attack if administered shortly after onset of the attack. This program includes the planning of demonstration applications that make use of medical informatics in acute myocardial infarction (AMI) related health care; public health; health education; and biomedical, clinical, and health services practice and research. Projects

involve the use of informatics applications relevant to treatment of AMI for the public, for patients, and for health care providers.

Examples of some of these projects include:

- Development of a card-sized device to be carried by patients at high risk for developing an acute coronary syndrome to transmit transmitting current and past history and baseline and current ECG from any telephone to a central facility.
- The use of personal digital assistants (PDAs) to allow patients to record and evaluate symptoms as they occur
- Development of an educational, data access, and diagnosis support system to reduce time to treatment for patients with acute myocardial infarctions to one hour
- Development of wearable ("wristwatch") devices to assess the utility of real-time algorithms to detect cardiovascular abnormalities and, potentially to alert the wearer to seek medical attention
- Determination of whether improving recognition of myocardial infarction-related signs and symptoms by patients and passers-by will reduce myocardial infarction mortality and adverse reactions

Contracts for the National Heart Attack Alert Program were awarded for a total of \$1,288,000 in FY 1999.

Warren Grant Magnuson Clinical Center (CC)

The mission of the Warren Grant Magnuson Clinical Center at the National Institutes of Health (Clinical Center) is to provide the patient care, services, environment, and training to support the clinical research conducted by the NIH intramural program. Clinical Center investigators contribute to the intramural research portfolio through the conduct of independent research and as collaborators on Institute clinical research protocols.

The Clinical Center supports a wide breadth of behavioral health and social science research projects. The Pharmacy Department, in collaboration with the National Institute of Diabetes, Digestive and Kidney Disorders, supports several studies assessing patients' appraisals and perceptions of post-transplant functioning and satisfaction using a variety of quality of life measures. Clinical

Center Nursing Department investigators are evaluating the quality of life of patients with HIV/AIDS, melanoma, and in patients undergoing non-myeloablative allogeneic peripheral blood stem cell transplants. The Nursing Department also supports a study assessing behavioral responses of demented patients to invasive diagnostic testing. The impact of educational and support groups on the quality of life of thyroid cancer patients is the focus of a study conducted by the Social Work Department in the CC. The Rehabilitation Medicine Department supports research protocols designed to correlate the physiological and psychological components of fatigue, the individual's perception of fatigue with performance and to validate a battery of self-administered assessment tools. Another study initiated by the Rehabilitation Medicine Department evaluates the coping responses of patients with chronic disease and disability.

The Clinical Center Clinical Bioethics Program has several research protocols that assess a broad range of behavioral health and social science issues. These research initiatives include: a) a study that queries Medicare beneficiaries and patients at risk for Alzheimer's disease about their willingness to participate in clinical research, their attitudes about research with stored tissue, and their attitudes about the use of research advance directives; b) a survey of Organ Procurement Organizations regarding policies about harvesting organs of patients with living wills or other advance directives, or when there is conflict between the dead patient's family and the patient's previously expressed wishes; and c) a study of international research professionals to determine views on various ethical issues associated with international research and the impact of U.S. regulations on human subjects research.

Conclusion

The creation by OBSSR of a working definition of behavioral and social sciences research; the consistent application of this definition by the Institutes and Centers; and the annual budget reporting by the NIH Office of Budget are all factors that contribute to a better assessment of the role of behavioral and social sciences research in accomplishing the NIH mission. Although the amount of funding of behavioral and social sciences has varied across the Institutes and Centers, most show a steady increase over the past five years. NIH now funds a total of approximately \$1.8 billion in behavioral and social sciences research.

To ensure that behavioral and social sciences research continues to play a critical role in fulfilling our mission, the National Academy of Sciences has been commissioned by OBSSR to identify research priorities in the behavioral and social sciences. These priorities will be helpful to OBSSR and the NIH Institutes and Centers in developing new or additional behavioral and social sciences

research funding initiatives.