National Institute on Aging (NIA)
National Advisory Council on Aging (NACA)
Review of the Division of Behavioral and Social Research (BSR)

BSR Review Committee Report

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Review Committee Members

*(*current NACA Member; **former NACA member)*

**John T. Cacioppo, Ph.D., University of Chicago (Co-Chair)
**Alan M. Garber, M.D., Ph.D., Department of Veterans Affairs and Stanford University (Co-Chair)
Lisa Berkman, Ph.D., Harvard University
Laura Carstensen, Ph.D., Stanford University
Nicholas Christakis, M.D., Ph.D., Harvard University
*Peggye Dilworth-Anderson, Ph.D., University of North Carolina at Chapel Hill
**James Jackson, Ph.D., University of Michigan
Daniel Kahneman, Ph.D., Princeton University
**Ronald D. Lee, Ph.D., University of California, Berkeley
Daniel McFadden, Ph.D., University of California, Berkeley
*John C. Morris, M.D., Washington University
Samuel H. Preston, Ph.D., University of Pennsylvania
**John Rowe, M.D., Columbia University
James P. Smith, Ph.D., RAND Corporation
**James Vaupel, Ph.D., Max Planck Institute of Demographic Research and Duke University
**David Wise, Ph.D., Harvard University

Rose Maria Li, M.B.A., Ph.D., Executive Secretary

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I. EXECUTIVE SUMMARY

The present review of the Division of Behavioral and Social Research (BSR) is part of the National Institute on Aging's (NIA's) periodic and broader review of its programs to assess whether the overall performance and, more importantly, the future trajectory of research being promoted and supported by a division are appropriate. Some of the challenges include assessing the balance of what is being supported, and perhaps most challenging of all is to imagine those areas that are underrepresented or not represented. The reviews are meant to help staff improve the programs through self-evaluation and advice.

Previous reviews of BSR were conducted in February 1998, May 2000, and May 2004. The 2008 Review Committee consisted of 16 distinguished scientists, of whom 2 are current National Advisory Council on Aging (NACA) members and 7 seven are former NACA members. Several of the current committee members served on the previous BSR review (John Cacioppo, Alan Garber, Ronald Lee [2004 review Chair], James Jackson, Daniel Kahneman, James Smith, and David Wise).

BSR has been highly responsive to the recommendations in the 2004 review report and has made excellent progress in many areas, as documented throughout this report. The overwhelming impression of the Committee is that BSR has been substantially transformed in just 4 years with a number of notable accomplishments, as follows:

- The staffing of the BSR Division has been strengthened, which has paid dividends in terms of program vitality and outreach, scientific growth and raised morale;
- Improved ability to address relevant scientific questions through the regular consideration of biological measures in BSR-supported studies, conjoined with traditional social, behavioral, and economic measures;
- Enhanced comparative advantage of being able to support truly interdisciplinary research, ranging from genetics through intervention and population research, from individuals to societies;
- Improved collaborative relations with the NIA Division of Neuroscience;
- Active recruitment of promising junior investigators and outstanding investigators new to aging research;
- Enhanced capacity to identify and respond to new, emerging research areas that have special promise for advancing our understanding of aging; and
- Expanded development and dissemination of public datasets to serve multiple investigators across disciplines.

Major challenges for BSR for the next 4 years include the following:

- Develop alternative mechanisms for promoting interdisciplinary training appropriate for the next generation of aging researchers;
- Develop a strategic plan for dealing with budgetary constraints that will likely continue or worsen in the coming 4 years. The development of such a strategic plan should be cognizant of the problems and opportunities summarized in the Committee Findings (Section IV.) and Subcommittee Reports (Section V.) including the following needs:
    - Revitalizing the social demography and sociology portfolios;

- Articulating priorities for the area of behavioral and community interventions; and
- More fully integrating the epidemiology program with other sciences (which is hampered in part by the intramural/extramural division of epidemiology research at the NIA).

II. REVIEW PROCESS

The 2008 BSR Review Committee received background material to assist them in their deliberations, including copies of the 2004 review report, memoranda prepared by BSR program staff on salient topics and in response to Committee queries, and trends in grant support and other available data. A fuller listing of the materials provided as supporting documentation to the Committee is provided in appendix I. The Committee participated in three 90-minute conference calls (May 12, July 29, and September 4) prior to the full review on September 22–23, 2008, and one 45-minute conference call on November 18, 2008 to finalize this report. Beginning with the July 29 teleconference, the meetings included ample time for executive sessions that were closed to BSR staff as a way to encourage full and uninhibited deliberations about any potentially sensitive issues. The meeting on September 22–23 also included executive sessions with NIA Director Dr. Richard Hodes and BSR Director Dr. Richard Suzman at the start of the meeting and again with Dr. Hodes near the end of the meeting.

The review was guided by the following five overarching areas for consideration:

1) What promising areas for future research should be encouraged?
2) Has BSR been supporting a balanced, high-quality, and innovative portfolio of research? Are there significant gaps? What areas are weaker than they should be, and which, if any, might now be deemphasized?
3) Is the branch structure appropriate to the science? Is BSR adequately staffed?
4) How can BSR promote training and development of new scholars in fields that are becoming increasingly interdisciplinary? Is BSR attracting adequate numbers of high-quality individuals to pursue research careers in fields of relevance to BSR, and can their professional development be sustained?
5) What can be done to ensure appropriate review of high-risk, interdisciplinary research projects and program projects?

Subcommittees were formed to consider special issues in the following nine research topic areas, each chaired by a member of the Review Committee (chair shown in parenthesis below):

1) Genetics (James Vaupel, Max Planck Institute for Demographic Research and Duke University)
2) Demography, social epidemiology, sociology of aging (Samuel Preston, University of Pennsylvania)
3) Disparities (James Smith, RAND Corporation)
4) Behavioral economics and community interventions (Lisa Berkman, Harvard University)
5) Cognitive interventions (John Cacioppo, University of Chicago)
6) Medicare, health services, and long-term care (Alan Garber, Stanford University)
7) Psychology of aging (Laura Carstensen, Stanford University)
8) Satellite accounts (Alan Garber, Stanford University)
9) Social neuroscience and neuroeconomics (John Cacioppo, University of Chicago).

Each of the subcommittees was tasked with preparing a brief (1- to 2-page) statement highlighting BSR achievements and shortcomings and providing guidance on future directions. The topic areas were not meant to be comprehensive and were suggested primarily by BSR staff, in consultation with Committee members. They represent important, burgeoning areas or areas needing extra attention that may be perceived as being deficient or potentially critical for progress. Subcommittee members were provided background briefs summarizing BSR efforts and staffing in the area of discussion and including questions posed by BSR staff intended to guide (but not dictate) discussions. The subcommittees were asked to think broadly and not be constrained in scope when defining priorities for their assigned areas.

For some topic areas, written input was invited from experts identified by BSR staff and subcommittee chairpersons.[1] Appendix II lists the subcommittee members and individuals from whom input was invited and indicates the extent of participation. Written input was shared with BSR staff and all subcommittee members (if received in advance of their meeting) and with the chair of the subcommittee (if received after the subcommittee meeting) to ensure that all input was considered and incorporated into the subcommittee report as appropriate. BSR staff participated on the subcommittee calls as resource persons, and all subcommittees were afforded an opportunity for an executive session (closed to BSR staff) near the end of the call to discuss any potentially sensitive issues that subcommittee members wished to raise. Drafting of the subcommittee and Committee reports and recommendations was carried out independently of BSR staff, with assistance provided by Dr. Rose Li, Executive Secretary. The assistance of Rose Li and Associates, Inc. was instrumental in organizing the teleconferences and meetings and in the preparation of this report.

At the direction of the Division Director, BSR staff prepared portfolio summaries on the economics of aging, work, and behavioral medicine, even though no subcommittee was formed in these three areas. Economics of aging, considered to be a core of BSR's success in the past 20 years, is a dynamic area that is well supported by BSR program staff with a clear sense of direction and focus. To underscore the Committee's sense that research on retirement, economics of aging in general and integration of economics and health deserves continued emphasis, a brief entry for this topic has been added at the end of the subcommittee reports to highlight these points.

The materials provided by BSR staff and the subcommittee reports served as the primary basis of deliberations of scientific directions. From this information, the Committee identified the overarching findings for BSR (see Section IV., Committee Findings) as well as the top recommendations by topic area (see Section V., Review of Scientific Topic Areas). Committee members continued to provide input after the September meeting. Final discussion took place on November 18 by teleconference, with all Committee members confirming their concurrence with this report shortly thereafter.

[1] Beginning on August 13, 2008, BSR posted on its Web site a solicitation for comments by September 20 2008 from the broader research community and other interested parties about both past and future activities. Comments were received from Alan G. Kraut, Executive Director, Association for Psychological Science, and jointly from Greg Duncan, President, Population Association of America and Michael White, President, Association of Population Centers.

III. DESCRIPTIVE BACKGROUND

BSR supports social and behavioral research and research training on the processes of aging at individual, institutional, and societal levels. It focuses on how people change over the adult life course, on the interrelationships between older people and social institutions, and on the societal impact of the changing age composition of the population. Emphasis is placed upon the dynamic interplay between the aging of individuals and their social and physical environments and on multilevel interactions among psychological, physiological, genetic, social, and cultural factors. Current research initiatives focus on (1) health disparities; (2) aging minds; (3) increasing health expectancy; (4) health, work, and retirement; (5) interventions and behavior change; (6) genetics, behavior, and the social environment; and (7) the burden of illness and the efficiency of health systems.

BSR operates under the direction of the Division Director, Dr. Richard Suzman; the Deputy Division Director, Dr. John Haaga; and the Assistant Director, Ms. Georgeanne Patmios. BSR has two branches: The Individual Behavioral Processes (IBP) Branch is headed by Dr. Sidney Stahl, and the Population and Social Processes (PSP) Branch is led by Dr. John Phillips, with substantial interactions between them. A section devoted to research resources and development is housed within the BSR Office of the Director to coordinate and implement initiatives related to research data and resources.

BSR research, training, and career development awards totaled over $161.9 million in fiscal year (FY) 2007, and funding has been level in nominal terms since FY04 and declining in real terms during the same period (using the Biomedical Research and Development Price Index as a deflator). Since around 2002, BSR awards have constituted about 20 percent of the NIA extramural research total, even though the grant budgets are no longer set at the division level (with the exception of centers programs).

In recent years, the IBP Branch has managed about $83.9 million per year in awards and the PSP Branch about $63.8 million per year. Within the IBP Branch, the top-funded sections in FY07 were those focused on behavioral medicine and interventions ($33.2 million), psychological development and integrative sciences ($26.6 million), and cognitive aging ($22.7 million). Within the PSP Branch, the top-funded sections were devoted to demography ($25.7 million), health and retirement economics ($23.1 million), health systems ($8.4 million), and epidemiology of aging ($6.4 million). The Health and Retirement Study (HRS) and other cross-cutting projects are managed in the BSR Office of the Director ($17.0 million). Since the 2004 review, there has been real growth in psychological development and integrative science and in economics following the programming of several initiatives in these areas.

IV. COMMITTEE FINDINGS

BSR has not rested on its laurels but has been unrelenting in its pursuit of outstanding researchers from diverse fields, and it has integrated them in highly productive ways. This is an excellent program that continues to push the field of behavioral and social research on aging forward. Of note, BSR has been a strong proponent of identifying and supporting work of the highest scientific merit that is likely to change thinking or make general contributions to scholarship rather than research that focuses on narrow questions that are of less general interest.

BSR should continue to emphasize integrative science and multilevel analyses. BSR has led the way in integrating the biological and social sciences in ways that are innovative and illuminating for topics relevant for the NIA. Obvious examples include economics with health, biology and genetics with demography (biodemography), and behavioral economics and neuroscience (neuroeconomics). Integrated levels of analysis, ranging from genes to biomarkers to neural systems to people to social systems, are critical for elucidating pathways linking social behaviors and social environments to age-related outcomes and, ultimately, for guiding interventions. The nature of the research question and not the measurement tool should dictate BSR's engagement in these fields. BSR should continue to promote joint efforts with other Divisions and Institutes and Centers (ICs) to explore the interface of behavior, neuroscience, and epidemiology in studies of normal aging. An illustrative opportunity for development includes affective neuroscience, with particular emphasis on the ways in which basic psychological processes such as emotional regulation, motivation, and executive function contribute to health and functioning over the life course.

BSR should promote studies, including those focused on social epigenetics, that adopt a life course perspective. Research that is most relevant to the well-being of older adults does not necessarily mean that the work should be focused only on older adults but that the work should advance scientific understanding of issues relevant to aging or lead to improvements in the well-being of older adults.

As knowledge about potentially effective experimental interventions grows, there needs to be a better strategy to allocate funds optimally. The Committee recommends that BSR explore establishing a board to advise BSR on how to prioritize the intervention and translation projects that should be targeted and to begin to lay the groundwork for a more systematic accumulation of knowledge. To the extent possible, these trials should be based on well-conceived hypotheses or conceptual models and strong preliminary empirical support for efficacy. The near-term focus should be on theoretical advances and underlying mechanisms, which will inform larger scale intervention study designs. BSR also might consider leveraging large interventions funded by other ICs.

Changing kinship systems in modern American society (reflecting divorce, half-siblings, step-siblings, etc.) are having profound implications for caregiving, retirement, bequests, etc. and provide opportunities for basic demographic and even behavior genetics research. Unprecedented demographic change will have very substantial implications, including the cost of healthcare and social security. To fund the added cost of these and other programs will likely require, for example, means to facilitate longer working lives. Thus, the micro- and macroeconomy of population aging should remain central to BSR's portfolio.

The Committee supports BSR's expressed intention to revitalize the social demography, epidemiology, and sociology portfolios. These areas offer opportunities to understand, for example, the impact of social networks and kinship systems in health behavior and healthy aging. Related to this, greater attention needs to be paid to the sources of diversity in the aging experience over the life course due to experiences mediated by ethnicity and race, gender, and immigration. Greater attention to cross-national research opportunities might provide increased knowledge of natural experiments in divergent aging experiences and aging policy developments that would inform more general understanding in aging societies.

Much of the research to date on health disparities has been descriptive. The Committee recommends the promotion and support of research that explains pathways to health disparities using conceptual frameworks, such as a life course perspective.

There may be structural problems that limit research progress. Support for training and constitution of research networks that would address a few critically important questions (e.g., large education effects in health), at the IC and/or NIH level, would yield large dividends. Alternative mechanisms should be explored to (1) attract a diverse group of the best and brightest researchers to investigate age-related issues and (2) train them in the multidisciplinary body of knowledge and methodological skills required. BSR is encouraged to do the following:

- Develop more short-term, intensive workshops to facilitate cross-disciplinary training. Rather than wait for an outside investigator to submit an application for a meeting grant, BSR should be allocated more resources to take the initiative in organizing such workshops to expedite the process for addressing significant questions (e.g., the effects of education on health, environmental effects on physical health) that cut across fields. Another possible approach is to encourage greater collaboration among relevant Roybal Centers for Translational Research on Aging and the Centers on the Demography and Economics of Aging.
- Strengthen the Resource Centers for Minority Aging Research (RCMARs) by more closely integrating them with other NIA research efforts. Utilizing existing RCMARs might yield significant synergies in continuing BSR's important contributions to research training in ethnically diverse scientific populations.
- Expedite review of individual predoctoral (including dissertation) and postdoctoral fellowship awards.
- Promote the NIH Pathway to Independence (K00/R00) funding opportunity.

In response to the prior review, BSR has made a number of excellent hires. Moreover, the intellectual caliber of the material prepared in advance of this review struck the Committee as first rate. The recruitment of a number of key scientific staff in the areas of health economics, psychology, cognition, behavior, and population genetics and a relative stability in professional staffing has paid dividends in terms of scientific growth and raised Division morale. Additional staffing in the areas of behavioral or health economics or social epidemiology would allow further development of promising initiatives. The Committee is aware that the NIA Scientific Review Office is overburdened, which could harm review of applications across divisions. This situation should be addressed as soon as possible.

BSR has overseen enormous improvements in data structure and data availability within the United States and around the world and has been one of the most persuasive proponents of data sharing. An excellent example is BSR's stewardship of the HRS and similar studies throughout the world. Indeed, BSR has been ahead of the curve in terms of building data resources that create research opportunities for entire fields. Successes to date, as described in subcommittee reports, should be expanded upon. More international comparative health research should be encouraged, and greater attention to and oversight of data sharing plans are needed. BSR should be praised in their efforts to make other Government datasets publicly available. New applications that exploit previously collected data should be encouraged and facilitated. Two such opportunities might be datasets from the intramural Laboratory of Epidemiology,

Demography, and Biometry and the Centers for Medicare and Medicaid Services, which could be valuable to the extramural scientific community if made widely available.

V. REVIEW OF SCIENTIFIC TOPIC AREAS

From the large number of recommendations made by the subcommittees, included below are only the top recommendations for each specific topic area, as put forth by the subcommittee chairpersons and vetted by the Review Committee. Fuller descriptions of the subcommittee recommendations have been compiled into a separate document ("Detailed Reviews of Scientific Topic Areas," September 2008), which is available upon request. The Committee wishes to underscore that the number of recommendations or the length of the writeup for these topic areas in the full report is not indicative of the relative importance attributed by the Committee to the different topics. Differences simply reflect the styles of the groups assigned to each topic.

A. Genetics

The BSR plan for genetics research is excellent. BSR's interests cover a broad range of phenotypes, including cognition, life expectancy, survival, and disability, as well as sociability, economic behaviors, risk-taking, conscientiousness, and other social and psychological motives. Twin research is well represented in the BSR portfolio and is likely to yield new insights through developments in modeling twin data in richer ways. BSR has fostered the emerging field of biodemography; further research in this field, including research on social species of mammals and insects, may lead to important findings about genetic factors that influence behavior. BSR has heavily invested in large social/behavioral surveys; the high productivity of this research can be further enhanced by adding extensive structural genomic (e.g., single-nucleotide polymorphism [SNP] genotyping), functional genomic (e.g., RNA expression), and epigenomic parameters (e.g., DNA methylation) to pursue genome-wide association study strategies. Ideally, such strategies would be "environmentally sensitive"; e.g., looking at SNP phenotype associations in higher and lower risk groups. To date, BSR has struck a reasonable balance between caution and willingness to take a few risks.

Recommendations for the near future include the following:

(1) Develop valid, reliable, and well-defined phenotypic measures in behavioral and social research. The priority should be to focus on traits of general public health importance. BSR is encouraged to rely on applicants to propose substantive phenotypes of interest. However, BSR should specify conditions (e.g., standards of validity and reliability, degree of heritability, degree of population homogeneity, minimum sample size, proof of principle) and should support efforts to standardize and refine phenotypic measurements.

(2) Promote studies, particularly epigenetic studies, that adopt a life course perspective. There is increasing interest in understanding the biological mechanisms through which early-life social exposures, such as education, poverty, marriage, child abuse, social interactions, and so on, affect an individual's life chances for decades afterwards, including their cognition and longevity. Evidence from studies of animals shows that early-life experiences have considerable epigenetic regulatory impacts. More insights can be obtained from gene-environment studies both in terms of phenotypes and the outcome

of intervention trials. (See Section V.B., Demography, Social Epidemiology, and Sociology of Aging.)

(3) Strengthen bioinformatics. Methods are needed to interpret extensive genome-wide association data. Another challenge is incorporating the explosion of terms to capture multiple environmental interactions. The development of bioinformatic and analytic tools should be promoted, with particular emphasis on methods that can be used to study age-specific effects and age trajectories. The use of demographic and nongenetic data on individuals (e.g., smoking behavior) can increase the power of genetic analysis.

(4) Enhance communication across disciplines and improve data sharing. BSR should take steps to facilitate collaborations between social and behavioral scientists and researchers in other fields; e.g., molecular biology, genetics. New applications that exploit previously collected data should be encouraged and facilitated.

B. Demography, Social Epidemiology, and Sociology of Aging

BSR-supported aging research in demography, social epidemiology, and sociology of aging should favor (1) a developmental, **life course approach** to aging studies without an arbitrary age cutoff, (2) integration of **biogenetic information**, and (3) **multilevel modeling** that considers both individual and contextual factors. To generate the best science, the field of aging research should be broadly construed. The NIA deserves credit for encouraging researchers to work at the intersection of allied fields, thus complementing in important ways the work of university departments and schools. BSR has assembled a talented staff to oversee the broad portfolio of projects in the area of demography, sociology, and epidemiology, and they have done an outstanding job. An individual trained in social epidemiology would be a welcome addition.

In terms of proposed program development, the following areas merit emphasis:

(1) Family demography and family sociology. The changing nature of kinship networks in our society needs to be studied because of their implications for the well-being of older people. In particular, there is considerable scientific value and policy interest in modeling marital status among older people, as spouses are typically the principal caregivers, social class differences in marital status accentuate differences in the quality of living arrangements and care receipt, and there are important implications of marital status trends for the fiscal balance of Social Security.

(2) Studies of institutional and network effects on behavior and outcomes should be encouraged, particularly with respect to health outcomes. International studies are often the best way to understand the effects of variation in institutional settings. An initiative focused on understanding the sources of international variations in health outcomes, including the role of medical systems, could be very productive. Recent studies have identified an important effect of personal networks on health behaviors; additional research addressing the role of networks may have a high payoff.

(3) Biodemography and behavioral genetics. Work on evolutionary and genetic bases of sociality should be encouraged, both in humans and in animals. Epigenetic approaches to studying gene-environment interactions, especially measurement of methylation of

tissues and links to genetic factors, are rapidly developing. Getting the basic science right in terms of interactions between genes and the environment is crucial. More cross-training of social scientists and biologists, including geneticists, would help stimulate advances in this high-growth area. (See Section V.A., Genetics.)

(4) Macrodemography of health and disease. Apart from national cancer registries, there is no data system that permits a national accounting of levels of disease incidence, survival, and mortality by duration since diagnosis and age. As a result, there often is no good information on the source of trends and differentials in mortality, disease prevalence, and disability.

(5) Medicare forecasting and the macroeconomic implications of population aging. This area should remain central to BSR's portfolio, as unprecedented demographic change could have significant implications for the economy and social programs and, in turn, population health.

C. Disparities

Research in the area of disparities has been heavy on description and light on explanation. The big gap in the field of health disparities is in understanding how and why differences emerge between social groups and how they are maintained. In most cases, a theoretical framework is lacking, let alone sharply drawn hypotheses to guide empirical research and data collection. Research on health disparities should in the end be motivated by how it informs us about what causes bad health and what the consequences of poor health are. Only by identifying pathways across diverse groups can we hope to develop effective interventions. Progress in this area will depend critically on development of conceptual frameworks, especially attention to life course considerations, and improvements in research infrastructure.

The following should be the top research priorities for BSR in the area of disparities research:

(1) Encourage development of multiple and contrasting conceptual frameworks for understanding the causes of observed disparities. Examples would include the importance of place—not just who you are but where you are; a life course framework that recognizes the impact of earlier life conditions on health outcomes after age 50; the two directions of causation between socioeconomic status (SES) and health; clarifying the nature of the important effects of education on health; and why some social groups develop and maintain good health behaviors, while others do not.

(2) Invest in development of an infrastructure (e.g., data, training) that promotes research in disparities. Sufficiently large study samples are needed to test hypotheses that seek to explain racial/ethnic differences in health and well-being and other disparities of interest. Such sample sizes are not available in the major datasets. BSR should improve training of a diverse group of scholars representing varied disciplines and backgrounds, and scholars at a more senior level to pursue rigorous research in the area of disparities.

(3) **Encourage bold experimental or intervention studies that are informed by well-conceived hypotheses or conceptual models.** Promising possibilities include adding SES measures in clinical trials and conducting more ambitious studies that randomize people to different hospitals or to different doctors within a hospital or that randomize hospitals to particular disease management protocols to test hypotheses about what makes a difference. Because such studies are expensive, it needs to be clearly demonstrated in advance that they can achieve results that cannot be obtained by less expensive methods and that the results are likely to generalize beyond circumstances in which they were generated.

D. Behavioral Economics and Community Interventions

BSR's portfolio in the area of behavioral economics and community interventions boasts several notable projects but lacks an overall strategy. The contours of the program have been defined in large part by investigator-initiated applications, resulting in a seeming potpourri of projects. While there was strong sentiment among Committee members regarding preserving the primacy of investigator-initiated applications, which is considered to be the most reliable source for innovative research ideas, very large intervention studies may require greater program staff direction to launch. It would be reasonable for BSR to explore establishing a board to advise BSR on how to prioritize the intervention and translation projects that BSR should target and to begin to lay the groundwork for a more systematic accumulation of knowledge.

The Committee identified the following three key recommendations in the area of behavioral and community interventions.

(1) **Give preference to projects that feature either behavioral interventions or behavioral outcomes and that can demonstrate cost-effectiveness.** Cost-effectiveness relates both to healthcare savings and to improved health outcomes in the long run. Projects that are designed for and targeted at high-risk populations are of particular interest. Topic areas of high priority include the following.
   a. Identifying and evaluating high-impact interventions to promote reductions at the population level in biological risk, chronic conditions, and functional outcomes including disability.
   b. Determining how to get people to take the actions that they know are good for them but that they have difficulty doing themselves.
   c. Explicitly considering interventions that modify the environment, including institutional interventions.

(2) **Continue to apply behavioral economic approaches to health domains.**

(3) **Encourage the translation and adoption of effective interventions to benefit a broader segment of the population.**

E. Cognitive Interventions

In the area of cognitive interventions, the greatest likelihood of progress is expected to come from coupling highly innovative research that tests hypotheses about the enhancement of

cognitive functioning with examinations of potentially effective interventions in large-scale studies. As knowledge about potentially effective interventions grows, it is to be expected that a greater fraction of BSR support be directed toward intervention trials. In 2008, $7 million (6 percent) of BSR's $120 million research grants portfolio was on cognitive interventions compared to $3 million (or 2 percent) in 2004.

Currently, there is a growing base of intriguing empirical data from cognitive intervention trials and other evidence, including the strong associations between education and cognitive functioning, but insufficient theory to justify large-scale interventions. **The near-term focus should be on theoretical advances and underlying mechanisms, which will inform larger scale intervention study design.** Research is needed to evaluate the relative importance of different components of a particular intervention as well as to evaluate programs that are harder to tease apart into their constituent parts. There is also increasing interest in the research community to incorporate biomarkers, proteomics, genomics, and neuroimaging modalities to help describe or validate what is meant by "cognitive aging"; to identify potent mechanisms from training, exercise, and social interventions on the brain; and to understand etiology of change, including identifying otherwise presymptomatic individuals.

The following additional steps should be taken:

- **Publicize the availability of relevant data.** Closer relationships should be encouraged between BSR's observational/epidemiological longitudinal studies community and cognitive researchers who have identified pathways of interest.
- **Explore collaborations for evaluating cognitive improvement product claims.**
- **Emphasize intensive workshops.** To promote the development of new scholars in the area of cognitive interventions, BSR is encouraged to put greater emphasis on short-term workshops that tend to reach a broader audience of high caliber.

F. Medicare, Health Services, and Long-Term Care

BSR is among the most important sources of support for basic behavioral research on health outcomes and the broader implications of health policy changes. Because much of this research is considered health services research, the boundaries between the work that is considered suitable for NIA funding and the research portfolios of other ICs within the NIH, the Agency for Healthcare Research and Quality (AHRQ), and other Federal agencies have sometimes seemed unclear. The uncertainty is increased by ambiguity in the boundaries of health services research more generally. Although the Review Committee does not believe that the limits of the NIA's role in health services research can be sharply defined, the principles that should guide its work in this area are clear.

First, and of utmost importance, **scientific merit should be the chief criterion the NIA applies in deciding which research to support in health services research** and in other areas that fall within BSR's purview. That is, BSR should seek to identify and support work that is likely to change thinking or make general contributions to scholarship, not research that focuses on narrow questions that are not of general interest or have little scientific content. Second, **BSR should support health services research that is most relevant to the well-being of the elderly**. This does not necessarily mean that the work should only be conducted in the elderly—

for example, studying ways that healthcare utilization in middle age affects health and healthcare use at advanced ages might well be an appropriate subject for support—but that the work should lead to improvements in the well-being of the elderly.

Data availability is crucial to research throughout BSR, but in this area, the heavy reliance on administrative data and other data that are not collected primarily for research purposes makes data access an overriding priority. In fact, some of the most crucial information used to address important health policy issues affecting the elderly has been derived from administrative files such as the Medicare claims files. NIA efforts to make such data available and to fund supplemental data collection efforts, as well as its efforts to support data linkages (e.g., with program data from the Centers for Medicare and Medicaid Services [CMS], such as Medicaid, Minimum Data Set [MDS], Online Survey, Certification, and Reporting [OSCAR] database on nursing homes, and Outcome and Assessment Information Set [OASIS]) and other activities that make existing data more useful, should remain a top priority for BSR in the future. Continued interactions among BSR, the NIA, and the NIH with CMS research staff should be encouraged as a way to help ensure that high-quality, evidence-based research is supported that is of both significant scientific interest and of value to policymakers.

The NIA has a role in supporting **comparative effectiveness research**. For example, NIA-sponsored research can establish causal relationships, coordinate cost-effectiveness studies, improve measurement of health outcomes and quality of care, and contribute to the development of an evidence base that complements the work of AHRQ, another Federal agency, or a public-private partnership in the area of comparative effectiveness. BSR might consider commissioning the Organisation for Economic Co-operation and Development to expand or update its earlier BSR-supported work on disease-based comparisons of health systems, with appropriate support provided to individual countries to ensure comparability of information. Innovative approaches for measuring quality should be considered from throughout the social sciences.

A related issue is the very real need for centers to **train individuals in the comparative effectiveness methodologies**, especially with respect to characteristics of the population that are important for understanding study designs. One of the best sources of such individuals would be M.D./Ph.D. programs in the social sciences, but few existing M.D./Ph.D. programs accept students into social sciences Ph.D. tracks. Several options might be explored to train such individuals, including support for Ph.D. training among medical students and expanded M.D./Ph.D. programs.

Finally, because the research questions in this area of science are often multilevel and multidisciplinary, **review panels should be constituted with appropriate experts** to provide rigorous reviews of proposed training programs and research projects.

G. Psychology of Aging

Consensus quickly emerged that the most innovative research in psychology crosses traditional subdisciplines within the field. This work focuses on the ways in which social, emotional, and cognitive factors interact to influence the ways that people live their lives; e.g., how they make decisions, respond to stress, maintain important relationships, regulate strong emotions, and how these efforts affect their physical health. The best research is addressing these issues at multiple levels (from genes to brain systems to behavior) and is blurring the traditional boundaries of

cognitive, social, and personality research. Psychological science also has become highly collaborative with other disciplines, notably so with biology, neuroscience, genetics, and economics.

In order for psychological science to address lifespan developmental and other long-term processes, there needs to be continued support for longitudinal research in order to understand how people change over time. For these efforts to proceed effectively, BSR should continue and strengthen its support for research on measurement where needed and the integration of cognition and biological measures. It is important that research in this field incorporates substantive and methodological advances in areas of scientific growth (e.g., neuroscience, genetics) whenever possible. Many important questions in the psychology of aging would benefit from study in both normal aging and in patient populations; thus, it is important that structural boundaries within the NIA (e.g., between normal aging versus dementia) be sufficiently permeable to support such work.

Although there were many specific recommendations made by the subcommittee, the following are considered to be of the highest priority in the context of today's science:

(1) Studies that help to improve adaptive functioning of individuals in their daily environments and identify causal mechanisms that contribute to their resilience; and
(2) Infrastructure support in the form of center grant support and innovative training mechanisms, including short-term intensive workshops that complement the institutional training awards (T32). (See Section VI., Training in Behavioral and Social Research on Aging.)

H. Satellite Accounts

National Health Accounts are primarily built from data on funds flows and do not adequately reflect changes in societal health and well-being. The development of satellite health accounts to measure nonmarket or near-market components of health and well-being is an important topic that has been garnering increasing attention over the years.[2] Other satellite accounts might focus on research and development, environment, energy, and pensions.

BSR has sponsored several research projects in support of national health accounts, national well-being accounts, and intergenerational transfer accounting. In many instances, BSR has had an influential role in shaping progress in this area by other agencies; e.g., Bureau of Economic Analysis, Bureau of Labor Statistics. It is important that BSR continue to exert this influence on the development of cross-cutting principles and methodology.

[2] In addition to the activities undertaken by the National Academies and Federal agencies, the Sarkozy Commission on the Measurement of Economic Performance and Social Progress, chaired by Joseph Stiglitz, has assembled an impressive array of international experts, including many NIA/BSR grantees, to prepare recommendations for improving National Income and Product Accounts and measuring the quality of life.

In this research area, the following should be high priorities for BSR:

(1) Develop national nonmarket or "near-market" satellite accounts for health and/or well-being. BSR can have a particularly strong influence in the early conceptual stages to help establish evidence-based principles and methodologies for the development of such accounts. BSR should support efforts to evaluate and improve the performance of models to determine the effects of changes in medical care on health outcomes.

(2) Collect data on how people spend and experience time, especially outside work. This effort should occur in parallel to the development of other measures of well-being and is critical for informing measures of life quality and household production accounts. BSR should be commended for its efforts in adding measures of time use to ongoing national studies, and such efforts should continue.

(3) Lay the necessary groundwork to better understand and evaluate the death experience, including the quality of that experience as viewed by family members, survivors, and other observers, as well as associated costs and perceived value of expenditures. Although this topic was considered premature for a satellite account, the combination of psychological and economic expertise within BSR suggests that important developmental work could be undertaken that would contribute to the conceptualization of satellite accounts in a broad sense.

I. Social Neuroscience and Neuroeconomics

BSR's interest in the developing fields of social neuroscience and neuroeconomics is responsive to the 2004 external review that encouraged more multilevel measures to address research questions at the heart of behavioral and social outcomes and underscored that the nature of the research question(s) and not the measurement tool(s) should dictate BSR's engagement in these fields. The current NIA/BSR portfolio in this area appears to be concentrated on two broad themes: (1) Shifts in the utilization of different decision processes across the lifespan as the result of age-related changes in brain circuitry and function, which may explain observed lifespan differences in decisionmaking, including greater reliance on emotions, and (2) the impact of psychosocial factors on cognition, well-being, physiological functioning, and health behaviors across the lifespan. These could be enlarged to include other key areas that were identified as having special potential for BSR, as follows:

- The effectiveness and role of social relationships, emotion reasoning, and emotional regulation across the lifespan and the influence of social and emotional factors in social behavior, decisionmaking, and health;
- The way that genetic expression or age-related changes in the central nervous system affect social cognition, emotion, and economic decisionmaking across the lifespan;
- Methodological advances, ranging from the identification of appropriate animal models to biological assessments suitable for ambulatory and survey settings to the development and dissemination of multivariate statistical and multilevel modeling tools as well as databases for bioinformatic and neuroinformatic information; and
- Better integration of social neuroscience and neuroeconomics with behavioral intervention research to improve understanding of how incentives influence behavior change.

BSR has the opportunity to shape the development of this field by attracting the most promising students and young scholars to questions relevant to aging. BSR has few training programs that cover interdisciplinary interests in social and affective neuroscience, decisionmaking, and neuroeconomics, and promising alternative mechanisms for training should be explored. (See Section VI., Training in Behavioral and Social Research on Aging.)

J. Economics of Aging

The promotion and support of research on the economics of aging continues to be one of the great contributions of BSR. That contribution starts with the development and continuing support for the HRS and its companion surveys, now in over 20 countries. Substantively, there have been many areas within the economics of aging where important advances have been made. One involves the dual interactions between SES and health. Economic research has challenged conventional views that pathways from health to economic resources are of secondary importance in creating large differences in health status by SES. Research also has demonstrated that certain pathways from SES to health, such as income, may not be as central as previously believed. Other dimensions of SES such as schooling are more central, but the reasons why education matters are poorly understood.

Support for behavioral economics also has been strong in BSR. The key topics include quality of decisions about savings, retirement, and financial literacy. This research demonstrated that the default position really matters; whether the default is that the worker automatically joins the pension program or opts out of pension contributions has quite different implications for actual savings behavior. Collaborations between the fields of psychology and economics may be particularly fruitful in the future as decisions about retirement, work, and spending will have increasingly important consequences for this country. Identifying the ways that people weigh options, respond to incentives to work, and engage in financial planning will proceed most efficiently when opportunities to work across fields are provided.

Retirement has been another productive component of BSR research. Americans are living longer, and disability at older ages is declining. Until recently, labor force participation of older persons has been declining. To pay for increasing Social Security costs and, in particular, rising healthcare costs, older persons will likely remain in the labor force longer. A far-reaching issue is to understand the implications of prolonging the labor force participation of older persons.

BSR support also has led to a very broad view of the types and levels of economic resources needed for retirement. While Social Security is critical for some, other households must supplement with private pensions, which have been switching rapidly to defined contribution instead of defined benefit; individual wealth holdings, which largely reflect prior savings; and the development of new financial instruments such as 401(k) plans. Changes in institutional arrangements have been rapid, and the adequacy of these resources for the retirement years has been questioned.

Rapid demographic aging combined with questions about the capacity of current financial institutions to finance income security and healthcare during retirement has created the need for BSR to support high-quality research on macrodemographic consequences of population aging,

including the impact of aging on aggregate saving and capital formation; the effect of baby boomer retirements on asset markets; the role of international capital flows; and the impact of the aging workforce, and even a declining workforce, on productivity and economic growth.

The economics of aging has been at the core of BSR research in the past 20 years and merits continued research support.

VI. TRAINING IN BEHAVIORAL AND SOCIAL RESEARCH ON AGING

The Committee examined the characteristics of recent grant recipients, including representation by both pre- and post-doctoral candidates, and considered the full range of possible training mechanisms. BSR recognizes that the training and development of new scholars is critical for the continuing health of a scientific area, and they have been active in recruiting promising junior investigators and outstanding investigators new to aging research. Because of the interdisciplinarity and relative novelty of emerging research areas, alternative mechanisms should be explored to complement the T32 institutional training mechanism in order to (1) attract the best and brightest researchers to investigate age-related issues and (2) train them in the multidisciplinary body of knowledge and methodological skills required. Promising alternative mechanisms include the following:

1. Intensive 2- to 4-week sessions with researchers from different disciplines—training in different methodologies and building networks among the junior and senior researchers in these programs—have proven highly effective in cross-disciplinary emerging academic specializations. Short-term intensive programs hold more promise for spreading knowledge, expertise, and enthusiasm than training grants at one or two institutions. Such workshops also may help overcome the disciplinary obstacles faced by, for example, social and behavioral scientists interested in genetic analyses and offer a fruitful way to forge links between, for example, intervention research and social neuroscience/neuroeconomics.

2. Supplements to grants to add a postdoctoral fellow who could serve as a bridge between established investigators in two or more fields also hold promise for encouraging greater interdisciplinary collaboration by investigators.

3. The outreach sessions and workshops that BSR has convened at relevant conferences could be continued and possibly extended. The preconference workshop at this year's meeting of the Association for Psychological Science is an example of a successful effort to expose the best young scholars in one of the contributing disciplines to the broad range of research questions relevant to the NIA/BSR. Other important functions for such workshops include (1) providing tutorials in methodological tools, including multivariate analyses that effectively integrate across levels of analysis; (2) increasing dialogue between neuroscientists (e.g., functional magnetic resonance imaging researchers, geneticists), focusing on social neuroscience/neuroeconomics; and (3) bringing together behavioral social psychologists, economists, gerontologists, and others focusing on behavior change.

Training opportunities promoted through the RCMARs can offer significant synergies with other BSR-supported research training activities, particularly to address questions related to minority aging health and health disparities from a broader and more multidisciplinary perspective. Although the RCMARs have made significant progress in recruiting and mentoring scholars, BSR staff are encouraged to explore opportunities for thematic partnerships between the RCMARs and other BSR components to maximize the possibility of meaningful collaborations that further enhance the impact of the RCMARs.

BSR staff reported a dearth of applications for individual predoctoral (including dissertation) and postdoctoral fellowship awards, particularly from demographers and economists. The Committee believes there are real obstacles that if left unaddressed will continue to preclude sizable numbers of applications for individual fellowship awards. Foremost is the long interval between submission and award. A way to streamline the application, review, approval, and funding of fellowship awards should be developed, and ways should be found to fund a higher proportion of them. Graduate students who apply for dissertation awards typically do so in their fourth or fifth years of tenure at their universities. Students are discouraged from applying because they realize that (1) chances of success on one's initial application are low and (2) they will not have an opportunity to resubmit before they graduate. They correctly reason that the risk/benefit ratio is not in their favor and that they might spend a lot of time preparing an application, taking them away from working on their dissertations (at what is typically a crucial time in their dissertation work), with a low prospect of success during the time interval while they are still graduate students. Postdoctoral applicants face similar issues. The typical postdoctoral applicant has a 2- to 3-year appointment and would have to be funded on the first attempt since there is no time to reapply. This combination of a lack of time horizon and low success rates again strongly discourages applications. Possible solutions that might be implemented by the NIA to address this issue include having fellowship applications reviewed administratively by the NIA (as is done with diversity supplements), shortened applications (e.g., to 5–10 pages) subject to an expedited review, and/or an accelerated cycle length for resubmission of unsuccessful applications. The NIA also could publicize the success rates for first-time applicants to encourage more applications.

The NIH Pathway to Independence mechanism (K99/R00) should be promoted more actively by BSR because of its many advantages. This omnibus program provides an opportunity for promising postdoctoral scientists to receive both mentored and independent research support from the same award. The initial phase provides 1–2 years of mentored support for highly promising postdoctoral research scientists followed by up to 3 years of independent support contingent on securing an independent research position. Award recipients are expected to compete successfully for independent R01 support from the NIA during the career transition award period.

VII. GRANT APPLICATION REVIEW PROCESS

Some of the broad and profoundly important questions of interest to BSR are simply too complex to be answered by a single individual, a single laboratory, or even a single discipline. Although many brilliant scholars are working on such questions, the answers derived are often partial and rarely impart a comprehensive understanding of a problem. There has been a shift over the past half century to larger and larger interdisciplinary teams as an important source of

scientific and scholarly breakthroughs. This shift in the production of cutting-edge knowledge has been documented in all fields of scholarly activity, ranging from physical and biological sciences to the social and behavioral sciences. Fostering interdisciplinary research on fundamental questions of aging continues to be a central feature of BSR. To the extent that the NIH infrastructure is premised on outdated and narrow silos, infrastructure surrounding the review process may discourage innovation.

The trend toward and value of interdisciplinary science shows no sign of abating, so continued attention to the issues of merit review is critically important. The review of program project (P01) and centers (P30) applications present particular challenges. It is possible, for instance, that the savings achieved by eliminating site visits for large interdisciplinary grants is not worth the costs in innovation. The Committee strongly encourages in-person reverse site visits for large program project applications. The challenge associated with finding qualified reviewers can be particularly acute in the review of P30 applications. For example, the centers on demography and economics of aging currently are competed once every 5 years at the same time. Given the number and caliber of institutions expected to participate, the availability of qualified reviewers is greatly constrained.

The Committee is highly supportive of the NIH effort to enhance peer review (initiated by the NIH Director in June 2007). Particularly important are the NIH recommendations aimed at improving reviewer retention (promoting the possibility for partial terms and the notion of a "ready reserve" composed of seasoned investigators), improving scoring transparency with the introduction of review criteria–based scoring (thus making it possible to accord greater weight to investigator qualifications as appropriate), and shortening grant applications. The selection of reviewer chairpersons is particularly important for maintaining focus on scientific issues, and training should be made available as needed for educating and working with reviewers to appropriately carry out their responsibilities.

VIII. BSR'S RELATIONSHIPS WITH OTHER COMPONENTS OF THE NIA

The Committee endorses the principles originally put forth in the 2004 review. BSR should encourage the use of the most appropriate methodologies to answer the research questions they address, including such innovative techniques as neuroimaging and those used in genetics. The BSR program area has been and should continue to be defined by content rather than method. The points of complementarity and interface should be identified and embraced as a way to bring expertise together. These areas may actually represent the most important opportunities for program development. It is important to maintain flexibility so that BSR can adapt as the science evolves.

BSR relationships with the Division of Neuroscience (DN) that were difficult just 4 years ago have been improved. A particularly welcome development is the improved collaboration in the area of cognitive aging. As the DN director stated in the Committee's September 22 meeting, interactions between BSR and DN are essential to understanding what underlies cognitive functioning and cognitive change and will become increasingly so as the NIA begins to fund more genome-wide association studies. The Committee endorses the recommendations from the DN Review Committee Report (September 24, 2008) that BSR should work together with the DN to (1) support studies of behavior as well as brain function, (2) study the continuum of cognitive aging across the lifespan, (3) promote multidomain intervention trials to modify

cognitive aging, and (4) examine the growing diversity of the aging population. Improved cognitive, emotional, and social measures and analytic approaches should be encouraged for use in clinical trials for understanding the trajectory of cognitive aging. That opportunities in science are sometimes overlapping is healthy and should be embraced as exciting opportunities for collaboration.

BSR maintains good working relationships with the intramural Laboratory of Demography, Epidemiology, and Biometry at the NIA and should be encouraged to continue to explore opportunities for mutually beneficial collaborations with NIA's intramural researchers. BSR may be able to offer some guidance to these intramural programs to improve sharing of important data resources, which would be of significant benefit to public health research. Public use access data, such as those from the HRS, have spurred hundreds of papers and hundreds of grant applications. The proportion of papers using the HRS data that does not involve HRS investigators is enormous and a key indicator of the data's popularity and success. The same cannot be said in the area of epidemiology. Allowing greater public access to research data collected through NIA's intramural epidemiology laboratory could contribute greatly to reversing the decline of BSR's epidemiology section in terms of funded studies and would certainly increase the returns on NIA's investment in those studies.

IX. BSR STAFFING

BSR is distinguished by the superb quality of its leadership. Dr. Suzman is highly respected as a scientist and rigorous proponent of high-quality behavioral and social research, and his breadth of knowledge and openness to new ideas are well recognized. He has assembled an outstanding team, attracting and retaining top professional staff since the 2004 review, and this has clearly contributed to growth in topic areas for which new staff are concentrating and higher morale in the Division. BSR has never been stronger in terms of the level of professional support in all its units and the level of camaraderie across units. Gains have been made particularly in the area of genetics, cognition and psychology, and economics. Additional staffing in the area of social epidemiology or social demography and interventions would be helpful given the expected areas of future growth for BSR.

X. CONCLUSION

BSR is well positioned to lead a number of exciting new research initiatives, many of which are discussed in this report. However, recent events, particularly the credit crisis and volatility in the stock market, suggest that all Federal agencies will be grappling with ever tighter budgets in the foreseeable future, exacerbating a decline in real spending on biomedical and behavioral research that has already begun. The Committee believes that the greatest challenge facing BSR, along with the rest of the NIA and the NIH as a whole, is the need to prepare to absorb deeper cuts than were previously anticipated while minimizing the deleterious impact on scientific progress.

With strong leadership and staff, BSR is poised to provide rigorous thinking and careful stewardship of limited funds and will doubtless continue to play a vital role in advancing behavioral and social research. The Division plays a leadership role, not just at the NIA but also across the NIH. Compared to efforts at other NIH ICs, BSR is extraordinary in its ability to bring together multiple disciplines to address important behavioral and social research questions, spanning macro population issues to neuroscience. Analyses that integrate multiple levels of

inquiry, ranging from genes to biomarkers to neural systems to behaviors, are critical for elucidating pathways linking social behaviors and social environments to age-related outcomes and, ultimately, for guiding interventions.

The Division has been highly responsive to the 2004 report, making excellent progress in stimulating cross-fertilization across social sciences and with allied fields such as medicine, genetics, biology, and neuroscience. Indeed, BSR has been prescient and the unrivaled leader at the NIH in embracing discoveries in biology and genetics as they shape consideration of social science questions; e.g., how social factors affect expression of genes across the life course; how the social and physical environment affects an individual's physiology, emotional state, mental functioning, and so on; and the intermediate pathways between the two.

APPENDIX I

BACKGROUND DOCUMENTS PROVIDED TO COMMITTEE

All materials provided to Committee members were posted on a password-protected Web site so that reviewers could access them at their leisure.

In advance of the May 12, 2008 teleconference:

1) May 12, 2008, teleconference agenda
2) Three-page letter from Dr. Richard Suzman outlining the goals of the review and the proposed timeline, May 7, 2008
3) Roster of Review Committee members
4) List of proposed subcommittees, including proposed chairperson and primary BSR staff person(s)
5) BSR program brochure (updated March 21, 2008)
6) BSR organizational chart (May 12, 2008)
7) BSR Review Committee Report, May 2004
8) Two-page memo on recent work at the National Academies commissioned by NIA/BSR

In advance of the July 29, 2008 teleconference:

1) July 29, 2008, teleconference agenda
2) Schedule of review
3) Roster of Review Committee members (rev. July 23, 2008)
4) Summary table of subcommittees, expected participants, and key questions, ordered by teleconference date (if known) and dial-in information (rev. July 28, 2008)
5) Notes from May 12, 2008, Committee teleconference
6) BSR Review Committee Report, May 2004
7) Detailed Reviews of Scientific Topic Areas for BSR/NIA Staff Use, May 2004
8) February 17, 2005, presentation by Dr. Richard Suzman to the NIA Planning Group reviewing program responses to the 2004 review report recommendations
9) BSR response to the 2004 review (rev. July 23, 2008)

In advance of the September 4, 2008 teleconference:

1) September 4, 2008, teleconference agenda
2) Summary table of subcommittee information, including participants and dates and times, ordered by topic area (rev. September 3, 2008)
3) BSR funding trends over time, as a proportion of NIA total, by mechanism, by portfolio area, and by branch
4) BSR observations about training
5) BSR response regarding appropriate balance and interactions with the NIA intramural program
6) BSR memorandum on structure and staffing
7) BSR observations about review issues
8) Draft agenda for September 22–23 Committee meeting
9) Notes from July 29, 2008, Committee teleconference
10) NIA press releases from September 2004 to present on papers resulting from BSR grants support (prepared August 25, 2008)

11) Drafts of reports from the following subcommittees:
    a. Demography, Social Epidemiology, and Sociology of Aging
    b. Cognitive Interventions
    c. Medicare, Health Services, and Long-Term Care
    d. Psychology of Aging
    e. Social Neuroscience and Neuroeconomics of Aging

In advance of the September 22–23, 2008, meeting in Bethesda

1) September 22–23, 2008, tentative meeting agenda
2) BSR background brief on work and older workers
3) BSR background brief on economics of aging
4) BSR background brief on behavioral medicine
5) BSR funding trends over time (updated September 18, 2008)
6) BSR memos on dissertation review process and funding mechanisms to support short-term training
7) BSR media mentions, 2006–2008
8) Compilation of scientific topic area reports (draft as of September 19, 2008)
9) Preliminary draft Committee report (rev. September 22, 2008)
10) Proposed draft overarching evaluative statements and recommendations

In advance of the November 18, 2008, teleconference:

1) Draft Committee report (updated November 13, 2008)