



TRANSLATING BEHAVIORAL SCIENCE INTO ACTION:

*REPORT OF THE
NATIONAL ADVISORY MENTAL
HEALTH COUNCIL
BEHAVIORAL SCIENCE
WORKGROUP*

EXECUTIVE SUMMARY

A. INTRODUCTION

The current social and economic burden of mental illness in America is enormous. Its toll includes more than \$148 billion a year in direct and indirect costs, and an incalculable amount of suffering for a sizeable proportion of our population. Mental disorders also account for more than 10 percent of the global burden of disease. Four mental disorders (unipolar major depression, bipolar disorder, schizophrenia, and obsessive-compulsive disorder) rank among the 10 leading causes of disability worldwide, with unipolar major depression leading the entire ranking. A public health challenge of this magnitude demands the best science we can offer to improve mental health and clinical care in the United States and beyond.

This report focuses on ways to enhance the potential contributions of one specific area of science--behavioral science¹--a bedrock of the National Institute of Mental Health (NIMH) research since the Institute was founded in the late 1940s. It suggests new ways to build on the Institute's rich portfolio of basic behavioral science to reach its public health goals in the 21st century.

Behavioral science can offer critical insights into the nature of mental illness and health and the processes and interventions that can prevent illness or lead from disorder to remission, recovery, and rehabilitation. It is clear, however, that the field, which has yielded great practical benefits for education, the military and industry, as well as many health areas, has much more to offer in mental health. Many findings that might inform interventions have not yet been applied in the clinical and services domain; others remain to be explored and developed.

As suggested by the Workgroup's findings (see Chapter II), addressing major communication issues could strengthen the application of behavioral science knowledge to clinical care and service delivery:

- Communication and collaboration between basic scientists and clinical and services researchers;

¹ See NIH definition of behavioral and social sciences research, Appendix A. Please note that this document uses the terms "behavioral science," "behavioral research," "behavioral science research," and "behavioral and social science" interchangeably, as it does the terms "consumer," "client," and "patient."

- Engagement by the scientific community in research identified as important by consumers, family members, providers, and payers;
- Adoption, development, and dissemination of essential research tools and methods for translational research, and sharing of research findings among laboratory scientists, clinical researchers, and services researchers; and
- Translation of relevant research to other stakeholders.

In this report, the National Advisory Mental Health Council's (NAMHC) Behavioral Science Workgroup recommends ways to help NIMH foster translational research² that addresses effectively many of the core problems facing people with mental illness. Such research can shed light on risk, prevention, treatment, rehabilitation and the organization, delivery, and use of services. A summary of major priority research areas and recommendations for NIMH leadership in developing research in these areas follows.

B. PRIORITY TRANSLATIONAL BEHAVIORAL SCIENCE RESEARCH AND FUNDING AREAS

The Workgroup has chosen to highlight three specific areas of study in which the push of research progress converges with the pull of public health need (i.e., the real-world needs of consumers, practitioners, payers, and policymakers) to create prime targets for intensified study. These priority research areas are critical starting points for progress in translational science because they are at the interface of what end-users have identified as important and what behavioral science researchers regard as areas of opportunity. They offer the prospect of conducting exciting research, advancing scientific understanding of behavior--in health and in illness--and improving the mental health of our Nation. (For discussion of specific research directions within these priority areas, see Chapter III.)

PRIORITY AREA 1: BASIC BEHAVIORAL PROCESSES IN MENTAL ILLNESS

Understand how basic behavioral processes (e.g., cognition, emotion, motivation, development, personality, social interaction) are altered in mental illnesses, how these processes relate to neurobiological functioning, and the implications of these alterations for etiology, diagnosis, course, prevention, treatment, and rehabilitation.

- Develop reliable and valid methods for assessing these basic behavioral processes as part of clinical diagnosis.
- Assess how preventive, treatment, and rehabilitative interventions affect these basic behavioral processes.

² Translational research in the behavioral and social sciences addresses how basic behavioral processes inform the diagnosis, prevention, treatment, and delivery of services for mental illness, and, conversely, how knowledge of mental illness increases our understanding of basic behavioral processes.

- Evaluate these basic behavioral processes as indicators of risk for the development or exacerbation of mental illness.
- Combine basic behavioral research with neuroscientific, pharmacological, and genetic research to produce an integrated approach to understanding, preventing, and treating mental illness.

PRIORITY AREA 2: FUNCTIONAL ABILITIES IN MENTAL ILLNESS

Understand how mental illnesses and their treatments affect the abilities of individuals to function in diverse settings and roles (e.g., carrying out personal, educational, family, and work responsibilities).

- Apply methods from basic behavioral science to the development of tools to assess functioning.
- Use methods from basic behavioral science to understand how specific rehabilitation and other intervention techniques improve specific types of functioning.
- Develop interventions that focus on improving functioning in addition to reducing clinical symptoms.
- Include the assessment of functioning as an outcome in intervention, services, and risk-factor research.

PRIORITY AREA 3: CONTEXTUAL INFLUENCES ON MENTAL ILLNESS AND ITS CARE

Understand how social or other environmental contexts influence the etiology and prevention of mental illness and the treatment and care of those suffering from mental disorders. Context includes interactions among factors at the individual, family, sociocultural, and service-system or organizational levels. Examples include:

- **Individual:** How social and cultural influences at the individual level--such as developmental history, styles of expressing emotion, levels of motivation, personality, beliefs, values, preferences, needs, and goals--affect risk for mental illness and inform the development, design, and targeting of new interventions, and how such characteristics affect behavioral responses to prevention and treatment.
- **Sociocultural:** How ethnicity, culture, language, socioeconomic class, family and social networks, and neighborhood or community affect risk, diagnosis, prevention, and treatment of mental illness.

- **Organizational:** How policies, incentive structures, and cultures at all levels of health/mental health organizations and institutions affect the behavior of those providing care and of those receiving it, as well as the outcomes of care.

The three priority behavioral research areas are so central to the core mission of NIMH that it may seem puzzling that the Workgroup needs to highlight them for special encouragement. They pose many interesting research questions that should attract and excite a substantial number of behavioral scientists spontaneously. However, such research is sparse at best in the current NIMH portfolio, suggesting that these are difficult areas to develop. At present too few researchers are attempting to bridge across basic, clinical, and services research, and not enough are working with colleagues in related allied disciplines to move research advances out of the laboratory and into clinical care, service delivery, and policymaking.

NIMH can and must play a catalytic role in initiating and sustaining the best possible science in all three priority areas of behavioral translational research. Because research topics within these areas are at different stages of development, they will require different strategies and timetables for moving forward. But all priority areas will benefit from a systematic, phased approach to development that assesses their current status and needs, their potential contributions to clinical care and service delivery, and the steps required to realize those contributions. To be successful in these efforts, NIMH, of course, must embody in its administration of translational research the same spirit of multidisciplinary collaboration and coordination that it fosters in the research community.

The Institute stimulates outstanding mental health research through a blend of scientific leadership and efficient research administration. As the leading supporter of basic and clinical behavioral science, as well as treatment research and services research related to mental illnesses, NIMH is strongly positioned to build a successful and enduring program of translational behavioral research. However, the Institute needs to develop a comprehensive approach to building, sustaining, and applying systematically the behavioral knowledge needed to improve critical aspects of mental health care. Doing so requires making efficient and effective use of its considerable resources and roles, which include, in addition to being a catalyst for new research directions, being an integrator, convener, and influential mental health/public health advocate.

Establishing a strengthened program of translational behavioral science research at NIMH will require special effort and incentives to overcome today's extensive structural, financial, and attitudinal barriers (discussed in Chapter II). NIMH needs to address effectively and comprehensively a host of very practical questions. These include:

- How can basic researchers at various points in their careers be attracted to pursue unconventional and even risky avenues of needed translational research?
- How can they be trained or partnered with others to conduct such research, and who will train them?

- How can excellent behavioral, clinical, and services researchers be encouraged to collaborate in translational research projects?
- How can reviewers with expertise in specific areas be briefed to recognize the best translational research?
- How can translational researchers be encouraged to consult and collaborate with consumers and community representatives in the design and development of research?
- How can such researchers find and exchange information readily with one another, with prospective collaborators in other disciplines, and with end-users of their findings--consumers, policymakers, practitioners, and payers?

First steps in responding to these issues are addressed in Chapter IV and in the following action plan, submitted for consideration by the NAMHC and the NIMH Director:

C. ACTION PLAN

RECOMMENDATION 1. To establish and publicize translational behavioral science research as a priority funding area for NIMH and to develop a coherent strategy for its systematic development:

- a. Develop requests for applications (RFAs) to jump-start research in each of the funding priority areas identified in this report, starting first with Priority Area 1: Basic Behavioral Processes in Mental Illness.
- b. Issue an RFA to translate basic risk and behavioral process research into new interventions aimed at the prevention and treatment of mental disorders and related problems.
- c. Develop an implementation plan for long-term development of research in the three priority areas of translational research.
- d. Commission a "snapshot" of the current status of translational research in the NIMH portfolio in the research priority areas. This snapshot would serve as a baseline for evaluating the success of research stimulation efforts.
- e. Convene workshops/conferences that bring together experts in basic behavioral research, clinical research, and services research, as well as consumers, family members, providers, health systems representatives, policymakers, and researchers from allied areas to identify specific areas of promise for translational research within the priority areas.

- f. Use new and existing mechanisms [e.g., research reviews, special workshops, RFAs, requests for proposals (RFPs), and program announcements (PAs)] to stimulate continuing development of translational research (including reinvigorating existing research initiatives in areas such as dissemination research, human subject protections, and services research) and the tools needed to conduct such research.
- g. Develop a plan for behavioral translational research that addresses communication to and among scientists as well as research dissemination to the public, to practitioners, and to other health care personnel. That plan should include articles on research opportunities in this area for publication in scientific journals that reach a broad audience of basic behavioral, clinical, and services researchers.

RECOMMENDATION 2. Stimulate NIMH-funded research centers to provide an infrastructure for new research, speed the translation of findings, and encourage interaction across basic, clinical, and services research:

- a. Offer competitive supplements (e.g., for access to patients, laboratory equipment, clinical trials) to existing NIMH research center programs to:
 - Emphasize the integration of behavioral science in basic, clinical, and services research, as well as greater interaction at the interface between behavioral and biological science; and
 - Encourage studies that apply and test basic behavioral processes in understanding, identifying, treating, or preventing mental disorders.
- b. Create, as needed, new research centers--with specified behavioral translational goals and finite life spans.

RECOMMENDATION 3. Develop innovative approaches to supporting translational research:

- a. Invite current basic behavioral scientist grantees to apply for supplements to include research on clinical populations in their studies, and current clinical and services research grantees to apply for supplements to include research on process, functioning, and/or context in their studies. These supplements could be competitive or administrative, undergoing an expedited, in-house review.
- b. Offer mechanisms for the addition of basic behavioral scientists to ongoing clinical and services research at academic, provider, state, and local settings and for the addition of clinical and services researchers and clinicians to basic behavioral research.

- c. Encourage community-based research on mental disorders through small developmental grants to local and state governments, communities, or businesses working in partnership with academic researchers.
- d. Revise and expand the focus of the B/START (Behavioral Science Track Award for Rapid Transition) and RAPID (Rapid Assessment Post-Impact of Disaster) announcements to expedite the submission, review, and funding of initial pilot efforts for translational research in clinical settings.
- e. Commission technologies, tools, and other products identified as high-priority needs by mental health consumers and practitioners, using mechanisms such as contracts and research grants through the Small Business Innovation Research and the Small Business Technology Transfer programs.

RECOMMENDATION 4. Encourage the development, synthesis, and dissemination of cumulative behavioral scientific knowledge on mental illness:

- a. Conduct behavioral research syntheses in priority areas and disseminate them widely, in appropriately tailored formats, to various audiences of stakeholders.
- b. Use meetings as a strategic tool for advancing translational science, with a stated goal and work product, and a plan for including representation from all relevant stakeholder communities.
- c. Use new technologies to support virtual meetings when appropriate (e.g., chat rooms with consultant experts for potential applicants interested in designing research) and to disseminate reports of meetings.

RECOMMENDATION 5. Train researchers at all career levels (predoctoral and postdoctoral students, as well as established researchers/faculty) to conduct translational behavioral research:

- a. Support research education programs that provide opportunities for basic behavioral and social science students and faculty to interact with clinical and services research students and faculty, exchanging basic, clinical, and services research course work and expertise. Include courses on new state-of-the-art behavioral science methods and clinical nosology, and ideally involve faculty exemplars who combine basic behavioral research expertise with expertise in clinical, services, and/or policy issues.
- b. Foster individual fellowship programs and career awards that require two mentors, one in the basic research arena and one in the clinical/services research arena. By doing so, individuals at all stages of their careers would be encouraged to develop skills in translational research.

- c. Support research education programs that provide short-term training to enable established basic behavioral researchers to learn about clinical and services research, and clinical and services researchers to learn about basic behavioral research. If feasible and appropriate, this might include a rotation at the NIMH intramural research program.
- d. Revise training grant policies to permit payment for teaching in translational research training programs that draw faculty from many departments and from clinical/service settings.
- e. Establish translational research expertise banks--through the Internet and other mechanisms--to make expert translational advice available to prospective grantees and trainees (see 4(c) above).
- f. Give priority, in funding translational training grants, fellowships, research education grants, and career awards, to outstanding training programs positioned to bridge basic, clinical, and services research in mental health.

RECOMMENDATION 6. Encourage fair and expert peer review of translational behavioral research applications:

- a. Prepare reviewers at NIMH and the National Institutes of Health's (NIH's) Center for Scientific Review (CSR) to assess translational research projects.
- b. Include among the evaluation criteria for applications submitted in response to RFAs the expected impact of the proposed research in improving public health.
- c. Encourage a new orientation process that gives reviewers excellent syntheses of research areas, addresses the technical and review issues in new research priority areas, and provides information on the current portfolio and program initiatives, and the programmatic objectives for moving the portfolio forward.
- d. Ensure that for each application, reviewers collectively have appropriate expertise in basic, clinical, services, and other relevant research areas.

RECOMMENDATION 7. Facilitate appropriate and rapid funding of outstanding translational research:

- a. Implement a rapid revision and program review process for well-scored applications that can be easily corrected without requiring the delay of an additional submission and review.

- b. Encourage cross-divisional technical assistance, as needed, and give special consideration to the funding of translational projects having both basic and intervention research components.

RECOMMENDATION 8. Stimulate and disseminate relevant methods to improve the capacity for research translation:

- a. Foster the appropriate use of existing methods and the development and dissemination of new approaches by supporting research that:
 - Develops psychometrically sound measures of basic behavioral processes, functioning, and context that are appropriate for use in clinical and service settings.
 - Uses statistical sampling methodologies more comprehensively to enhance the external validity of research findings.
 - Introduces epidemiological methods of risk identification into behavioral risk-factor studies.
 - Adapts and develops statistical methods to facilitate the study of effect modifiers and individual differences as well as other approaches focused on the issue of “for whom and under what co
 - Encourages coordination among studies to facilitate research synthesis.
- b. Upgrade the quality of diagnosis by issuing RFAs or RFPs calling for psychometrically sound clinical assessment tools for practitioners, based upon contemporary measurement theory.

RECOMMENDATION 9. Improve policy decision-making processes regarding the delivery of mental health services and the utility of research data:

- a. Support research that makes creative linkages between mental health services delivery questions and the behavioral research literatures of organization, marketing, and decision science.
- b. Support research that combines state-of-the-art quantitative and qualitative measurement approaches to improve the quality of care.

RECOMMENDATION 10. Identify which treatments work for whom, under what circumstances, and why, to aid in improving mental health services and reducing disparities in mental health care:

- a. Support translational research that incorporates the theoretical perspectives and methodological approaches of the social and behavioral sciences into research addressing fundamental questions in mental health intervention and services research.
- b. Increase research on mental health disparities that includes contextual variables--such as ethnicity, social class, and culture.

RECOMMENDATION 11. Expand NIMH staffing resources by inviting behavioral scientists to participate in part-time consultancies or to serve as temporary visiting staff.

RECOMMENDATION 12. Monitor the effectiveness of NIMH in improving its translational research portfolio:

- a. Develop a plan for evaluating success in implementing the three research and funding priorities of this report.
- b. Evaluate NIMH's dissemination efforts to assess and improve outreach to key stakeholders.

Concluding Comments

The mysteries of mental illness have never been closer to solution than now at the dawning of the 21st century. This exciting time of discovery offers abundant opportunities to increase scientific knowledge about behavior and the brain in health and illness. That knowledge, intriguing in its own right, can and must be used to save and enhance the lives of millions of Americans burdened by mental disorders and millions more at risk of illness.

The NIMH is uniquely positioned to translate scientific achievement in behavioral research into clinically relevant advances. But it must deploy wisely and consistently a powerful array of persuasive and communicative mechanisms to create the novel and sometimes risky collaborations and research paths essential to translational research. The Behavioral Science Workgroup offers to Steven E. Hyman, M.D., NIMH Director, and the NAMHC an action plan outlining a practical strategy for enhancing the clinical contributions of behavioral science and changing the face of mental health care in America.

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I. PROLOGUE

The dawn of a new century evokes both celebration and contemplation by the National Institute of Mental Health (NIMH). The care of people with mental illness has never been more effective or humane, thanks in part to a 50-year Federal investment in developing a strong scientific base for that care. Many of the major mental disorders are now sufficiently understood and manageable to permit many people to live and work as productive members of their communities despite their illness. This accomplishment was almost unimaginable when NIMH was founded five decades ago. The prospect of building on extraordinary advances in behavioral science, neuroscience, and genetics, combined with vital progress in research methodology, epidemiology, diagnosis, and treatment, promises an even brighter future for people with or at risk of mental illness.

But one has only to pick up a newspaper or visit a local bus station, jail, or emergency room to realize the challenges remaining. NIMH needs to continue to explore intensively the basic biological, social, psychological, and environmental roots of mental illness. At the same time it needs to ensure that these advances are translated into clinically relevant, practical information, innovations, and interventions that actually can reduce the burden of mental illness for individuals, their families, their communities, and the Nation at large.

The current social and economic burden of mental illness in America is enormous. It is estimated at more than \$148 billion in direct and indirect costs each year, with an incalculable amount of suffering for a sizeable proportion of our population. A recent international study (Murray & Lopez, 1996) of the indirect costs of illness and injury revealed that mental disorders account for more than 10 percent of the global burden of disease. Four mental disorders (unipolar major depression, bipolar disorder, schizophrenia, and obsessive-compulsive disorder) rank among the 10 leading causes of disability worldwide, with unipolar major depression leading the entire ranking. A public health challenge of this magnitude demands the best science we can offer to improve mental health and clinical care in the United States and beyond.

This report focuses on ways to enhance the potential contributions of one specific area of research--behavioral science³--a bedrock of NIMH scientific activity since the Institute was founded in the late 1940s. Examining past achievements and future possibilities, the report suggests new ways to build on the Institute's rich portfolio of behavioral science research to reach its public health goals in the 21st century.

Behavioral science offers critical insights into the nature of mental illness and mental health and the processes and interventions that can prevent illness or lead from

³ See NIH definition of behavioral and social sciences research, Appendix A. Please note that this document uses the terms "behavioral science," "behavioral research," "behavioral science research," and "behavioral and social science" interchangeably, as it does the terms "consumer," "client,"

disorder to remission, recovery, and rehabilitation. Indeed, the basic scientific advances that NIMH has been funding for half a century offer ways to facilitate the translation process.⁴ It is clear, however, that behavioral science, which has yielded great practical benefits for education, the military and industry, as well as many health areas, has much more to offer in mental health. The pages to follow offer some new approaches for capitalizing more fully on behavioral science to understand, treat, and serve the millions of Americans affected by mental illness.

A. WORKGROUP COMPOSITION AND CHARGE

As part of an ongoing review of major mental health research areas, NIMH Director Steven E. Hyman, M.D., and the National Advisory Mental Health Council (NAMHC) convened the Behavioral Science Workgroup to explore ways to enhance the field's mental health payoff (see Appendix B for the Council roster and Appendix C for the Workgroup roster). Workgroup members included a select group of NAMHC members, as well as researchers and advocates whose skills and knowledge complement those of the Council representatives. Members' expertise included social, cognitive, developmental, and clinical psychology, and psychophysiology, as well as anthropology, biostatistics, public health, and sociology. In addition, members worked in areas of treatment or services research covering the life span across many areas of illness, including depression, schizophrenia, personality disorders, anxiety, AIDS, and cancer. Council member Anne Petersen, Ph.D., was chosen to chair the Workgroup, and Robert Levenson, Ph.D., served as co-chair.

The Workgroup was convened to address an important imbalance in the NIMH research portfolio: Although the Institute provides extensive support for basic behavioral research and for clinical and services research, there is relatively little research connecting these bodies of knowledge. For people with mental disorders and their families, this means that potentially useful behavioral science knowledge is not adequately mined to help them cope with illness. For behavioral science itself, it means that important opportunities to test theories of human behavior and expand fundamental knowledge are lost.

Thus the group was charged with addressing the following key issues:

- How can basic behavioral science inform research on the etiology, diagnosis, treatment, and prevention of mental and behavioral disorders?
- How can basic behavioral science inform research on the accessibility, quality, and delivery of mental health services? What behavioral science findings or methods are particularly promising for use in clinical and services research

⁴ Translational research in the behavioral and social sciences addresses how basic behavioral processes inform the diagnosis, prevention, treatment, and delivery of services for mental illness, and, conversely, how knowledge of mental illness increases our understanding of basic behavioral processes.

(including findings relevant to research participation by people with mental disorders or other special populations)?

- How can NIMH encourage more systematic translation of basic behavioral research findings into the development of innovative research interventions that may ultimately improve real-world practices?
- What barriers impede the translation process, and how can they be overcome?

B. WORKGROUP PROCESS

The Workgroup met from March through November 1999, augmenting six full meetings with conference calls and subgroup meetings. To enhance its perspective on current behavioral science opportunities and barriers relevant to mental health, the Workgroup invited and reviewed:

- Recent reports and recommendations relevant to the Workgroup's task by other NAMHC workgroups;
- Descriptions and critiques of the current behavioral science portfolio by NIMH program staff in the three major extramural research divisions, as well as consultations with staff in other relevant program areas;
- Presentations by behavioral research administrators at other components of the NIH;
- Discussions with researchers and representatives of key professional research societies, provider groups, and mental health advocacy groups (see Appendix D for list of consultants); and
- Comments solicited from NIMH grantees, professional societies, and from individuals visiting the NIMH homepage.

The Workgroup is grateful to all who enhanced its understanding of how excellent behavioral research can improve the lives of people now living with mental disorders and lessen the future toll of mental illness for our Nation.

II. REALIZING THE PUBLIC HEALTH POTENTIAL OF BEHAVIORAL SCIENCE

The Workgroup's task and procedures have been described above, but what was learned through the interviews, reading, and portfolio review? Members worked to discern the pattern of public health need and scientific opportunity from the information reviewed. Consultants to the Workgroup--including researchers, providers, consumers and their family members, and NIMH staff--repeatedly described the great promise of behavioral science and at the same time called for more multidisciplinary and translational research to address the needs of providers and consumers. As summarized below, each group brought a unique perspective, but voiced general agreement on the need for and difficulty in achieving greater linkage across research fields and between basic and clinically oriented mental health research. All agreed that the representation of such research in the current NIMH portfolio should be increased. Many suggested why these are difficult areas to develop and offered steps NIMH can take to overcome current barriers.

A. CURRENT PERSPECTIVES ON BEHAVIORAL RESEARCH TRANSLATION

1. Consumers and Advocates

Behavioral technologies have improved the quality of life of people living with cancer, AIDS, heart disease, and substance abuse. Although people with mental disorders and their advocates also have benefited from some behavioral research advances, they want more extensive and more immediate benefits. Long-term investments in basic research, both behavioral and biological, are essential for progress toward the goal of eventually conquering mental illness. But consumers and family members want a greater investment directed at improving their quality of life now. They want to reclaim their personal, occupational, social, and recreational goals. And they want treatments and services tested against these real, meaningful, and behaviorally quantifiable objectives. The box below, "What People with Serious Mental Illness and Their Families Want from Behavioral Science Research," indicates some of the issues such research might illuminate.

What People with Serious Mental Illness and Their Families Want from Behavioral Science Research

The National Alliance for the Mentally Ill (NAMI), a grassroots organization of consumers with serious mental illnesses, their family members, and advocates, was asked to identify priority areas for individuals with severe mental illnesses that would benefit from behavioral science research. Dr. Laura Lee Hall, NAMI's Director for Research, noting that behavioral and social research is essential to understanding and improving the treatment and lives of children and adults with severe mental illnesses and their families, proposed the following areas of interest:

- Assessing therapeutic processes and outcomes
- Understanding the basic processes underlying family support, easing the burden of care, and exploring ethnic and other group differences in these processes
- Developing rehabilitation tools that speed and enhance recovery
- Discovering techniques to improve adherence to treatment and rehabilitation plans
- Exploring behavioral approaches for managing the side effects of medications
- Refining approaches for understanding and treating co-morbid substance abuse
- Recognizing the early signs of relapse and preventing the downward spiral for individuals with mental disorders
- Clarifying forensic issues of culpability and consent for people with fluctuating cognitive capacity
- Evaluating educational interventions for children with severe mental illnesses
- Preventing suicide by identifying how providers or family members can intervene
- Informing decisions about housing placements for individuals with severe mental illnesses returning to communities

2. Payers

Leaders in managed care organizations (MCOs) and state agencies providing and reimbursing care in large service systems must make difficult decisions regarding health/mental health care, often with insufficient hard evidence. They want to know what health goals can be reached at what cost, as well as the costs of not reaching them. Typically, their decisions must focus on which interventions will work for the largest proportion of their population.

Some representatives observed that because few of the available research findings appear applicable to their settings and clients, it has been difficult to see how a nontargeted approach to behavioral research could lead to real advances in clinical care. They also reported little confidence in investing time or training funds to implement new treatments or services without compelling research evidence obtained in settings and with clients like their own. Some potential contributions of behavioral science research to today's health care systems are described in the box below.

What Health Care Delivery Systems Need from Basic Behavioral Research

Council member Mary Durham, Ph.D., a services researcher and representative of a nonprofit MCO, identified a number of research areas in which behavioral science can contribute to MCOs and other health care delivery systems. These include:

- Basic behavioral research is needed to identify ways to improve patient adherence to and provider provision of treatment to improve clinical care;
- Clinical planners have an urgent need for behavioral interventions to enhance psychological and physical functioning, and to interrupt or reduce the adverse health consequences of stress;
- Health plan leaders need behavioral principles for stimulating and maintaining organizational change; and
- Evidence-based behavior-change techniques are needed to aid clinicians in enhancing healthful behavior and reducing unhealthful behavior.

3. Practitioners

Like some payers, some clinical providers felt that they were not necessarily well represented in current research related to services and health care policy. A particularly salient issue is the perceived lack of fit between research-based treatment guidelines and the clinical settings and consumer groups who were intended to use those treatments--a factor likely to affect utilization. Many reported that certain guidelines set conditions for duration and intensity of treatment that would not be permitted within their settings due to costs. Another comment was that the research findings had little to offer on the most complex cases with overlapping symptoms, physical illnesses, substance abuse, and difficult life circumstances. However, these concerns could be addressed, some felt, if practitioners had a larger role in developing and conducting generalizable research. One group of practitioners gave the Workgroup the following suggestions:

- Demonstrate the effectiveness of evidence-based treatment rules in care settings and with clients similar to sites where the rules are to be implemented.
- Document more clearly what interventions work for specific consumers in specific settings.

- Clarify motivational markers that might predict the clients who would stay with specific treatments or service options.
- Recognize that "free time" does not exist in clinical settings; do not expect practitioners or service sites to donate time, effort, or resources for research.
- Clarify for practitioners involved in difficult forensic issues (e.g., to treat or not to treat, determining abuse status, consent for treatment, potential for violence) what empirically validated decision rules exist to help make these determinations.
- Define and strengthen clinical decision-making processes.
- Discover optimal ways to diffuse evidence-based treatments and clarify the factors affecting clinicians' receptivity to treatment guidelines and new approaches to treatment (e.g., assess the incremental value of having the providers involved in developing the diffusion strategy).

4. Researchers

Researchers suggested diverse ways to encourage the translation of behavioral science. Some felt that NIMH should let science evolve with little external direction because continuing support of basic research should yield incremental gains that would gradually advance our understanding of mental disorders. Others argued for identifying and targeting support for research at the intersection between the most promising behavioral science and the greatest clinical/social need. Researchers from both orientations agreed that many critical barriers to research translation are embedded in the structure of the academic research community and reflected at NIMH. These difficulties, most of which are not specific to behavioral science, include:

- There is growing disciplinary fragmentation and specialization, and unfamiliarity with the language, values, and methods of other disciplines.
- Basic, clinical, and services researchers do not typically work together, and moving to bridge this gap is not easy.
- There is a split in training between research with clinical versus normal populations (often in separate departments and physical loci).
- Clinical populations are often inaccessible to basic researchers.
- The academic incentive system typically rewards productivity in traditional disciplinary areas--and in traditional disciplinary publications--and has few incentives for bridging research areas or fields of study.
- Training programs rarely span translation from basic to clinical research, and there is little, if any, exposure to services research.

- Many basic behavioral scientists are unaware of the interesting basic research issues and opportunities posed by mental disorders.
- Clinical and services researchers may find it difficult to access the current behavioral science knowledge base to inform their research.
- Some basic behavioral scientists are unaware of how to engage individuals with mental disorders in the research effort.

Basic behavioral scientists suggested to the Workgroup a number of reasons for their own personal reluctance to conduct translational research or to encourage their students to do so. Some new investigators expressed concern about what they saw as significant barriers and disincentives to beginning a career in patient-oriented research. These include: inadequate knowledge about the nature of mental disorders; concern about funding stability and resources; uncertainty about how to recruit participants and engage clinical colleagues to collaborate, and about where "hybrid" research would be published; and doubts about the applicability of basic research to clinical issues. Other important barriers they mentioned include: their lack of exposure to the clinical literature; fear of appearing "amateurish" to grant reviewers in a new research area; and lack of methods experts or individuals who can cross lines among behavioral, physiological, neural, and clinical research.

One of the most surprising barriers cited by these researchers was their lack of awareness of specific NIMH translational research program announcements (PAs) (e.g., requests for research on informed consent, behavioral science in services research, and method development),⁵ even though they had been published in the conventional dissemination outlets. The lack of effective communication to potential applicants is a significant obstacle that needs to be addressed.

5. Research Administrators

a. Current Status of NIMH Behavioral Research Programs

NIMH program staff gave the Workgroup an informal "snapshot" of the current NIMH behavioral research portfolio that included its strengths, its shortcomings, and its future translational possibilities.⁶ Their comments made clear that during the past 4 years, NIMH research priorities have undergone a transformation under the direction of Dr. Steven Hyman. NIMH is placing greater emphasis on the public health relevance of its research and on the role of consumers and advocates in shaping the Institute's

⁵ ("Research on Ethical Issues in Human Studies"; "Dissemination Research in Mental Health"; and "Integrating Mental Health Services Research and Behavioral Science"--see NIMH Website at <http://nimh.nih.gov/grants/pamenu.cfm> for full announcements.)

⁶ NIMH program staff provided abstracts of all the Institute's grants (except for neuroscience and AIDS) and assessed their individual research program areas. These assessments included a program synopsis, a description of its payoff to date, and a description of research gaps as well as opportunities for further research and translation.

research agenda. (Their recent inclusion in treatment and services research review groups is but one indication of this shift.) This change means looking at the Institute's research portfolio not only from the perspective of scientific readiness and opportunity, but also with an eye toward clinical and public health need for knowledge and innovative applications to clinical care. This perspective already was familiar to NIMH staff and grantees concerned with behavioral science research in the area of HIV/AIDS research. The creation of this Workgroup was intended to reflect and accelerate this change in perspective throughout NIMH.

The Institute also has undergone a significant reorganization of its funding divisions to better reflect and achieve these new priorities. Each of the three extramural research divisions at NIMH⁷ funds behavioral research, which forms a substantial part of the total NIMH research portfolio. In the aggregate, behavioral and social science research⁸ represents an estimated 34 percent of total NIMH FY 1998 funding (including AIDS research). However, across the three major NIMH extramural research divisions, there is a great need to close the gaps separating basic science, clinical research, and health services research; as well as those separating process from outcome research, and consumer needs from the foci of scientific research. Three prime problem areas identified by staff include:

- The substantive and methodological behavioral science base is being underused in developing new diagnostic, prevention, treatment, and service strategies.
- Until quite recently, a strong emphasis on diagnosis and acute treatment drew attention away from rehabilitation, maintenance, and the impact of mental illness on daily lives.
- Relatively few researchers have responded to recent NIMH efforts to stimulate translational research through PAs directed at behaviorally oriented translational research.

b. Potential Strategies for Developing NIMH Behavioral Translational Research

Despite the difficulties of stimulating behavioral translational research, programs have successfully developed and/or used behavioral research knowledge to illuminate and address very concrete and complex clinical problems. A particularly dramatic example is the work of the Institute's AIDS research program. Developed over 16 years, this program has given rise to effective research-based behavioral preventive interventions for HIV and has built from scratch a respected cadre of behavioral researchers who are leaders in the conduct of translational studies. In 1983, when the NIMH AIDS research program began on an annual budget of less than \$200,000, there were no behavioral researchers with specific expertise in HIV prevention, and no research focused specifically on high-risk sexual behavior. Relatively few behavioral researchers were

⁷ Division of Neuroscience and Basic Behavioral Science; Division of Services and Intervention Research; and Division of Mental Disorders, Behavioral Research and AIDS (DMDBA).

⁸ See Appendix A: OBSSR Definition of Behavioral and Social Sciences Research.

doing health-related applied studies, and even fewer services researchers were available to study the efficacy of HIV interventions in real-world settings. To build a clinically applicable research program on HIV/AIDS prevention, it was necessary to find and pool the relevant knowledge of diverse researchers and attract and train them to conduct studies in the nascent, high-risk, and highly stigmatized area of HIV prevention. The program's budget has since grown to almost \$130 million a year, and the AIDS behavioral prevention approaches it has developed are now being assessed in large-scale intervention studies in selected sites throughout the world.

The NIMH Center for Mental Health Research on AIDS has demonstrated that basic behavioral research can be translated into effective real-world interventions to prevent the spread of HIV. It also provides telling lessons in how to build over time an interdisciplinary field to fulfill a public health mission. Although some important facets of the Center's experience may be unique, many aspects appear to be broadly applicable to other kinds of NIMH research. The NIMH AIDS research model, although largely derived from trial and error, can now be seen as a phased approach to program development. [Indeed, one can also point to NIMH's genetics effort as a successful example of a phased strategy (National Institute of Mental Health Genetics Workgroup, 1998).]

The key components for building a behavioral research field with clinical impact appear to be these:

- Widespread recognition of a pressing public health need;
- Clear statement of program goals developed with all key stakeholders (e.g., develop effective behavioral interventions for HIV prevention);
- Intensive sponsorship of literature syntheses to assess the state of knowledge, encourage information exchange, and stimulate research and training interest;
- Use of scientific meetings to encourage collaborations/cooperation across types of basic and applied research, scientific disciplines, consumer/researcher/policymaker perspectives, and Federal agencies;
- Stable and appropriate funding of the types of research targeted in the announcements--primarily RFAs and PAs--to attract and keep researchers of quality;
- Development of qualitative and quantitative tools needed to initiate and advance the research field;

- Well-trained, energetic staff to work with and encourage the participation of potential grantees and trainees;
- Appropriate scientists on review committees who can uphold high standards for research excellence while maintaining realistic expectations for research design and methodology in developing clinical/applied/services research areas;
- Creation and support of time-limited multidisciplinary research centers to foster integrative research and provide a training ground for developing future researchers and research;
- Development of multiple levels and types of training support to stimulate career development in essential new multidisciplinary translational areas;
- Use of a knowledge diffusion model both in the design and in the dissemination of interventions involving key leaders in the community; and
- Long-range, systematic program planning to identify new opportunities and to evaluate program progress.

With long-term nurturance by a comprehensive program such as this, many of the usual barriers separating basic research from clinical and services research can be overcome. The NIMH AIDS research program has had a palpable impact on the careers of many basic behavioral scientists, encouraging them to broaden their perspective beyond basic animal research or studies of normal human populations to include observational and intervention studies of ill people or people at high risk of illness. Indeed, some rare individuals move comfortably back and forth or in parallel across basic and clinical/services research studies. As one such researcher described this research synergy:

I am particularly pleased that our program of research does not stop with these kinds of field experiments. The work itself feeds back to our original theoretical ideas. For example, we have begun to understand why preventive health messages framed in certain ways motivate different behaviors. Most decision theorists are not especially focused on mechanism, but we are able to isolate the importance of changes in perceived risk and shifts in anticipated emotions as possible mediators of behavior change. I've found it very rewarding to be able to conduct research in an area that allows me to address theoretical questions in social psychology while confronting real problems of social and personal relevance.

B. MOVING FORWARD

The Workgroup has been asked essentially how to increase the amount and speed of clinical payoff from behavioral research. The broad answer is to apply the lessons learned from the many stakeholders cited above and from successful translational research programs in developing new clinical applications of basic behavioral research to improve all aspects of mental health care. To do so, NIMH needs to:

- Clarify its goals for behavioral translational research;
- Initiate a strategic, phased approach for identifying and developing priority research areas for mental health translational research with all stakeholders; and
- Enhance infrastructure and training capacity for such research and ensure its long-term continuity and coordination.

A fundamental principle in implementing these three activities should be: Let the intended end-users of translational research--patients, providers, payers, and policymakers--join as expert partners in setting the research agenda and forming research questions. Doing so provides invaluable benefits for the total research enterprise: it grounds the research in the realities of public health need; it encourages solutions to practical problems in clinical care; and it paves the way for greater long-term acceptance and application of research-based innovations.

The Institute clearly has the power to foster greater translation of behavioral science knowledge; it needs a plan for doing so. Accordingly, the Workgroup members have synthesized from many resources broad guidance for a relatively long-term process of research transformation at NIMH. First steps articulated by the Workgroup can and should be initiated immediately.

The chapters to follow offer a coherent approach for developing new clinical applications of basic behavioral research to improve all aspects of mental health care--including diagnosis, treatment (psychosocial, pharmacological, and somatic), rehabilitation, prevention, and services delivery. Research using basic behavioral principles and ideas to address provider, payer, and consumer issues offers a vital way to improve the lives of people with mental illness. But it has even more to offer. Designed well, translational research also can test the validity and generalizability of basic behavioral principles themselves and offer clues to their refinement. Once this process is underway and some of the best behavioral scientists are working on clinically relevant problems, many benefits and applications are likely to emerge that cannot now be specifically anticipated.

Chapter III suggests some of the exciting ways in which behavioral research can address pressing issues confronting people with mental illness and those who provide and support their care. Chapter IV reflects the Workgroup's judgment of how to capitalize on those research opportunities to move more NIMH behavioral research from promise to practice.

III. PRIORITY AREAS FOR BEHAVIORAL TRANSLATIONAL RESEARCH

The long-term NIMH investment in behavioral science research has yielded a wealth of opportunities for developing and applying behavioral science knowledge and methods to benefit clinical, intervention, and services research and, ultimately, clinical care. These range from studies that clarify basic brain function to studies that enhance understanding of the causes and prevention of violent behavior, to epidemiological research and health services research studies that inform the organization, financing, and delivery of public and private mental health services.

All aspects of *basic* behavioral science can contribute to improved clinical practice. The excitement and importance of these areas were reviewed in the 1996 NAMHC report *Basic Behavioral Science Research for Mental Health: A National Investment*. In brief, potential clinical gold resides in substantive areas of basic behavioral research that include:

- Affect /motivation/emotion/personality;
- Perception/memory/learning/reasoning/decision making;
- Social processes/environmental factors;
- Behavior change;
- Life span development;
- Cultural studies and ethnography; and
- Animal and comparative behavior.

Basic behavioral science promises to contribute to the development of a new generation of therapeutic and preventive interventions for many mental illnesses. For example, a program of research on self-concept discrepancy and depression shows how research can progress from theory to laboratory studies to clinical application (see box below, "From Campus to Clinic: Developing a New Psychotherapy for Depression"). It provides an excellent illustration of how basic behavioral science can contribute to clinical practice and intervention.

From Campus to Clinic: Developing a New Psychotherapy for Depression

Self-System Therapy is a very new, brief structured psychotherapy for depression that is currently being tested through an NIMH-sponsored randomized clinical trial. This therapy is an outgrowth of very basic behavioral science studies and theories relating to how people regulate their thoughts and moods.

One foundation for this research is the basic research finding that normal people react with negative affect (such as depression or anxiety) to certain self-discrepancies (e.g., between their perceptions of who they are vs. their "ideal" or "ought" selves). This finding and others contributed to the hypothesis that when people are chronically aware of these discrepancies, they are more likely to experience repeated bouts of negative affect. Furthermore, it seemed possible that this chronic accessibility, in combination with other risk factors, might increase the risk of more serious emotional problems, such as depression.

In 1996, Timothy Strauman delineated these various risk factors in a model of depression involving the psychology of self-evaluation (Strauman, 1996). This model described how predisposing factors (e.g., individual differences in the intensity or regulation of emotional states, traumatic early life events) might combine with factors that influence the development of self-representations (e.g., personality structure, parenting styles) and factors triggering negative self-evaluation (e.g., self-discrepancies, current life difficulties) to lead to a final common pathway to depression.

Strauman and his colleagues are now establishing the final link from the model to a treatment intervention for depressed patients. They had previously demonstrated that both cognitive-behavioral therapy (CBT) and interpersonal therapy (IPT)--two effective treatments for mild to moderate clinical depression--decreased self-discrepancies in clinically depressed and anxious individuals. Now, studying patients with major depressive disorder, they are evaluating the impact of Self-System Therapy, an intervention more specifically targeted to two main sources of distress: 1) problematic self-beliefs (i.e., particular beliefs, goals or standards used in self-evaluation that conflict with other important beliefs); and 2) the tendency to invoke ideal or ought standards irrespective of the demands of a given situation.

This line of research is exploring, among other questions, whether altering specific self-beliefs can change the onset or duration of depression or anxiety. New findings may also shed light on which active ingredients account for the success of CBT and IPT--an important question for future intervention development.

Applied research areas with relevance to mental health--such as health psychology/behavioral health, organizational change and management, communications and persuasion, and education--offer still more avenues for improving clinical care. In addition, powerful behavioral science technologies are available in areas such as measurement, testing, survey techniques, observational methods, statistical methods, and research analysis.

Notwithstanding the focus of this report on a single but very broad research area, it is important to remember that no single discipline or cluster of disciplines is sufficient to unravel the mystery of mental disorders, their prevention, and treatment. One of the great lessons of late 20th century research in mental illness is the necessity for intellectual ecumenism in an age of overspecialization. Basic behavioral research, neuroscience, pharmacological research, and genetic science--individually and in various combinations--have enormous potential to contribute to the understanding, prevention, and treatment of mental illness. The challenge to NIMH leadership is to

orchestrate the individual strengths and characteristics of these fields into a coherent understanding of these extremely complex disorders of molecule *and* mind, of brain *and* behavior. For example, research on the neuroscience and genetics of mental disorders needs to be informed by state-of-the-art concepts, measures, and methods of basic behavioral research if it is to contribute fully to an understanding of psychopathology.

Progress in translating behavioral science advances in knowledge into meaningful advances in clinical care requires building a research environment in which collaborations across disciplines are normal, not exceptional. Realizing the enormous potential of such research requires challenging the trend toward increased disciplinary specialization by encouraging greater collaboration of basic behavioral scientists with their counterparts in biologically and clinically based disciplines, an issue addressed in Chapter IV.

In this chapter, the Workgroup highlights three specific areas of study in which the push of research progress converges with the pull of public health need (i.e., the real-world needs of consumers, practitioners, payers, and policymakers) to create prime targets for intensified study. These priority research areas are critical starting points for progress in translational science because they are at the interface of what end-users have identified as important and what behavioral science researchers regard as areas of opportunity. They offer the prospect of conducting exciting research, advancing scientific understanding of behavior--in health and in illness--and improving the mental health of our Nation.

A. BASIC BEHAVIORAL PROCESSES IN MENTAL ILLNESS

PRIORITY AREA 1. Understand how basic behavioral processes (e.g., cognition, emotion, motivation, development, personality, social interaction) are altered in mental illnesses, how these processes relate to neurobiological functioning, and the implications of these alterations for etiology, diagnosis, course, prevention, treatment, and rehabilitation.

- Develop reliable and valid methods for assessing these basic behavioral processes as part of clinical diagnosis.
- Assess how preventive, treatment, and rehabilitative interventions affect these basic behavioral processes.
- Evaluate these basic behavioral processes as indicators of risk for the development or exacerbation of mental illness.
- Combine basic behavioral research with neuroscientific, pharmacological, and genetic research to produce an integrated approach to understanding, preventing, and treating mental illness.

a. Issue: Many of the most debilitating and problematic aspects of mental illness (for consumers and their families, and for clinicians) are characterized by changes in basic behavioral processes. Assessing these changes--for which many sensitive measures have now been developed by behavioral scientists--offers a promising complement to traditional category-focused diagnostic systems. Further, in combination with other, more biological assessment approaches, these assessments may offer new insights into the functional and structural neurobiology of mental disorders.

An extensive body of behavioral science has identified the specificity and variability of basic behavioral processes in normal populations and has developed a range of methodologies and technologies for such research. This work now needs to be extended to include clinical populations, both to test the generalizability of the basic findings and to clarify how--and in which dimensions--people with certain illnesses or symptoms differ from the population at large. Applying this knowledge and these methodologies to clinical populations can lead to refined diagnosis, better measurement tools, and more precisely identified points of intervention to prevent or lessen symptoms and improve functioning. It also will increase understanding of how behaviors, symptoms, and disabilities actually cluster across disorders.

b. Research Avenues⁹: Some important research needs and opportunities within Priority Area 1 are described below.

- **Memory and Emotional Processes in Schizophrenia**

As basic behavioral researchers have worked to refine and differentiate psychological functions and to understand their interrelatedness, they have developed new methods that are being applied in psychopathology research. For example, the question of whether people with schizophrenia have memory deficits has led to an examination of various types of memory in such patients. Using methods developed by basic behavioral researchers (Cohen & Faulkner, 1988; Conway & Dewhurst, 1995), studies of individuals with schizophrenia recently revealed deficits in their episodic memory, that is, memory for personal events; these individuals find it difficult to recall and review specific experiences (Danlon, Rizzo, & Bruant, 1999). This research on memory may have implications for designing cognitive rehabilitation programs. Testing for deficits and preserved or

⁹ Note that for this priority area, as well as the following two, the examples provided are illustrative and not exhaustive; many other lines of research are germane as well. In all of these priority areas, the examples given are drawn both from the "push" of basic research and from the "pull" of public health need. Some represent relatively well-developed areas in which potential links to specific mental illness already are evident but in need of further refinement. Others represent promising lines of research whose relevance to specific mental disorders and their diagnosis, prevention, and treatment remains to be explored. Still others--particularly in Priority Areas 2 and 3--are largely statements of research need. But above all, the examples are intended to highlight the great promise of applying basic research to problems of mental illness. The Workgroup's intent is to encourage researchers to consider making such bridges in other domains not yet considered or explored.

enhanced process may form the basis for the next generation of diagnostic and rehabilitative approaches.

Basic research also is relevant to studying multiple aspects of the emotional system (emotional experience, emotional expression, emotional physiology) in schizophrenia. People with this disorder have both "positive" symptoms characterized by excess (e.g., hallucinations, delusions) and "negative" symptoms characterized by deficit (e.g., social withdrawal, poverty of speech). A new line of basic research on the emotional system in such individuals is challenging previously held beliefs about the dampening of emotion in schizophrenia (Kring & Neale, 1996). This research has revealed that, in response to viewing emotionally charged films, people with schizophrenia do indeed show markedly less emotional *facial* behavior than controls, a finding that is consistent with descriptions of emotional flatness in the disorder. However, when the other components of the emotional response to these films were examined, a much more complex picture emerged. The subjective emotional experience reported by people with schizophrenia was comparable to that of controls, but the ill individuals had the same or greater levels of autonomic nervous system response.

Thus, while showing little outer manifestation of emotion and seeming emotionally lifeless and constricted, such patients may actually be experiencing a great deal of emotion. These findings have enormous implications for understanding, treating, and dealing with the disorder. They suggest that at least some people with schizophrenia may live in a world where their emotions are constantly misread and misinterpreted by others, a particularly cruel consequence of the disease. The findings also have important implications for research on the biological underpinnings of schizophrenia. The likelihood that emotional dampening in schizophrenia is limited to facial behavior points toward very different underlying neural mechanisms than would be implicated if all aspects of emotion were dampened.

- **Self-Awareness and Depression**

Another productive area for translational research concerns the interaction of self-awareness and depression. Recent research suggests that people prone to ruminate in response to their negative emotions--a characteristic more prevalent among women than men--are particularly at risk for more severe and prolonged distress following negative life experiences. Their ruminative style increases the accessibility of negative thoughts and memories, which exacerbate depressed mood (Lyubomirsky & Nolen-Hoeksema, 1995). The greater prevalence of clinical depression among women may stem in part from rumination effects that amplify symptoms and extend depressive episodes. Clinical research suggested by these findings includes studies of the potential efficacy of depression treatments that distract individuals from their self-absorbed thoughts long enough for their depressed mood to be relieved or that encourage people to believe that they can change depression-inducing situations.

Understanding cognitive and emotional abilities--their boundaries and constraints, the mechanisms that underlie them, how people use them, and what they can do to change them--is a crucial task for researchers dedicated to improving mental health. However, the next generation of behavioral science research can and should go beyond simply studying in symptomatic or ill individuals those phenomena found in normal subjects; basic researchers also need to develop hypotheses predicting which processes would be preserved, hindered, or atypical when certain symptoms or disabilities are present. Empirically testing these predictions will be the sharpest test of understanding which processes are involved or affected and how to correct them to improve mental health.

- **Measurement Theory and Clinical Diagnosis**

Great strides have been made over the last decade in developing instruments to aid in detecting and diagnosing mental disorders. Although these measures have provided a common language for researchers and, in some cases, for reimbursement policy, developing and improving tools for research and practice remain important translational goals. Incorporating newer methodologies developed within the broad domain of the quantitative and measurement sciences could improve the precision of diagnosis and conceptualization of mental illness, shorten testing time for patients, and strengthen the assessment of patient recovery. Three examples of potential applications to clinical diagnosis and practice follow:

- *Developing multi-dimensional measurements of functioning* that complement traditional symptom-based diagnostic systems could help to refine understanding of treatment outcomes and differentiate individuals who are currently grouped within a single diagnostic category. For example, separate assessments of schizophrenia along dimensions of social interactions, attentional deficits, and neurophysiological abnormalities could both provide a more comprehensive evaluation and suggest potential areas of treatment emphasis. Similarly, developing measurement systems that blend symptom-based indicators with process-based indicators would allow for a richer understanding of the individual client, thereby allowing finer grained treatment approaches and leading to better scientific understanding of the complex interplay of process and symptom.
- *Computer adaptive testing approaches* (described below) could be modified to address the difficult problem of diagnosis. Adoption of these approaches (already widely used in a number of educational testing domains ranging from ability assessment to tracking outcomes of interventions for reading disabilities) might significantly reduce the amount of testing time required to arrive at a diagnosis, or, perhaps more important, provide an estimate of an individual's functional level. The technology of computer adaptive testing is well established, but has not yet been rigorously explored as a technology for clinical assessment in the mental health domain.

Using these approaches, an assessment begins with an estimate of the individual's level on a trait or behavior (e.g., a small number of probe items). By sequentially presenting questions from an item pool ranging in level of intensity or difficulty, the assessment progressively focuses on a level appropriate for the individual. For example, if the assessment were focused on phobias, the questions might involve behaviors related to limits in daily functioning. Starting with an initial estimate of the average level of restriction, the person would confirm or deny this level of disability. A confirmation would be followed by a question addressing still greater severity. This process would continue until an estimate of the functional level of the individual, with predetermined precision, is obtained. This provides a tailored assessment, and only the number of questions needed to obtain an estimate of pre-specified accuracy would be asked.

- *Item response theory (IRT)* refers to the development of test questions systematically varying in "difficulty" in order to measure individual differences in ability. Such carefully crafted and tested questions would be helpful to patients and clinicians, as well as researchers, in two ways. The first would be to develop new and better scales of "wellness," "functioning," "satisfaction," or similar important constructs. A second use would be to establish banks of items with similar characteristics, which could be used interchangeably in repeated assessments of the same individual over time to track the course of recovery without the identical item having to be used repeatedly. These applications could improve the ability to monitor change by assessing very fine differences in functions or symptoms during the course of treatment and recovery.

- **Biobehavioral Research and Mental Illness**

The contributions of behavioral science to mental health can be multiplied many times over through collaboration with other vital areas of research. For example, mental health research is likely to benefit exponentially from advances at the interface of neuroscience, genetics, and behavioral science that can clarify how behavioral and biological factors interact in the etiology, course, and amelioration of psychopathology. Examples of research opportunities at this interface are described below.

- *Brain Plasticity and Behavior*

As research and clinical interest expand from acute control of symptoms to include longer-term issues of rehabilitation or recovery, there is growing interest in recovery of brain functioning. The term "brain plasticity" refers to changes in the structure and functioning of the brain, whether through development, learning, or recovery from injury. Researchers examining brain plasticity have noted that "experience produces multiple, dissociable changes in the brain including increases in dendritic length, increases (or decreases) in

spine density, synapse formation, increased glial activity, and altered metabolic activity" (Kolb & Wishaw, 1998). The size of ventricles (open, fluid-filled areas) in the brain--a measurement that is used as an index of brain dysfunction in several disorders--has been found to change over time with changes in experience and nutritional status. Several studies of psychotherapy outcomes have found brain functional changes that are associated with positive behavioral outcomes (Baxter et al., 1992). Research in this area, typically conducted by basic behavioral researchers often in cooperation with psychopathology researchers, is still at the early stages of its development in clinical populations and needs to be expanded.

- *Biobehavioral Development and Mental Disorders*

Behavioral science offers a rich description of risk factors associated with the onset of mental disorders at multiple levels of analysis/environment. Normal behavioral development (cognitive, linguistic, motor, emotional) has received extensive study, and the behavioral course of some child psychopathologies has been described (e.g., conduct problems, autism). Complementing this area of research progress is a young but growing research area focused on genetic control of the unfolding of brain structure and system development. Also evolving rapidly are visualization technologies (e.g., functional magnetic resonance imaging--fMRI) that provide unprecedented access to the living, behaving, developing brain, even as recently reported, while a fetus responds in utero to its mother's voice. At present, however, these are all too often separate fields of study (e.g., neurodevelopment, behavioral development, and developmental psychopathology/psychiatry) with little crosstalk and with separate literatures, separate schools (medical vs. graduate), and distinct conceptual frameworks (medical model vs. transactional). The potential gains in developmental understanding and in clinical capacity to avert or divert adverse developmental trajectories demand the Institute's best efforts to stimulate greater collaboration and cooperation across these disciplinary lines.

- *Genetics and Behavior*

Mental disorders are extremely challenging to genetic researchers because they do not stem from errors in single genes. In addition, both genes and environment appear to be complexly and interactively involved in the development of mental disorders, perhaps with multiple components of each. Furthermore, a mental disorder such as schizophrenia may be at the most severe end of a continuum of schizophrenias that include, in descending severity, schizoaffective disorder, schizophreniform disorder, schizotypal personality disorder, and possibly other variants. Growing research evidence suggests that other major mental disorders may follow the same pattern. Thus, collapsing multiple diseases or degrees of illness into a single category makes the search for genetic influences much more difficult, since each

subset of a disease may have different genetic influences. A gene hunter may miss an important lead because it is not seen in all members of the affected population.

Circumventing this problem requires careful behavioral and biological descriptions of the behavioral phenotypes of specific subsets of mental disorders (how the mental disorders are expressed in individuals) so that these subsets can be identified genetically--a vital task for behavioral researchers. Vital, too, is the application of behavioral technologies from psychometrics and behavioral genetics to study sources of genetic and environmental variation and to dissect and understand the embedded phenotypes. Therefore, very fine analysis of hypothesized phenotypes is required so that appropriate subsets are defined and genetically linked.

Understanding the behavioral phenotype also is critical in the area of basic genetics, where researchers are testing the role of given genes through powerful "knockout" technologies that genetically alter animals to provide models of presumed genetic deficits. This research has revealed critically important understandings of disease processes at the cellular and molecular levels. However, when attempting to find the genetic basis for certain enduring behavioral dispositions that may confer or reflect susceptibility to mental disorders, identifying specific behaviors associated with specific genetic manipulations is no easy matter. Analyzing the changed behavior of genetically altered species requires the collaboration of experts in animal behavior who bring measures and paradigms developed to understand behavior in genetically normal animals, as well as extensive knowledge of species-specific social and sexual behaviors that might be disrupted.

Genetic manipulation is but one of many potential techniques for creating animal models of mental disorders. Because providing an overarching model of a mental disorder has proved difficult, researchers need to begin with partial models that can aid significantly in the clinical research enterprise. Animal research and comparative behavioral research have provided some partial animal models that are useful for research, such as dogs with acral lick syndrome, a compulsive licking behavior that resembles behaviors seen in obsessive-compulsive disorder, and which, like them, responds to medications such as fluoxetine (Prozac). Again, progress in such research requires, at a minimum, a pooling of behavioral and biological expertise.

In conclusion, the most tantalizing biobehavioral findings would be those in which convergent data across multiple fields and levels of analysis provide a new empirical nexus for understanding specific mental disorders. For example, personality and temperament research, neuroimaging, animal models of behavior, and genetic research recently have all converged in important new theories and findings regarding behavioral and biological aspects of mood and mood regulation. This work has important implications for such topics as the relationship between anxiety

and depression, which has long been a source of controversy in both the clinical and experimental literatures. Further multidisciplinary research that builds on this emerging perspective might offer a more cohesive conceptualization of these and other mental disorders.

B. FUNCTIONAL ABILITIES IN MENTAL ILLNESS

PRIORITY AREA 2. Understand how mental illnesses and their treatments affect the abilities of individuals to function in diverse settings and roles (e.g., carrying out personal, educational, family, and work responsibilities).

- Apply methods from basic behavioral science to the development of tools to assess functioning.
- Use methods from basic behavioral science to understand how specific rehabilitation and other intervention techniques improve specific types of functioning.
- Develop interventions that focus on improving functioning in addition to reducing clinical symptoms.
- Include the assessment of functioning as an outcome in intervention, services, and risk-factor research.

a. Issue: A wide range of relationships and activities--including those at home, work, school, and in health care settings--can be limited by acute episodes of mental illness. In addition, chronic and recurrent episodes of severe illness or those that begin before adulthood may limit functioning even after primary symptoms have abated. The levels and domains of activity limitations may vary quite widely both within and across diagnostic categories and in individuals over time. Yet similar levels and types of disabilities can be seen in people with quite different diagnoses. For example, limitations in social functioning may occur in individuals with disorders as diverse as schizophrenia, bipolar disorder, major depression, and social phobia. These illnesses therefore can constrict an individual's social-support network, resulting in fragile resources for coping with crises.

Given these considerations, an assessment focused solely on diagnosis-related symptoms may not suffice for helping people who are struggling to cope with mental disorders. How consumers function at home, with friends, with health care providers, at work, and during leisure time may be equally important outcomes to address. For example, a young man with schizophrenia may find that although the new medications reduce symptoms of psychosis such as hallucinations, he still is having trouble going to a job interview or taking the driver's license test--two tasks essential to realize his wish for self-sufficiency and recovery. Another consumer with bipolar disorder, who now feels more in control of her mood fluctuations, might discover that some of her

previously acquired skills--such as getting to work on time, negotiating public transportation, and managing money--need a great deal of improvement. A third person with depression, whose problems in functioning began in early adolescence and interfered with the development of social skills, may never have learned certain age-appropriate skills for initiating a personal relationship--an essential step toward fulfilling his dream of having friends and dating.

Because impaired functioning creates a serious economic and social burden for our society, for people affected by the disorder and for their families, health care providers, payers, researchers, and policymakers need to pay increased attention to clients' levels of functioning--before, during, and after treatment. As the enormous functional toll exacted by mental illness gains increasing recognition (as illustrated by the recent international comparative data on disease disability and the Surgeon General's report on mental illness) (Murray & Lopez, 1996; U.S. Department of Health and Human Services, 1999), so too does the need for demonstrably effective ways to assess and improve consumers' abilities to carry out their responsibilities and manage residual or recurring symptoms of their illness.

b. Research Avenues: Powerful research tools and theoretical perspectives are available in the behavioral sciences for examining issues related to functioning, including interpersonal interactions, social influence, emotion, learning, self-concept, and decision making. Research in the area of functioning needs to take advantage of these resources by linking to behavioral theory and methods. Some ongoing mental health research that focuses on or includes functioning is beginning to make those links, but most research to date does not. The opportunities for research on functioning described below suggest some ways in which behavioral science theory and methods could provide new tools for identifying and improving the functional abilities of people with mental illness.

- **Measuring Functioning**

Assessment of functioning has lagged considerably behind assessment of clinical symptoms in mental illness. The lack of standardized assessment and classification tools has hampered the ability of researchers and policymakers to assess accurately the form and frequency of functional impairments and to project future health care needs and costs. Recent efforts by the World Health Organization (WHO) and NIMH have led to the development of the WHO-DAS II, a generic measure of functioning that includes the domains of understanding and communicating, getting around, self-care, getting along with other people, life activities, and participating in society. The WHO-DAS II is now undergoing worldwide psychometric testing. Pilot studies are currently underway to determine its ability to predict service needs, health service use, and costs.

The WHO-DAS II is an exciting use of behavioral science with great promise for providing reliable and valid data to researchers and service providers. However, since it was designed to be used across many cultures and illnesses, instruments

like this may not be as useful for informing everyday treatment and rehabilitation plans for a specific person. Basic behavioral science theory and methods can be used to devise instruments that will take into account issues that are more specific to an individual and his/her context and symptoms. These instruments also could evolve into sensitive person-specific measures of the subtle but important changes over time in an illness.

- **Strengthening Rehabilitation Effectiveness and Functioning**

Psychosocial rehabilitation generally is regarded as important to help people coping with mental disorders function in community settings. However, many rehabilitative interventions are not now grounded in research, and there is wide variation in how well these interventions help specific people with specific deficits. Researchers have documented numerous specific cognitive and psychophysiological deficits associated with mental disorders (e.g., in attention, information processing, and psychophysiological arousal). But there is little understanding of how those deficits are related to specific functional problems or how such problems may be addressed by rehabilitation approaches. Current research is seeking to make these links. However, much more work needs to be done to spell out completely the link between the neurological-cognitive deficits and the formulation of rehabilitation strategies that are specific for particular functional deficits.

- **Understanding Illness Management and Recovery**

Consumers in community settings need and want to be able to take care of themselves. To do so they must improve functioning that was diminished, compensate for functioning that was lost, and learn new skills that were never developed. Teaching and reinforcing those strategies is the goal of rehabilitation programs. Behavioral research examining how people perceive and regulate their own behavior promises to shed light on many of the central rehabilitation problems of mental disorders (Metcalfe & Shimamura, 1994). For example, researchers have shown that individuals' awareness of the nature of their deficit is one of the most predictive measures of whether they will be able to benefit from rehabilitation efforts and develop compensatory skills. However, people with certain clinical conditions do not understand that they cannot remember information, even about their own illness; others are unable to use that information when needed. These are called deficits of *monitoring* and of *control*. For instance, unlike people with other kinds of amnesia, those with Korsakoff's disease lack knowledge of what they will be able to remember. This impairment in monitoring may originate specifically from the frontal cortex. Neuropsychological and computational models have clarified how basic memory processes are related to the monitoring and control processes. They also point to a whole syndrome of deficits that should be related specifically to impairments in monitoring.

Studies of individuals with impairments of control are few. People with such deficits have frontal lobe impairments and may have deficits related to the amygdala system as well. People with such deficits understand and can even fluently express what they should do, but cannot put that knowledge into practice. Clearly, this dissociation between monitoring and control processes has profound implications for daily functioning, as well as for our understanding of the basic architecture of human cognition. Much more detailed follow-up may clarify how these different components of cognition interact in different clinical and normative groups, and what intervention strategies might help people with such impairments. Deficits in monitoring and control may have important implications for functioning (in social relationships, work, at home and in school) and for the design of rehabilitation strategies.

- **Enhancing Disorder Management and Functioning**

Managing the symptoms of severe mental illness so that an individual can remain engaged in the activities of life can be a daily challenge. Managing the illness typically requires taking medication that can have many discomforting side effects, including dry mouth, blurred vision, sedation, restlessness, sexual dysfunction, weight gain, and tardive dyskinesia (involuntary movements of the head and limbs). Understandably, many of those experiencing such side effects want to quit taking the medication, and some do. This can lead to an acute episode of illness.

Behavioral strategies can reduce medication side effects by teaching clients to identify symptoms, to monitor their behavior and emotions, and to develop more effective communication skills, all of which help them negotiate with health care providers regarding medication changes. A series of recent studies illustrates the effectiveness of behavioral training techniques (e.g., didactic instruction, modeling, response rehearsal, coaching, and contingent social reinforcement) in teaching what are known as *collaborative medication management skills* to people with schizophrenia who are likely to discontinue medication. As a result, behavioral skills training has been identified as an essential ingredient in a comprehensive biobehavioral approach to schizophrenia treatment. More refined assessments are needed of the functional impact of these interventions, in combination with other behavioral approaches for strengthening the illness-management skills of clients in community settings.

- **Coping with the Social Environment**

In addition to coping with the symptoms of their illness, many people with severe mental disorders struggle to establish or maintain successful relationships with family members, friends, and co-workers. The primary and most intense social contacts for many of these consumers are with family members. Behavioral research has guided the development and testing of family education and support groups that assist family members in understanding the illness and coping with day-to-day stresses. Behavioral family psychoeducation programs place considerable emphasis on improving communication and problem-solving skills; the programs are

designed to enhance family members' ability to work together and minimize conflict. Most studies evaluating the effects of these family interventions have found that the psychoeducational programs for families produce dramatic reductions in the number and duration of acute episodes of illness among their ill relatives as well as improved health for family members.

Recent studies also suggest there are behavioral methods for directly helping those with severe mental illnesses cope with life in the community. Two randomized controlled trials showed that over a 3-year period an individually tailored form of cognitive-behavioral therapy, in combination with antipsychotic medication, could significantly reduce relapse and improve social functioning among those consumers who were living with their families (Hogarty et al., 1997). Further research is needed to extend the breadth and duration of these effects to permit people with severe mental illness to live more productive and fulfilling lives.

C. CONTEXTUAL INFLUENCES ON MENTAL ILLNESS AND ITS CARE

PRIORITY AREA 3. Understand how social or other environmental contexts influence the etiology and prevention of mental illness and the treatment and care of those suffering from mental disorders. Context includes interactions among factors at the individual, family, sociocultural, and service-system or organizational levels.

a. Issue: To respond well to the mental health needs of Americans with mental illness--especially given our Nation's extensive cultural diversity--clinical practitioners, decisionmakers, and researchers need to understand how a variety of contextual factors affect the mental health service system and those who deliver and use (or do not use) its services. This point was made in a call to arms to psychiatry that applies equally well to the other mental health professions:

Psychiatry needs new ways of delivering culturally appropriate care to the disenfranchised and the destitute, for whom mainstream approaches are often too expensive, foreign, and centralized. As a profession, we also have much to learn from indigenous diagnosticians and therapists. Finally, psychosomatic, mind-brain, behavioral health, and psychopathologic investigations need to configure the social world in their paradigms of research if we are to understand better the sources and consequences of mental illness. *Psychiatry can no more afford to be contextless than it can afford to be mindless or brainless* (Emphasis added) (Lewis-Fernandez & Kleinman, 1995).

Mental disorders arise and are treated in complex biological, sociocultural, and economic settings. People with these disorders differ in their individual characteristics and in their manifestations of and responses to illness depending on the community and cultural environments in which they live. The organizations that provide mental health and rehabilitative care operate with a range of values, styles, goals, and financial restrictions. Their capacity to address the individual needs of those with mental illness may be affected by their social, economic, and legal environments. All these contextual factors--individual, sociocultural, and organizational--have main and interactive effects

on risks for illness, course of illness, help seeking, and responses to interventions. These effects, individually and in combination, need to be identified and assessed to aid in designing and/or developing interventions appropriate to the needs and circumstances of specific individuals or groups suffering from mental disorders.

Contextual factors are particularly salient in research on disparities in the receipt and quality of mental health care. Excellent mental health treatment should be available to all Americans, but there are still significant socioeconomic, geographic, and ethnic disparities in the seeking, use, and provision of care, as well as treatment outcomes. A significant issue in this regard, which needs a contextual research approach, is diagnosis. Evidence shows that the diagnosis one receives can be strongly influenced by the racial group to which one belongs. Also relevant is research evidence that identification of certain mental health problems--whether defined by Western mental health professionals (e.g., anorexia) or through folk and cultural traditions (e.g., *ataques de nervios*, see (b) below)--are highly dependent on the sociocultural backgrounds of the clinician and the consumer. These and other findings indicate the necessity for more methodologically sophisticated and behaviorally informed research on diagnosis and the diagnostic process.

Areas within mental health services research, such as research on help seeking, treatment, and outcomes, also need a contextual perspective. Evidence shows that those who are not part of the mainstream culture are more likely to seek services and respond best *if* those services are provided in an environment that is geographically accessible and socially and culturally comfortable for them and respectful of them. To alleviate disparities in help seeking, treatment, and outcomes, consideration of sociocultural and other contextual factors is essential.

The basic behavioral and social sciences have extensive literatures that are gold mines for mental health research conducted from a contextual perspective. They focus on the very social, cultural, psychological, and market factors influencing behavior that are critical for a contextual perspective. Theory, methods, and empirical findings in these literatures can aid understanding of issues such as:

- **Individual:** How social and cultural influences at the individual level--such as developmental history, styles of expressing emotion, levels of motivation, personality, beliefs, values, preferences, needs, and goals--affect risk for mental illness and inform the development, design, and targeting of new interventions, and how such characteristics affect behavioral responses to prevention and treatment.
- **Sociocultural:** How ethnicity, culture, language, socioeconomic class, family and social networks, and neighborhood or community affect risk, diagnosis, prevention, and treatment of mental illness.

- **Organizational:** How policies, incentive structures, and cultures at all levels of health/mental health organizations and institutions affect the behavior of those providing care and of those receiving it, as well as the outcomes of care.

There has been some research collaboration among basic researchers, services researchers, and service providers. But much more intensive efforts are needed to ensure that basic behavioral theory, methods, and empirical findings relevant to contextual issues inform research on diagnosis, engagement, and care of those with mental disorders. The following research examples suggest some of the exciting findings that have emerged from beginning steps taken in this direction.

b. Research Avenues:

- **Diagnosing Symptoms and Functioning Across Cultures and Subcultures**

New tools and approaches are critical for understanding a variety of difficult treatment and service issues. Anthropological and cross-cultural research studies have shown that the expression of emotion can vary widely across cultures, as can mental illness symptoms, their meanings, and the categories of mental disorders. A cross-cultural research program on diagnosis should examine how these differences affect individuals' experience and reporting of symptoms; how the expression of emotion affects diagnosis; how the language of interview affects the assessment of individuals in their first and second languages; and how social distance due to ethnicity, class, and gender affects the diagnostic process.

The benefits of cross-cultural approaches to diagnosis are illustrated by research on *ataques de nervios* (attacks of nerves) among some Latino populations in the United States (Guarnaccia & Rogler, 1999). This research has determined that this culture-specific illness refers to distinct patterns of loss of emotional control and that the type of loss of control (fear vs. anger) is related to specific mental disorders (panic vs. mood disorder). This research has also suggested that these clusters may prove to be useful markers for detecting mood and anxiety disorders among Latinos.

- **Developing Measures and Interventions through Ethnography**

Some research questions regarding the etiology and course of mental disorders require an ethnographic approach. Ethnographic and other qualitative methods, which have a long history in anthropology, describe illness and suffering in relation to the sociocultural contexts in which they occur. This requires that researchers consider the nature of mental disorders, and necessarily involves issues of “meaning” and “value” that contribute to people's perceptions of themselves and their world. This approach has proved quite useful in two areas of applied research: measurement development and intervention development.

- *Measurement Development*

When doing research in community settings, investigators need to account for variations in how care is delivered. One concept that has been assumed to be critical is “continuity of care.” However, researchers have typically approached this concept through ad hoc measurement of related constructs, such as number of visits or presence of a particular type of service. This limited conceptualization recently has been expanded. An ongoing ethnographic study has sought to identify the elements of continuity of care by documenting the interpersonal processes of giving and receiving care (Ware et al., 1999). Through careful interviews with clients and clinicians, the investigators have identified six mechanisms of continuity, which they term *pinch hitting*, *trouble shooting*, *smoothing transitions*, *creating flexibility*, *speeding the system up*, and *contextualizing* (or helping the client perceive a discouraging situation less negatively). Through this ethnographic work, a scale has been constructed that is being used currently in psychometric testing in ethnically diverse populations.

- *Intervention Development*

Caregivers working with people with severe mental illness in the community need to encourage health-promoting behavior in all aspects of life. This is especially important to prevent additional illness and because having co-morbid substance abuse and/or medical disorders complicates and exacerbates severe mental illness. Such efforts depend, in part, on understanding the perspective of the specific consumer population. Research built on an awareness of cultural contexts can aid in developing interventions that give consumers well-grounded, comprehensible information, respond to their personal concerns and viewpoints, and give them the skills needed to refrain from behavior that can compromise their physical or mental health.

Recent research has demonstrated the potentially life-saving power of culturally sensitive preventive interventions for individuals with severe mental illness (Susser et al., 1998). Because an elevated rate of HIV infection has been found in this population, developing an effective HIV preventive intervention for people with severe mental illness--especially those who are homeless--has been a high priority for NIMH. To encourage safer sex among homeless minority men with severe mental illness, a research team recently conducted a randomized clinical trial of an ethnographically based social-skills training curriculum built around the activities and the language of the men's daily lives in their shelter. The cultural relevance of the intervention made it meaningful and interesting to the men and held their attention despite the cognitive impairments produced by their illness.

During the initial 6-month follow-up, the experimental group's mean score on a sexual risk index was three times lower the control group's; it was two times

lower during the remainder of the 18-month follow-up. This intervention successfully reduced sexual risk behaviors of homeless men with mental illness; although the effect diminished over 18 months, it did not disappear. Further behavioral research of this type, which combines ethnographic sensitivity with social-skills training, is essential to enhance other health- and mental health-promoting behavior in people with severe mental illness in a variety of living environments, communities, and cultural contexts.

- **Framing Messages in Context for Health**

A developing body of behavioral science research promises new insights and approaches to aid in encouraging consumers to seek, remain in, and adhere to treatment, as well as motivating providers to offer appropriate diagnoses, treatments, counseling, or referrals. The rich array of techniques used to change behavior--whether of consumers or providers--includes tailoring messages so they are understood and accepted by the intended target groups. Research on "framing" focuses on the behavioral impact of the way in which messages are presented. To "frame" a message so that it will be effective, the framer must directly address individual and sociocultural contexts of the people whose behavior he or she seeks to change.

Message framing has received considerable study in health care and public health as researchers seek the best ways to reach consumers with health messages (see box below, "Taking a Chance on Health: The Impact of Message Framing"). To date, however, there has been relatively little framing research in the mental health arena--a research gap that begs to be bridged.

Taking a Chance on Health: The Impact of Message Framing

A crucial aspect of health education is knowing how to frame messages effectively to encourage behavior change. For example, in trying to encourage women to have mammograms, is it better to emphasize the benefits of doing it ("gain-framed" messages, e.g., "Obtaining a mammogram allows tumors to be detected early; this maximizes your treatment options") or the costs or risks of not doing it ("loss-framed" messages, e.g., "If you do not obtain a mammogram, tumors cannot be detected early; this minimizes your treatment options")?

One of the first examples of translational research based on basic decision science principles was an attempt to persuade women to use monthly breast self-examination (BSE). Women were asked to read one of two pamphlets describing BSE. The first emphasized its potential benefits (gain-framed message) and the second the potential costs of not doing it (loss-framed message). The loss-framed pamphlet was more effective in promoting BSE than the gain-framed one. The particular effectiveness of loss-framed messages in encouraging BSE makes sense in light of laboratory work on framing and risk-taking. BSE is perceived as an uncertain or risky behavior; it is not done to prevent cancer; rather it is performed in order to detect it. Each time a woman performs BSE, she runs the risk of finding a lump or another abnormality.

An additional decade of research revealed that the influence of message framing on health behavior depends on the type of behavior being promoted (Rothman & Salovey, 1997). Loss-framed messages were effective in promoting mammography and BSE, early-detection behaviors. But gain-framed messages were effective in promoting the use of infant car restraints, exercise, smoking cessation, and sunscreen--all prevention behaviors. The uncertainty associated with detection behaviors means that loss-framed messages should be more persuasive in promoting them. However, prevention behaviors are not perceived as uncertain or risky at all; they are performed to deter the onset or occurrence of a health problem, and gain-framed messages are more effective in encouraging them.

The correct match between a message frame (gain or loss) and the required health behavior (prevention or detection) especially motivates behavior change. A return to the laboratory allowed a more precise test of this framing by behavior-type hypothesis using hypothetical diseases, as well as taking a given health behavior--using a daily mouth rinse--and describing its function as prevention or early detection. This line of research began in the cognitive psychology laboratory then became "translational" in the sense that it was used in large-scale, field-based experiments designed to promote health behaviors in community-based interventions. Future research in this area needs to test whether much more targeted messages, which take into account contextual variables such as culture, status, and family illness history, will improve motivation to change behavior.

- **Understanding the Impact of Organizational Context and Climate**

Integrating the theory, methods, and knowledge base of behavioral science into services research can lead to new types of studies and new insights into critical service system issues. One such study (Glisson & Hemmelgarn, 1998) was designed to determine whether efforts to increase coordination of children's public service agencies improved service quality and children's outcomes, as many researchers, providers, and policymakers expected they would. However, based on the literature in organizational theory, the investigators also assessed how other

characteristics of the organizations--which included their overall culture and climate--affected the same outcomes.

The research team collected both qualitative and quantitative data over a 3-year period describing the services provided to children in one State. They found that the tested intervention--increasing coordination between organizations--had a negative effect on service quality and no effect on children's outcomes. In contrast, a positive organizational climate (including low conflict, cooperation, role clarity, and personalization) was the primary predictor of positive service outcomes (the children's improved psychosocial functioning) and a significant predictor of service quality. These findings--if supported by other studies--have immediate policy relevance because they suggest an approach to improving children's services more promising than traditional efforts focused only on organizational coordination. The lesson from this research is to focus on creating positive climates within organizations rather than on simply increasing coordination among them.

D. CONCLUDING COMMENTS

This chapter merely hints at the wealth of opportunities for translational research embedded within the Workgroup's three priority areas. Many more are suggested in the box below, "Further Research Avenues." However, turning research promise into tangible benefits for people with mental illness and for the science of human behavior requires well-planned, well-supported, and sustained effort by NIMH over many years. A framework for that effort is presented in the next chapter.

Further Research Avenues

Behavior science theory and findings offer rigorous directions for exploring many other concerns raised by individuals with mental disorders, their families, and their providers. The following behavioral science research opportunities round out the examples in this chapter.

- **Stigma:** Research has revealed the processes underlying stereotyping of individuals from ethnic and gender groups, as well as the functional costs that stem from fear of such stereotyping. Can these principles assist in constructing a program to destigmatize mental illness for the general public, the courts, the police, or emergency room workers?
- **Eating and Smoking Regulation:** For patients with severe mental disorders, weight gain is one of the troublesome side effects of medication. Can techniques for modifying eating behavior to improve weight loss in the general population be successfully applied to this specific group? Smoking cessation has been found to be particularly difficult for people with schizophrenia. Can behaviorally developed and evaluated smoking cessation programs be tailored and tested for effectiveness among these and other individuals with mental disorders?
- **Consumer Education:** Treatment research findings indicate that patients who receive educational counseling about mental illness or other illnesses can more closely follow their treatment plan. Are there cost-effective methods for providing this education through videotape or consumer educators that would enhance treatment adherence?
- **Burden of Care:** Behavioral research with families of Alzheimer's patients demonstrates growing sophistication in quantifying the burden of care for family members and in developing methods to ease this burden. Further research is exploring how consumers view the help received from family members. Can testing these findings--and the underlying models of social support, altruism, and self-esteem--for generalizability to burdens associated with mental illness provide important information for consumers and their families?
- **Decision Making:** Basic research is beginning to reveal the processes that guide and sometimes misdirect decision making by individuals and groups in the laboratory. Further research promises to extend these insights to clinical contexts. Can these models be translated into decision rules that consumers and their providers can and want to use in developing effective treatment plans? Topics for investigation could include the cognitive processes underlying diagnosis and planning or evaluation of treatment, as well as clients' seeking of and adherence to treatment. A related direction for future work is the design and use of artificial-intelligence technology to assist in clinicians' decision making.

IV. FROM KNOWLEDGE TO ACTION: THE NIMH LEADERSHIP ROLE

The three priority research areas discussed in Chapter III (Basic Behavioral Processes in Mental Illness; Functional Abilities in Mental Illness; and Contextual Influences on Mental Illness and Its Care) are so central to the core mission of NIMH that it may seem puzzling that they needed to be highlighted by the Workgroup for special encouragement. They pose many interesting research questions that might be expected to attract and excite a substantial number of behavioral scientists spontaneously. However, the representation of such research in the current NIMH portfolio is limited, suggesting that these are difficult areas to develop. (Indeed, NIMH staff are also working on strengthening the translational portfolio built on basic neuroscience and genetic science.) At present too few researchers are attempting to bridge across basic, clinical, and services research, and not enough are working with colleagues in related allied disciplines to move research advances out of the laboratory and into clinical care and policymaking.

NIMH can and must play a catalytic role in initiating and sustaining activity in the priority areas for translational research described in the preceding chapter. Because specific research avenues within these areas are at different stages of development, they will require different strategies and timetables for moving forward. For some avenues, the first step should be exploratory meetings blending basic, clinical, and services researchers with consumers, family members, providers or policymakers; for those topics that are better developed, issuing targeted RFAs, PAs, or contracts may be a relatively early step. Still others may first require changes in training, the creation of multidisciplinary research centers, or some combination of approaches. But all priority areas will benefit from a systematic, phased approach to development that assesses their current status and needs, their potential contributions to clinical care, and the steps required to realize those contributions. To be successful in these efforts, NIMH, of course, must embody in its administration of translational research the same spirit of multidisciplinary collaboration and coordination that it fosters in the research community.

This chapter describes a comprehensive NIMH approach to building, sustaining, and applying systematically the behavioral knowledge needed to improve critical aspects of mental health care. Although the examples and recommendations are focused specifically on facilitating translation of behavioral science, many are applicable to the generic problem of moving knowledge gained from any basic science into clinical and services research and ultimately into clinical practice and service systems.

A. BUILDING THE FIELD: FIRST STEPS

NIMH stimulates outstanding mental health research through a blend of scientific leadership and efficient research administration. As the leading supporter of basic and clinical behavioral science, as well as treatment research and services research related

to mental illnesses, NIMH is strongly positioned to build a successful and enduring program of translational behavioral research. However, it needs to make efficient and effective use of its considerable resources and roles, which include, in addition to being a catalyst for new research directions, being an integrator, convener, and influential mental health/public health advocate.

Establishing a viable program of translational behavioral science research at NIMH will require special effort and incentives to overcome the extensive structural, financial, and attitudinal barriers discussed in Chapter II. NIMH needs to address effectively and comprehensively a host of very practical questions. These include:

- How can basic researchers at various points in their careers be attracted to pursue unconventional and even risky avenues of needed translational research?
- How can they be trained or partnered with others to conduct such research, and who will train them?
- How can excellent behavioral, clinical, and services researchers be encouraged to collaborate in translational research projects?
- How can reviewers with expertise in specific areas be briefed to recognize the best translational research?
- How can translational researchers be encouraged to consult and collaborate with consumers and community representatives in the design and development of research?
- How can such researchers find and exchange information readily with one another, with prospective collaborators in other disciplines, and with end-users of their findings--consumers, policymakers, practitioners, and payers?

These issues are addressed in the remaining sections of this chapter.

The Institute also must address a critical research policy question: Which, if any, areas of translational research should it choose to stimulate immediately, and how should it phase the overall development of the research program? The Workgroup has identified three priority areas that represent first focal points for the emergent research program. However, long-term efforts are required to assess the changing state of knowledge and need in these and other research areas, determine the readiness of specific findings and theories for development toward clinical goals, and design a phased plan of action. It is essential to capitalize immediately on the attention and interest generated by NAMHC reports such as this to educate the field and stimulate its interest in participating in translational research. To jump-start the field and to alert the research community to the immense opportunities for knowledge advancement and mental health service presented by behavioral translational research, NIMH must make a highly visible commitment to developing the field.

Accordingly, a number of steps should be initiated immediately:

- **Issuing RFAs for Translational Research in Priority Areas of Study**

An RFA is a one-time call for research in a specific area. Its goals and criteria are clearly stated for researchers and for reviewers alike. Because it offers a funding set-aside, it is perceived by the research community as representing a priority area of research. NIMH is permitted to tailor review criteria for RFAs, since the reviews are held at the Institute. The opportunity for review through NIMH rather than through the NIH CSR, which oversees peer review of most investigator-initiated applications in behavioral science, has other advantages. The NIMH review structure can readily adopt some of the recommendations proposed in this chapter that would be unwieldy for CSR to undertake.

Having identified three priority areas of research: (1) Basic Behavioral Processes in Mental Illness; (2) Functional Abilities in Mental Illness; and (3) Contextual Influences on Mental Illness and Its Care), the Workgroup recommends that these be the foci for an initial series of RFAs, beginning with Priority Area 1. Other RFAs to follow include one focusing on interventions informed by theories of basic processes in mental disorders. It is important from the outset to highlight the need to develop interventions, both as a way to move behavioral theory into clinical practice and as a way to test behavioral theory in clinical populations. To aid in assessing basic behavioral processes, another prospective RFA or request for proposals (RFP)¹⁰ should call for the development of psychometrically sound tools for determining diagnosis and level of impairment--based on contemporary measurement theory--for use by practitioners; such practical assessment tools are urgently needed in clinical settings.

- **Creating a Systematic Implementation and Evaluation Plan**

Although these RFAs signal important new research opportunities, they are only the beginning of a long-term process of inquiry, assessment, and program development. The Institute needs to create a systematic implementation plan for the long-term development of research in the three priority research areas--one with clear goals that permit later assessment of the program's success.

Recommended steps include establishing a detailed baseline "snapshot" of the current NIMH translational research portfolio in the three priority areas. (The definition of translational research presented in the Executive Summary may provide a basis for developing an operational definition for this task.) This baseline would aid in current program development and would serve as one basis for an evaluation--perhaps a decade hence--of the success of the Institute's efforts in fostering translational behavioral science research.

¹⁰ RFP is a call for contract activity.

- **Additional Mechanisms to Stimulate Research**

- *Other Research Announcements*

The Workgroup strongly encourages NIMH staff to use every mechanism at their disposal to signal the Institute's strong interest in translational research and encourage the development of this field. This means, in addition to issuing the RFAs described above, following them up with standing announcements to the field--e.g., PAs--to emphasize the Institute's ongoing commitment to these research areas.

In light of the broad recommendations of this report, the Institute also should consider revising and/or reissuing existing translational research announcements germane to translational behavioral research (e.g., in the areas of dissemination research, human subject protections, and services research). It is important to note, however, that after the fairly low response to these efforts, future attempts in these areas must first identify important and attractive research issues as RFA/PA topics, and communicate these research opportunities effectively to the field.

As with other announcements noted above, PAs could follow RFAs to signal the Institute's ongoing commitment to these research areas. Mechanisms to alert and educate the field and stimulate research include workshops, research reviews, presentations to scientific and professional meetings, and journal and newsletter articles.

- *Workshops and Conferences*

The Institute can stimulate translational research through two broad types of meetings: (a) multidisciplinary meetings that bring together experts in basic behavioral research with their counterparts in clinical research and services research; and (b) meetings of behavioral researchers with consumers and experts from allied areas. Although their format and content will differ considerably, both types of meetings should focus on identifying specific areas of promise for translational research within the priority areas. In addition to their contributions to information exchange and research agenda-setting, such meetings and follow-up mechanisms should be structured to encourage subsequent collaborations among the participants.

Workshops and conferences, particularly when designed to encourage repeated contacts among carefully chosen participants, represent an important way to stimulate research and encourage groups to exchange information and perspectives. With the right mix of people and resources the Institute can create a venue where guild, patent, publication, profit, and advocacy issues can be put aside to consider both science and public health, or at least to consider how these issues can serve the public's health.

Experience in both the cancer and AIDS research arenas has underscored the importance of including in the research development process key stakeholders, including representatives from consumer and family groups, health-care delivery groups, practitioners, third-party payers, and employers. Broad inclusion should be the rule, not the exception. NIMH should add to its meetings representatives from basic science and clinical science, as well as allied fields with behavior-change expertise beyond the traditional mental health or academic sciences. The Institute also should provide participation opportunities for more junior researchers. Finally, other public and private funders and end-users of information should be routinely invited so that other sponsors and potential users of research knowledge can participate in shaping research questions.

- *Research Syntheses*

NIMH's leadership role is predicated on knowing and advancing the current state of research. Staying abreast requires talented staff and a willingness to foster many types of research synthesis. This synthesis effort is a prerequisite for implementing many of the recommendations at the end of this chapter. NIMH needs to generate broad reviews that take stock of what is known and what is needed in all research areas relevant to behavioral translational research. The value of the synthesis effort is contingent upon accessing and systematically analyzing all research that meets certain standards (regardless of publication status or success). Since many studies are too small in and of themselves to detect whether a particular intervention worked, meta-analysis can provide one powerful tool for merging data from multiple studies.

- **Fostering Communication Related to Behavioral Translational Research**

One of the central barriers to translational research is a lack of communication--across disciplines, across levels of inquiry, across departments and schools, sometimes across NIMH organizational lines, and among researchers, practitioners, and consumers. It is important to consider from the outset ways to break down communication barriers among groups whose collaboration is essential to transforming basic research into meaningful clinical advances. The meetings mentioned above are one important vehicle. The NIMH Web site offers another important means of rapid research dissemination to a variety of potential professional and lay audiences. NIMH also needs to consider ways to make key research findings and research opportunities accessible to those who need to know about them--whether they be practitioners, policymakers, consumers, or researchers outside the originating discipline. One of the first steps taken by NIMH staff should be to prepare articles on research opportunities in translational research for publication in scientific journals that reach a broad audience of basic behavioral, clinical, and services researchers.

- **Enhancing NIMH Staff Resources through Consultants**

NIMH staff work is essential to develop outstanding translational research and to review, award, and monitor research grants and contracts in this emerging research area. These vital roles ensure the Institute's ability to encourage, select, and sponsor important research from the many applications submitted for funding. Research administration requires a blend of system know-how and a keen understanding of substantive issues. Initiating time-limited NIMH appointments for outstanding translational researchers who serve as consultants in all three research divisions that fund basic behavioral research can invigorate NIMH programs and program staff while offering invaluable experience to the consultants themselves. Roles for such visiting scientists could include conducting staff training workshops and seminars as well as special workshops at scientific meetings for potential grantees.

B. OPTIMIZING THE PEER-REVIEW PROCESS

Peer review engages the best and the brightest researchers to consider the merits and weaknesses of their peers' applications for funding. This process must be finely tuned to the growing needs in the field and in the communities, such as the need for translational research. Clinical and basic researchers as well as practitioners interviewed for this report expressed concern that peer-review groups undervalue translational research.

Peer reviewers, who are essential advisors to the Institute, are placed in a difficult role. They are asked to evaluate and discuss the scientific merit of applications, but usually without the opportunity to review an Institute's portfolio or its objectives for research. This information should be made more readily available to reviewers, both at NIMH and at the NIH CSR. NIMH should encourage a new orientation process that gives reviewers excellent syntheses of research areas, addresses the technical and review issues in new research priority areas, and provides information on the current portfolio and program initiatives, and the programmatic objectives for moving the portfolio forward. In addition, periodic "booster shots" (e.g., at the start of review meetings) would be helpful.

A critical issue for translational research that can potentially pose problems for review is its boundary-breaking integration of disciplines and research perspectives. Thus, in addition to preparing reviewers adequately for their roles, it is essential to ensure that any group reviewing such research has the requisite mixture of expertise in basic, clinical, services, and other relevant research areas.

To encourage and expedite pathbreaking research, NIMH should adopt a formal method for considering rapid revision of cutting-edge translational research when the review group has indicated specific but remediable problems that can be resolved to the satisfaction of NIMH staff and Council. These procedures should be made known to

applicants. In addition, NIMH should revise and expand the focus of the B/START (Behavioral Science Track Award for Rapid Transition) and RAPID (Rapid Assessment Post-Impact of Disaster) announcements to expedite the submission, review, and funding of initial pilot efforts for translational research in practice settings.

C. FOSTERING COLLABORATIONS

Overcoming the barriers to translational research requires both effective communication and incentives to prepare and attract potential researchers and research participants. As recent NIMH experience illustrates, simply issuing PAs to the field is insufficient to stimulate translational research. The Institute needs to exploit its ability to promote innovation and collaboration through incentives that increase the speed and likelihood of getting funding for innovative ideas in the behavioral translational research arena, and that foster collaboration of behavioral scientists with clinical peers, methodological experts, providers of care, and consumers.

- **Providing Incentives for New Collaborations**

Meetings and reviews provide one avenue for sensitizing and alerting the field to new research opportunities and fostering collaboration and exchange. Further, although the NIMH research portfolio is largely driven by investigator-initiated research, many funding mechanisms in addition to RFAs are available or can be created to shape and focus aspects of that portfolio in desired directions. To increase interdisciplinary contributions to translational research, for example, NIMH needs to exploit funding mechanisms that mandate the collaboration of basic science, clinical, treatment, and services research (e.g., the model of the National Cancer Institute's (NCI's) clinical research centers). Collaboration requirements should be addressed in mechanisms aimed at junior and senior investigators, as well as in pre- and postdoctoral training and fellowship programs.

NIMH also can invite current basic behavioral scientist grantees to apply for supplements to include clinical populations as participants in their research grants in ways that address the translational research agenda. Similarly, current clinical and services research grantees should be invited to apply for supplements to include research on basic behavioral processes, functioning, and/or context in their research grants. These supplements could be competitive or administrative, undergoing an expedited, in-house review. The Institute also should offer supplements for the addition of basic behavioral scientists to ongoing clinical research at academic, provider, health plan, state, and local settings.

- **Forming and Supporting New Alliances for Research**

Conducting translational research will require new alliances and methods of developing and supporting such partnerships. NIMH should solidify its existing working relationships with other agencies/organizations, such as the Agency for

Healthcare Research and Quality (formerly the Agency for Health Care Policy and Research), the Substance Abuse and Mental Health Services Administration, the Centers for Disease Control and Prevention, and private businesses or nonprofits. It also needs to build partnerships through mechanisms linking health systems, services researchers, state mental health agencies, and academic research centers, including the Veterans Administration or the HMO Research Network. These collaborations open windows to research settings, populations, and opportunities for behavioral science research that extend well beyond those traditionally used in laboratory-based basic behavioral science research.

For researchers who wish to pursue research questions in these new practice settings, the lengthy grant-acquisition process can pose problems, as noted in the NAMHC 1999 *Bridging Science and Service* report (NAMHC Clinical Treatment and Services Research Workgroup, 1999). The time frame is often too short to establish the kinds of relationships needed to encourage practice settings to adopt research innovations. NIMH needs to explore ways to provide additional flexibility to: (1) permit planning grants for research development in practice settings; (2) pay for the time and resources that practice settings devote to the research venture; and (3) allow the private businesses, state and local governments, and advocacy groups to identify and articulate their own research questions and recruit researchers to answer them.

Community-generated research provides an opportunity to enhance the utility of research findings by changing the relationship between the researcher and the community. Community research programs began in the Netherlands and are now quite common throughout northern Europe and are growing in the United States as well. They typically involve partnerships with universities but also can involve researchers from any base to address problems of community concern. While environmental issues have been a common focus of these programs, community programs are likely to find translational mental health research of central importance given evidence about the large burden of illness imposed by mental disorders. Government support for such efforts could have many positive outcomes for public understanding of science, development of research skills among young people, and increased knowledge about many fields, including mental health. The clinical trials network initiated by the National Institute on Drug Abuse provides another example NIMH might consider as a potential model for community-based research addressing mental health issues.

- **Creating Multidisciplinary Settings for Translational Research**

In many developing areas of research, multidisciplinary, problem-focused research centers provide an important mechanism for concentrating scarce resources and bootstrapping a field. In addition, they are often excellent sites for training a new generation of researchers adept at multidisciplinary work. NIMH first should build on its existing research centers to provide opportunities for new translational

research, speed the translation of findings, and encourage interplay across basic, clinical, and services research.

The Workgroup favors initially offering existing research centers competitive supplements (e.g., for access to consumers, laboratory equipment, staff, clinical trials) to emphasize the integration of behavioral science in basic, clinical, and services research, as well as greater interaction at the interface between behavioral and biological science. The Institute subsequently may choose to create selectively one or more new translational research centers--with specified goals and finite life spans. Such centers should be organized around state-of-the-art behavioral science approaches to clinical problems, should include both behavioral and clinical scientists, and should demonstrate access to clinical populations or service settings.

D. CREATING TOMORROW'S RESEARCHERS

In an era of increasing specialization, there are few researchers who can see a body of work through from theory development to clinical implementation and even "manualization" and dissemination of the theory-based intervention. Nonetheless, it is possible, and even necessary, for multiple individuals to mine a body of basic behavioral research for its potential contributions to clinical practice and to ensure that appropriate teams of experts move promising work forward to the next stages of development. Many areas of basic behavioral research offer tantalizing possibilities for improving the lives of people with mental illness by contributing to new interventions, identifying the active ingredients of interventions, and using interventions to test basic behavioral models. However, turning these research possibilities into realities requires attracting and training a cadre of researchers who have the special skills and interdisciplinary orientation needed for translational research.

Investing in the training of young scientists to conceptualize translational research and work in multidisciplinary teams is likely to have the greatest long-term return of any investment in this area. If trainees are acculturated in doing this kind of translational work early in their careers, they are likely to continue to do it and to train their students to do this kind of work as well.

- **Training Support**

Major changes are occurring in the funding structure of universities, medical schools, and research institutes that have significant ramifications for research training. Because the Federal mechanisms for funding training, especially the National Research Service Award (NRSA) mechanisms, have certain mandated limitations (e.g., tuition reimbursement and other expenses), NIH should re-examine some of its policies in light of current and future needs of translational research training. Of particular importance, current levels of funding for training need to be increased dramatically to accommodate these changes. Accordingly, budget policies need to be altered to allow:

- Costs for training-related expenses to include support for administrative staff and training faculty. Not allowing these costs (see below) makes it virtually impossible for many particularly relevant training settings to apply for training grants. These include research institutes outside of university settings such as many clinical service centers settings (e.g., health plan research centers and medical health research and service centers). These are precisely the kinds of sites that would be most useful to cultivate translational research training because of their ready access to patient populations and to clinical and services researchers. It should be noted, however, that current NRSA policies do allow requests for additional training-related expenses in circumstances where they can be strongly justified.
- Payment to be based on the actual costs of training rather than the current formula approach, which does not cover staff costs and creates a disincentive for high-tuition institutions that rely on faculty self-generating salaries to apply for training funds. This lack of support for covering staff time is particularly problematic for translational research, which requires the interaction of such individuals to stimulate excellent training.
- Small-scale funding of pilot and small studies in targeted areas (e.g., translational research). In many cases, translational research cannot be done with volunteer undergraduate subjects or may require additional subject samples that complement a mentor's project. Thus trainees, particularly at the postdoctoral levels, should be allowed to request additional funds for subject payment, clinician oversight, and other necessary research expenses.
- Extra resources in funding translational training grants, fellowships, research education grants, and career awards (such as extra training positions or preferential funding) to outstanding programs and investigators that are well-positioned to bridge basic and applied research in mental health. This enhancement would explicitly acknowledge that establishing, conducting, and maintaining mental health translational research and research training is difficult and requires more resources than research that is less multidisciplinary and multidepartmental or even multi-institutional.
- **Fostering Training to Bridge Multiple Research Areas**

Promoting significant progress in behavioral translational research requires training researchers at all career levels (pre- and postdoctoral students as well as established researchers/faculty) to conduct studies that bridge across basic, clinical, and services research. NIMH can contribute appreciably to this new research climate by fostering individual fellowship programs and career awards that require two mentors, one in the basic arena and one in the clinical/services arena. In addition, NIMH needs to support research education programs that provide opportunities for basic behavioral and social science students to interact with clinical students, exchanging basic and clinical course work and expertise. Such programs

should include courses on new state-of-the-art behavioral science methods and clinical nosology, and ideally should involve faculty exemplars who combine basic research expertise with expertise in clinical and/or policy issues.

To encourage established researchers to extend their domains of investigation and collaboration, NIMH should support research education programs that provide short-term training to enable basic researchers to learn about clinical and services research, and clinical and services researchers to learn about basic research. If feasible and appropriate, this might include a rotation at the NIMH intramural research program.

E. REFINING QUESTIONS AND USING APPROPRIATE METHODS¹¹

How adequate are current methods for addressing translational research questions? NIMH needs to answer this question to provide a basis for integrating and adapting existing methodological tools more effectively, for developing new tools as needed, and for identifying effective ways to disseminate them. Historically, NIMH has very actively and effectively furthered the methodological basis for mental health research. But to keep pace with its new emphasis on translating basic research into better mental health and mental health care, NIMH needs to foster further methodological adaptation, development, and dissemination.

Methodological issues can best be resolved when the full community of scientists, using appropriately and creatively a wide range of approaches, comes together in a spirit of cooperative problem solving. No one methodological or theoretical approach can be expected to provide all answers to the set of issues that must be addressed. It therefore is essential to recruit a very wide range of methods (e.g., quantitative, epidemiological, qualitative, ethnographic, demographic, biostatistical) as well as a wide range of theoretical perspectives (cognitive, behavioral, psychopharmacological, sociological, economic) to deal with the problems of translational research. This will require scientists who have not previously worked together to collaborate. They will need to learn each other's languages and understand each other's perspectives and methods.

New developments that have grown out of basic research in methodology will help in dealing with the complicated study designs and data structures that arise in translational research (e.g., study designs and data sets with hierarchical structures, large data sets with missing data, data that do not follow a normal distribution, and syntheses of studies using a broad range of techniques). With help from NIMH, the following methodological domains will benefit particularly from these developments:

¹¹ Note: A more detailed and technical version of this section is presented in Appendix E.

- **Statistical Sampling**

Improving the quality of mental health research and its applications in clinical and services settings requires placing greater emphasis on external validity as an objective in the research design. Statistical sampling methods should be used more comprehensively to enhance the representativeness of the study samples in the design and implementation of research studies, outside of narrowly focused laboratory studies (usually based on convenience samples of volunteers). Behavioral science can potentially strengthen these methods through better understanding of the complex behavioral processes involved in participant recruitment, nonresponse, and attrition, and can provide techniques to increase external validity for research studies.

- **Risk Assessment**

The important and complex problem of assessing and measuring risks for undesirable mental health outcomes has vexed mental health research from its inception, and progress has been slower than desired. Improvements in methodological approaches to this problem are essential. Methodological issues that must be considered by NIMH include: (1) the use of retrospective and case control designs; (2) obtaining sufficient power to detect rare events; and (3) the need for adequately specified models that provide more than simple listings of risk factors without attention to potency, timing, and sequence. NIMH also needs to close the gaps separating the various communities of scientists working on the problem of risk assessment in the mental health field, particularly mental health epidemiologists, those who study development and psychopathology, and those who design and study preventative interventions. Lack of communication and integration hampers building a cumulative knowledge base and interferes with the progression of research from risk identification to intervention development, to tests of causal models hypothesized from basic research.

- **Individual-Differences vs. Group-Differences Approaches**

Most studies conducted to understand the potential value of clinical phenomena, interventions, or prevention programs use a "mean-difference" approach that, although important, is incomplete for clinical understanding because it does not address: (1) the numbers of individuals who prosper more under one treatment than under another; and (2) those for whom certain approaches work--and under what conditions.

Unfortunately, as in the rest of health care research, individual differences have not been well studied in most mental health clinical trials. Current analytic approaches need to be complemented by others that can reveal efficiently "What works for whom and under what circumstances?" Answering this question requires methods other than group-mean comparisons, as well as careful use of exploratory approaches. There are many promising methods that may prove helpful, but the problem of

building models for these inquiries has not yet been completely solved. Clearly, NIMH needs to make more efforts to adapt, develop, and disseminate analytic methods to meet these goals.

F. COMMUNICATING AND DISSEMINATING BEHAVIORAL TRANSLATIONAL RESEARCH

As noted in Section A of this chapter, NIMH has an active role to play in disseminating information to many audiences and stakeholder groups. Its communication activities can include encouraging the exchange of behavioral translational findings, methods, and research tools across scientific disciplines and fostering their targeted development and adaptation for practitioners, payers, and policymakers. Communicating appropriately the results of research to lay and professional audiences is also a vital Institute function.

- **Communicating with Scientists**

NIMH needs to explore the use of new technologies for communication among researchers to extend beyond journal-based sources and face-to-face meetings. It should invest directly in providing the infrastructure to permit researchers to hold virtual meetings, whether through the World Wide Web or through Web-supported teleconferencing. NIMH could establish translational research expertise banks--through the Internet and other mechanisms--to make expert translational advice available to prospective grantees and trainees. NCI offers an "ask the researcher" chat room where a methodologist or substantive expert is available to answer questions from prospective applicants or grantees. Such an innovation would be a cost-effective way for NIMH to help researchers gain access to the skills needed to enter new areas of interest. A chat room could aid in forming partnerships among researchers investigating similar topics, and a Web site could aid in matching researchers and applied research opportunities, with NIMH staff also identifying potential collaborators.

NIMH also should sponsor opportunities for researchers to meet with care providers and health care system representatives to discuss implementation of research or further testing for effectiveness in actual clinical settings. Such opportunities should seed future research plans that result in improved patient care.

The Institute should consider Web teleconferencing for grant-related work, review meetings, and workshops (also a cost savings). Recent explorations of the possibility of developing an NIH-based e-journal may have important implications for rapid dissemination of NIMH research; an e-journal of NIMH translational research is one option to be considered.

- **Communicating with Consumers and Practitioners**

The Institute recently evaluated its communication efforts to improve outreach to key stakeholders. Such efforts should be continued on an ongoing basis to strengthen the effectiveness of its dissemination programs. New behavioral technologies, as well as the results of the Institute's newly established dissemination research program, can provide guidance for reaching the public with research-based mental health messages. Does the public receive and retain such information and, most important, does it change to more appropriate behavior? Research on access, retention of information, and behavior change can suggest ways to shape the Institute's communications efforts for many critical target groups, including practitioners.

- **Listening to Nonscientist Experts**

Communication is a two-way street; a strong emphasis on the Institute's research dissemination role should not obscure the importance of listening to the needs and knowledge of its many stakeholders, including consumers, practitioners, payers, and policymakers. The Institute should seek out through a variety of mechanisms--small-group meetings, public forums, focus groups, and advisory groups--the experience of those who use or would want to use behavioral research findings to address issues related to clinical care. These experiences can educate NIMH staff and researchers to the realities of public health need as it is experienced in everyday life, and can sharpen the practical focus of translational research sponsored by the Institute. By acknowledging the expertise of nonscientists as partners in the translational research enterprise, the Institute also encourages greater willingness of these groups to participate in and adopt research they regard as relevant to their interests. A potentially important extension of the Institute's willingness to recognize the relevant contribution of nonscientists would be its pilot support of community-generated research, as outlined in Section C above in "Forming and Supporting New Alliances for Research."

G. EVALUATING PROGRESS IN DEVELOPING BEHAVIORAL TRANSLATIONAL RESEARCH

Effective development of a program of translational research at NIMH, be it in the behavioral, genetic or neuroscience areas, requires ongoing assessments of:

- What is in the portfolio?
- What is known and not known in the research literature?
- What new opportunities are emerging?
- Who is and should be working in the field?

- What are the measurable goals for each program initiative?
- Who will monitor progress toward program goals?
- Are the program goals being met? Why or why not?

As noted in Chapter II, as a first step, NIMH should identify immediately its baseline portfolio in the three priority areas identified in this report, and should develop a plan for evaluating success in stimulating research in these areas. After the program has had a reasonable time to gain a foothold--perhaps within a decade--its progress and impact on the field should be reassessed. Tracking progress against some nontargeted areas as "controls" would provide a useful comparison.

Chapter III and Sections A-G of this chapter have addressed, respectively, the promise of behavioral translational research and the leadership issues NIMH must address to realize that potential for people with mental illness. Because, as this chapter argues, comprehensive NIMH leadership is needed to fulfill the promise of behavioral translational research, the Institute should consider implementing in their entirety the Workgroup's specific recommendations presented in the action plan to follow.

H. AN ACTION PLAN FOR NIMH

Given the Workgroup's assessment of opportunities and needs for behavioral translational research, as well as the current barriers impeding the development of such research, the following action plan is presented for consideration by the NAMHC and the NIMH Director:

RECOMMENDATION 1. To establish and publicize translational behavioral science research as a priority funding area for NIMH and to develop a coherent strategy for its systematic development:

- a. Develop requests for applications (RFAs) to jump-start research in each of the funding priority areas identified in this report, starting first with Priority Area 1: Basic Behavioral Processes in Mental Illness.
- b. Issue an RFA to translate basic risk and behavioral process research into new interventions aimed at the prevention and treatment of mental disorders and related problems.
- c. Develop an implementation plan for long-term development of research in the three priority areas of translational research.
- d. Commission a "snapshot" of the current status of translational research in the NIMH portfolio in the research priority areas. This snapshot would serve as a baseline for evaluating the success of research stimulation efforts.

- e. Convene workshops/conferences that bring together experts in basic behavioral research, clinical research, and services research, as well as consumers, family members, providers, health systems representatives, policymakers, and researchers from allied areas to identify specific areas of promise for translational research within the priority areas.
- f. Use new and existing mechanisms [e.g., research reviews, special workshops, RFAs, requests for proposals (RFPs), and program announcements (PAs)] to stimulate continuing development of translational research (including reinvigorating existing research initiatives in areas such as dissemination research, human subject protections, and services research) and the tools needed to conduct such research.
- g. Develop a plan for behavioral translational research that addresses communication to and among scientists as well as research dissemination to the public, to practitioners, and to other health care personnel. That plan should include articles on research opportunities in this area for publication in scientific journals that reach a broad audience of basic behavioral, clinical, and services researchers.

RECOMMENDATION 2. Stimulate NIMH-funded research centers to provide an infrastructure for new research, speed the translation of findings, and encourage interaction across basic, clinical, and services research:

- a. Offer competitive supplements (e.g., for access to patients, laboratory equipment, clinical trials) to existing NIMH research center programs to:
 - Emphasize the integration of behavioral science in basic, clinical, and services research, as well as greater interaction at the interface between behavioral and biological science; and
 - Encourage studies that apply and test basic behavioral processes in understanding, identifying, treating, or preventing mental disorders.
- b. Create, as needed, new research centers--with specified goals and finite life spans.

RECOMMENDATION 3. Develop innovative approaches to supporting translational research:

- a. Invite current basic behavioral scientist grantees to apply for supplements to include research on clinical populations in their studies, and current clinical and services research grantees to apply for supplements to include research on process, functioning, and/or context in their studies. These supplements could be competitive or administrative, undergoing an expedited, in-house review.

- b. Offer mechanisms for the addition of basic behavioral scientists to ongoing clinical and services research at academic, provider, state, and local settings and for the addition of clinical and services researchers and clinicians to basic behavioral research.
- c. Encourage community-based research on mental disorders through small developmental grants to local and state governments, communities, or businesses working in partnership with academic researchers.
- d. Revise and expand the focus of the B/START (Behavioral Science Track Award for Rapid Transition) and RAPID (Rapid Assessment Post-Impact of Disaster) announcements to expedite the submission, review, and funding of initial pilot efforts for translational research in clinical settings.
- e. Commission technologies, tools, and other products identified as high-priority needs by mental health consumers and practitioners, using mechanisms such as contracts and research grants through the Small Business Innovation Research and the Small Business Technology Transfer programs.

RECOMMENDATION 4. Encourage the development, synthesis, and dissemination of cumulative behavioral scientific knowledge on mental illness:

- a. Conduct behavioral research syntheses in priority areas and disseminate these widely, in appropriately tailored formats, to various audiences of stakeholders.
- b. Use meetings as a strategic tool for advancing translational science, with a stated goal and work product, and a plan for including representation from all relevant stakeholder communities.
- c. Use new technologies to support virtual meetings when appropriate (e.g., chat rooms with consultant experts for potential applicants interested in designing research) and to disseminate reports of meetings.

RECOMMENDATION 5. Train researchers at all career levels (predoctoral and postdoctoral students, as well as established researchers/faculty) to conduct translational behavioral research:

- a. Support research education programs that provide opportunities for basic behavioral and social science students and faculty to interact with clinical and services research students and faculty, exchanging basic, clinical, and services research course work and expertise. Include courses on new state-of-the-art behavioral science methods and clinical nosology, and ideally involve faculty exemplars who combine basic behavioral research expertise with expertise in clinical, services, and/or policy issues.

- b. Foster individual fellowship programs and career awards that require two mentors, one in the basic research arena and one in the clinical/services research arena. By doing so, individuals at all stages of their careers would be encouraged to develop skills in translational research.
- c. Support research education programs that provide short-term training to enable established basic behavioral researchers to learn about clinical and services research, and clinical and services researchers to learn about basic behavioral research. If feasible and appropriate, this might include a rotation at the NIMH intramural research program.
- d. Revise training grant policies to permit payment for teaching in translational research training programs that draw faculty from many departments and from clinical/service settings.
- e. Establish translational research expertise banks--through the Internet and other mechanisms--to make expert translational advice available to prospective grantees and trainees (see 4(c) above).
- f. Give priority, in funding translational training grants, fellowships, research education grants, and career awards, to outstanding training programs positioned to bridge basic, clinical, and services research in mental health.

RECOMMENDATION 6. Encourage fair and expert review of translational behavioral research applications:

- a. Prepare reviewers at NIMH and the National Institutes of Health's (NIH's) Center for Scientific Review (CSR) to assess translational research projects.
- b. Include among the evaluation criteria for applications submitted in response to RFAs the expected impact of the proposed research in improving public health.
- c. Encourage a new orientation process that gives reviewers excellent syntheses of research areas, addresses the technical and review issues in new research priority areas, and provides information on the current portfolio and program initiatives, and the programmatic objectives for moving the portfolio forward.
- d. Ensure that for each application, reviewers collectively have appropriate expertise in basic, clinical, services, and other relevant research areas.

RECOMMENDATION 7. Facilitate appropriate and rapid funding of outstanding translational research:

- a. Implement a rapid revision and program review process for well-scored applications that can be easily corrected without requiring the delay of an additional submission and review.
- b. Encourage cross-divisional technical assistance, as needed, and give special consideration to the funding of translational projects having both basic and intervention research components.

RECOMMENDATION 8. Stimulate and disseminate relevant methods to improve the capacity for research translation.

- a. Foster the appropriate use of existing methods and the development and dissemination of new approaches by supporting research that:
 - Develops psychometrically sound measures of basic behavioral processes, functioning, and context that are appropriate for use in clinical and service settings.
 - Uses statistical sampling methodologies more comprehensively to enhance the external validity of research findings.
 - Introduces epidemiological methods of risk identification into behavioral risk-factor studies.
 - Adapts and develops statistical methods to facilitate the study of effect modifiers and individual differences as well as other approaches focused on the issue of “for whom and under what conditions.”
 - Encourages coordination among studies to facilitate research synthesis.
- b. Upgrade the quality of diagnosis by issuing RFAs or RFPs calling for psychometrically sound clinical assessment tools for practitioners, based upon contemporary measurement theory.

RECOMMENDATION 9. Improve policy decision-making processes regarding the delivery of mental health services and the utility of research data:

- a. Support research that makes creative linkages between mental health services delivery questions and the behavioral research literatures of organization, marketing, and decision science.

- b. Support research that combines state-of-the-art quantitative and qualitative measurement approaches to improve the quality of care.

RECOMMENDATION 10. Identify which treatments work for whom, under what circumstances, and why, to aid in improving mental health services and reducing disparities in mental health care:

- a. Support translational research that incorporates the theoretical perspectives and methodological approaches of the social and behavioral sciences into research addressing fundamental questions in mental health intervention and services research.
- b. Increase research on mental health disparities that includes contextual variables--such as ethnicity, social class, and culture.

RECOMMENDATION 11. Expand NIMH staffing resources by inviting behavioral scientists to participate in part-time consultancies or to serve as temporary visiting staff.

RECOMMENDATION 12. Monitor the effectiveness of NIMH in improving its translational research portfolio:

- a. Develop a plan for evaluating success in implementing the three research and funding priorities of this report.
- b. Evaluate NIMH's dissemination efforts to assess and improve outreach to key stakeholders.

I. CONCLUDING COMMENTS

The mysteries of mental illness have never been closer to solution than now, at the dawning of the 21st century. This exciting time of discovery offers abundant opportunities to increase scientific knowledge about behavior and the brain in health and illness. That knowledge, intriguing in its own right, can and must be used to save and enhance the lives of millions of Americans burdened by mental disorders and millions more at risk of illness.

The NIMH is uniquely positioned to translate scientific achievement in behavioral research into clinically relevant advances. But it must deploy wisely and consistently a powerful array of persuasive and communicative mechanisms to create the novel and sometimes risky collaborations and research paths essential to translational research. The Behavioral Science Workgroup offers to Dr. Hyman and the NAMHC an action plan outlining a practical strategy for enhancing the clinical contributions of behavioral science to change the face of mental health care in America.

V. References and Further Reading

Baxter, L.R., Schwartz, J.M., Bergman, K.S., Szuba, M.P., Guze, B., Mazziotta, J.C., Alazraki, A., Selin, E.C., Ferng, H.K., Munterd, P., & Phelps, M.E. (1992). Caudate glucose metabolic rate changes with both drug and behavior therapy for obsessive compulsive disorder. *Archives of General Psychiatry*, 49:681-689.

Behrens, J.T. (1997). Principles and procedures of exploratory data analysis. *Psychological Methods*, 2(2):131-160.

Cohen, G., & Faulkner, D. (1988). The effects of aging on perceived and generated memories. In: Poon, L.W., Rubin, D.C., & Wilson, B. (Eds.) *Cognition in Adulthood and Later Life*. New York: Cambridge University Press.

Conway, M.A., & Dewhurst, S.A. (1995). Remembering, familiarity, and source monitoring. *Quarterly Journal of Experimental Psychology*, 48:125-140.

Cuthbert, D. (1959). Use of half-normal plots in interpreting two-level experiments. *Technometrics*, 1(4):311-341.

Danlon, J.-M., Rizzo, L., & Bruant, A. (1999). Functional mechanisms underlying impaired recognition memory and conscious awareness in patients with schizophrenia. *Archives of General Psychiatry*, 56:639-648.

Duan, N., Manning, W.G., Jr., Morris, C.N., & Newhouse, J.P. (1983). A comparison of alternative models for the demand for medical care. *Journal of Business and Economic Statistics*, 1(2):115-126.

Gibbons, R.D., & Hedeker, D. (1994). Application of random-effects probit regression models. *Journal of Consulting Clinical Psychology*, 62(2):285-296.

Glisson, C., & Hemmelgarn, A. (1998). The effects of organizational climate and interorganizational coordination on the quality and outcomes of children's service systems. *Child Abuse & Neglect*, 22(5):401-421.

Guarnaccia, P., & Rogler, L. (1999). Research on culture-bound syndromes: New directions. *American Journal of Psychiatry*, 156(9):1322-1327.

Hogarty, G.E., Greenwald, D., Ulrich, R.F., Kornblith, S.J., DiBarry, A.L., Cooley, S., Carter, M., & Flesher, S. (1997). Three-year trials of personal therapy among schizophrenic patients living with or independent of family. II. Effects on adjustment of patients. *American Journal of Psychiatry*, 154(11):1514-1524.

Kolb, B., & Whishaw, I.Q. (1998). Brain plasticity and behavior. *Annual Review of Psychology*, 49:43-64.

Kring, A.M., & Neale, J.M. (1996). Do schizophrenic patients show a disjunctive relationship among expressive, experiential, and psychophysiological components of emotion? *Journal of Abnormal Psychology*, 105(2):249-257.

Lewis-Fernandez, R., & Kleinman, A. (1995). Cultural psychiatry: Theoretical, clinical, and research issues. *Psychiatric Clinics of North America*, 18(3): 433-48.

Lyubomirsky, S., & Nolen-Hoeksema, S. (1995). Effects of self-focused rumination on negative thinking and interpersonal problem solving. *Journal of Personality and Social Psychology*, 69:176-190.

Metcalf, J., & Shimamura, A.P. (Eds.) (1994). *Metacognition: Knowing about Knowing*. Cambridge: Massachusetts Institute of Technology Press.

Murray, C.J.L., & Lopez, A.D.L. (Eds.) (1996). *Summary: The Global Burden of Disease*. Cambridge: Harvard University Press.

National Advisory Mental Health Council. (1996). *Basic Behavioral Science Research for Mental Health: A National Investment: A Report of the National Advisory Mental Health Council*. Bethesda, MD: National Institutes of Health/National Institute of Mental Health. NIH Publication No. 96-3682.

National Advisory Mental Health Council Clinical Treatment and Services Research Workgroup (1999). *Bridging Science and Service: A Report by the National Advisory Council's Clinical Treatment and Services Research Workgroup*. (1999). Bethesda, MD. National Institutes of Health/National Institute of Mental Health. NIH Publication No. 99-4353.

National Institute of Mental Health Genetics Workgroup (1998). *Genetics and Mental Disorders: Report of the National Institute of Mental Health's Genetics Workgroup*. Bethesda, MD: National Institutes of Health/National Institute of Mental Health. NIH Publication No. 98-4268.

Olguin, J. (1997). A new look at half-normal plots for assessing the significance of contrasts for unreplicated factorials. *Applied Statistics*, 46(4):449-462.

Rothman, A.J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, 121:3-19.

Strauman, T.J. (1996). Self-beliefs, self-evaluation, and depression: A perspective on emotional vulnerability. In: Martin, L., & Tesser, A. (Eds.) *The cognitive sciences and psychotherapy [Special Issue]*. *Journal of Psychotherapy Integration*, 4:291-316.

Susser, E., Valencia, E., Berkman, A., Sohler, N., Conover, S., Torres, J., Betne, P., Felix, A., & Miller, S. (1998). HIV sexual risk reduction in homeless men with mental illness. *Archives of General Psychiatry*, 55:266-272.

U.S. Department of Health and Human Services. (1999). *Mental Health: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health.

Ware, N.C., Tugenberg, T., Dickey, B., & McHorney, C.A. (1999). An ethnographic study of the meaning of continuity of care in mental health services. *Psychiatric Services*, 50(3):395-400.

VI. APPENDICES

APPENDIX A

OBSSR* DEFINITION OF BEHAVIORAL AND SOCIAL SCIENCES RESEARCH FOR NIH

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.

I. Basic or Fundamental Research

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 sciences 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, workgroups, 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.

* NIH Office of Behavioral and Social Sciences Research

Examples of research topics and their implications 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 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

II. Clinical Research

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 include 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:

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 (e.g., 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:

Impact of providing inpatient smokers with information and brief counseling from nursing staff

Accessibility of rural dental health care facilities for migrant workers

Cost-effectiveness of occupational safety interventions

Use of schools as sites for the delivery of mental health services

Effects of capitation on health care utilization

Effects of ethnicity and gender on referral for mental health services

Association of health provider behavior to patient adherence to medical treatments

III. Adjunct Areas of Behavioral and Social Sciences Research

Adjunct behavioral and social sciences research areas 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 sections 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 benefited 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 include:

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

APPENDIX B

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APPENDIX E

NEEDED ADVANCES IN RESEARCH METHODS*

To enhance the application of behavioral science research in clinical and services settings and provide data and findings more pertinent to clinical and services researchers and practitioners, NIMH needs to assess the adequacy of current methods for addressing translational research questions. This assessment should provide a basis for integrating and adapting existing methodological tools more effectively, for developing new tools as needed, and for identifying effective ways to disseminate them. Historically, NIMH has very actively and effectively furthered the methodological basis for mental health research (e.g., the work of Gibbons and Hedeker, 1994**). However, to keep pace with its new emphasis on translating basic research into better mental health and mental health care, NIMH needs to foster further methodological adaptation, development, and dissemination. New developments that have grown out of basic research in methods will help in dealing with the complicated study designs and data structures that arise in translational research (e.g., study designs and data sets with hierarchical structures, large data sets with missing data, data that do not follow a normal distribution, and synthesis of studies using a broad range of techniques). With help from NIMH, the following methodological domains will benefit particularly from these developments:

- **Statistical Sampling**

Improving the quality of mental health research and its applications in clinical and services settings requires placing greater emphasis on external validity as an objective in the research design. Statistical sampling methods should be used more comprehensively to enhance the representativeness of study samples in the design and implementation of research outside of narrowly focused laboratory studies (usually based on convenience samples of volunteers). The emphasis on statistical sampling, representativeness, and external validity is not restricted to survey studies that employ structured interviews as the primary data collection vehicle (traditionally the main arena for the application of statistical sampling methods). It is equally applicable to clinical trials that focus on biological outcomes and studies that focus primarily on qualitative data collection methods.

Behavioral science potentially can strengthen these methods through better understanding of the complex behavioral processes involved in participant recruitment, nonresponse, and attrition, and can provide techniques to enhance external validity for research studies.

* Note: An abridged version of this appendix is presented in Chapter IV.

** Please refer to earlier references.

- **Risk Assessment**

The problem of assessing and measuring risks for undesirable mental health outcomes has vexed mental health research from its inception. The problem is complex and difficult, and progress in this domain has been slower than desired. Nonetheless, "risk assessment" remains an important problem that begs for solution, and improvements in the methodological approaches to this problem are essential. Methodological issues that must be considered by NIMH include: (1) the use of retrospective and case control designs; (2) dealing with statistical power problems in detecting rare events; and (3) the need for adequately specified models that provide more than simple listings of risk factors without attention to potency, timing, and sequencing.

NIMH also needs to close the gaps separating the various communities of scientists working on the problem of risk assessment in the mental health field. For example, as a rule, the work and methods of mental health epidemiologists do not seem to be well understood and/or integrated by those who study development and psychopathology, and vice versa. Similarly, there seems to be relatively little understanding--and few vehicles for cooperation--among these groups and those who design and study preventive interventions. Each group, relying heavily on its own research traditions and methodologies, gives insufficient attention to the well-established approaches of the other sub-fields. As a result, progress in risk assessment is inefficient and built upon separate and distinct knowledge bases, hindering the development of cumulative knowledge. Lack of integration interferes with the logical progression of research from risk identification, to studies of the basic processes that move people from risk to psychopathology, to the development of intervention strategies and targets that can test causal models hypothesized from the basic research.

- **Individual-Differences vs. Group-Differences Approaches**

Most studies conducted to understand the potential value of clinical phenomena, interventions, or prevention programs use a "group-differences approach" or the "Food and Drug Administration model." They are designed to discover group differences in a way that reveals the superiority of one intervention over another. This "mean-difference" approach, although important in regulating drug and food products, is incomplete for clinical understanding in two arenas. First, it does not address the numbers of individuals who prosper more under one treatment than under another. Second, it does not address the extremely important issue of identifying those for whom certain approaches work--and under what conditions. Even with the most straightforward medical treatments, identical treatments do not work equally well for all individuals. This probably also is true for the treatment of mental disorders, and these effects might be quite large.

Unfortunately, as in the rest of health care research, individual differences have not been well studied in most trials. Current analytic approaches need to be complemented by others that can reveal efficiently "what works for whom and under what circumstances." All the techniques currently employed to explore this issue require

large samples. For example, intervention researchers must often examine a dauntingly large number of interactions between the intervention and potentially important effect modifiers. More emphasis needs to be placed on the iterative nature of exploratory and confirmatory analyses (Behrens, 1997**). Exploratory analyses serve the important role of hypothesis generation, to be followed by confirmatory analyses in subsequent studies or through the use of “hold out” sample approaches (Duan et al., 1983**).

One potentially useful approach for understanding individual differences is the "half-normal plot" (Cuthbert, 1959;** Olguin, 1997**) commonly used in agricultural and engineering studies to explore interactions in factorial experiments. Another potentially useful approach is multilevel modeling, in which individual differences are modeled as a random effect. This approach is used widely in provider profiling to assess the differences in treatment outcome across providers. The presence of a random effect does not explicitly indicate specific effect modifiers, but it is a useful screening procedure to determine whether further exploration is likely to be worthwhile. The major points, however, are that answering the all-important “for whom and under what conditions” question requires methodological approaches other than group-mean comparisons and that careful use of exploratory approaches is critical.

Also promising is a group of “research synthesis” approaches--the best known of which is meta-analysis. These approaches use the results of collections of studies (with insufficient power individually to detect subgroups for whom a treatment has a desired effect) to help understand where treatment effects may be concentrated. Approaches such as these can be particularly useful when trying to understand how interventions affect subsets of the population (e.g., cultural minorities, individuals who live in rural communities) who rarely appear in large numbers in any one study. However, individual studies need to be conducted with some coordination (either explicit or implicit) so that they follow comparable assessment protocols; comparability is needed to allow for meaningful combinations of results or, more preferably, pooling of the data. These and other techniques may be helpful for understanding “for whom and under what circumstances,” but the problem of building models for these inquiries has not yet been completely solved. Clearly, NIMH needs to make more effort to develop and disseminate analytic methods to meet these goals.

