

Trans-NIH Research Opportunities in the Basic Behavioral and Social Sciences

NIH Council of Councils Working Group Report

May 21, 2021

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NIH bBSSR Definition and Historical Perspective

- NIH basic behavioral and social sciences research (bBSSR) *furtheres our understanding of fundamental mechanisms and patterns of behavioral and social functioning that is relevant to the Nation's health and well-being.*
- The NIH has a long-term commitment to basic research.
- In the early 2000s, there was concern if this commitment extended to bBSSR.
 - ACD Working Group Report on Research Opportunities in the Basic Behavioral and Social Sciences (2004)
 - Creation of OppNet
 - 2009–2014 through dedicated support (\$64M total)
 - Since 2014 through voluntary support for specific initiatives

Charge of the bBSSR Working Group

- What are the promising and emerging areas of bBSSR that are priorities for NIH support (i.e., have a plausible translational pathway to health-relevant applied research; not supported under the mission of another funding agency)?
- Which of these emerging areas of research are not adequately supported by the current NIH bBSSR portfolio?
- Can these inadequately addressed emerging areas of research be addressed by individual IC efforts, or do some require a trans-NIH effort to address?

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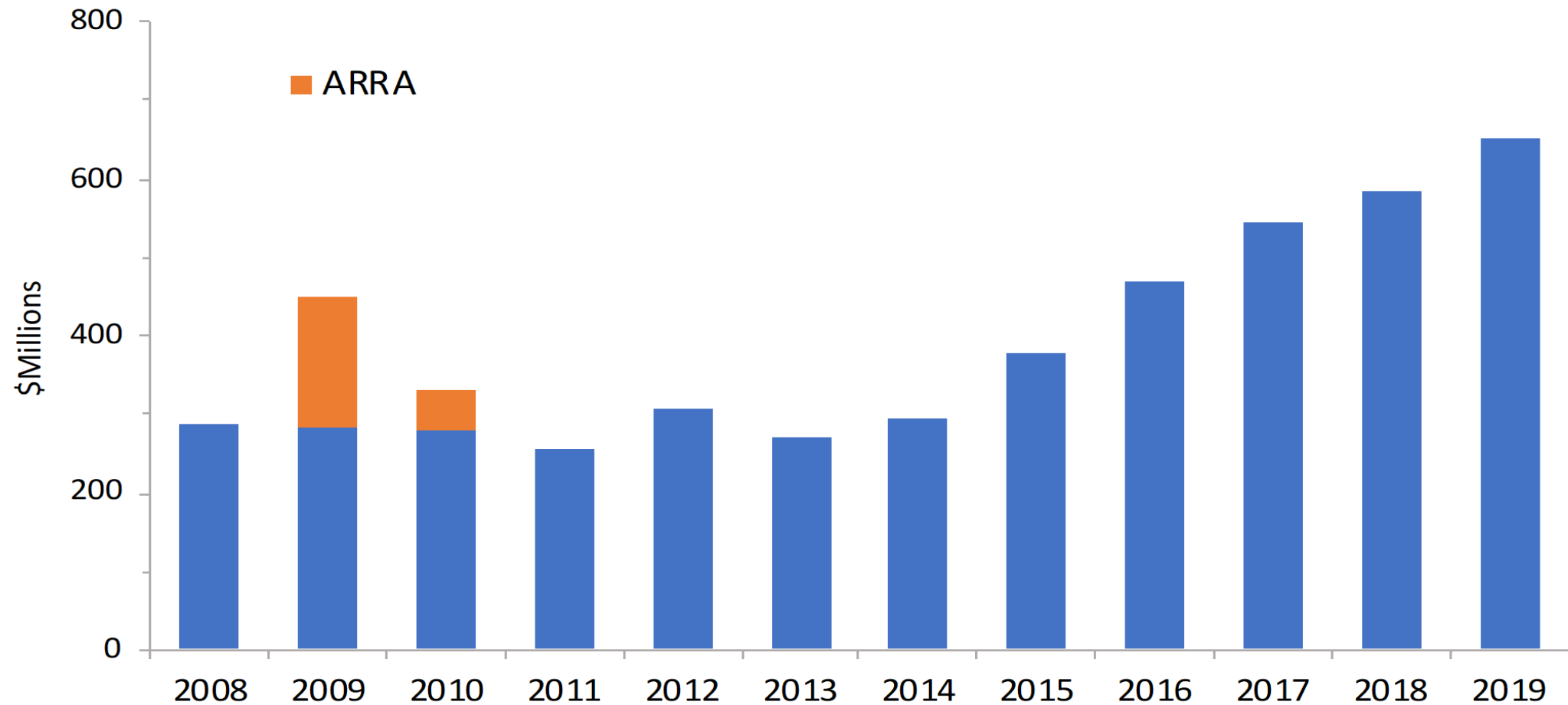
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Working Group Process

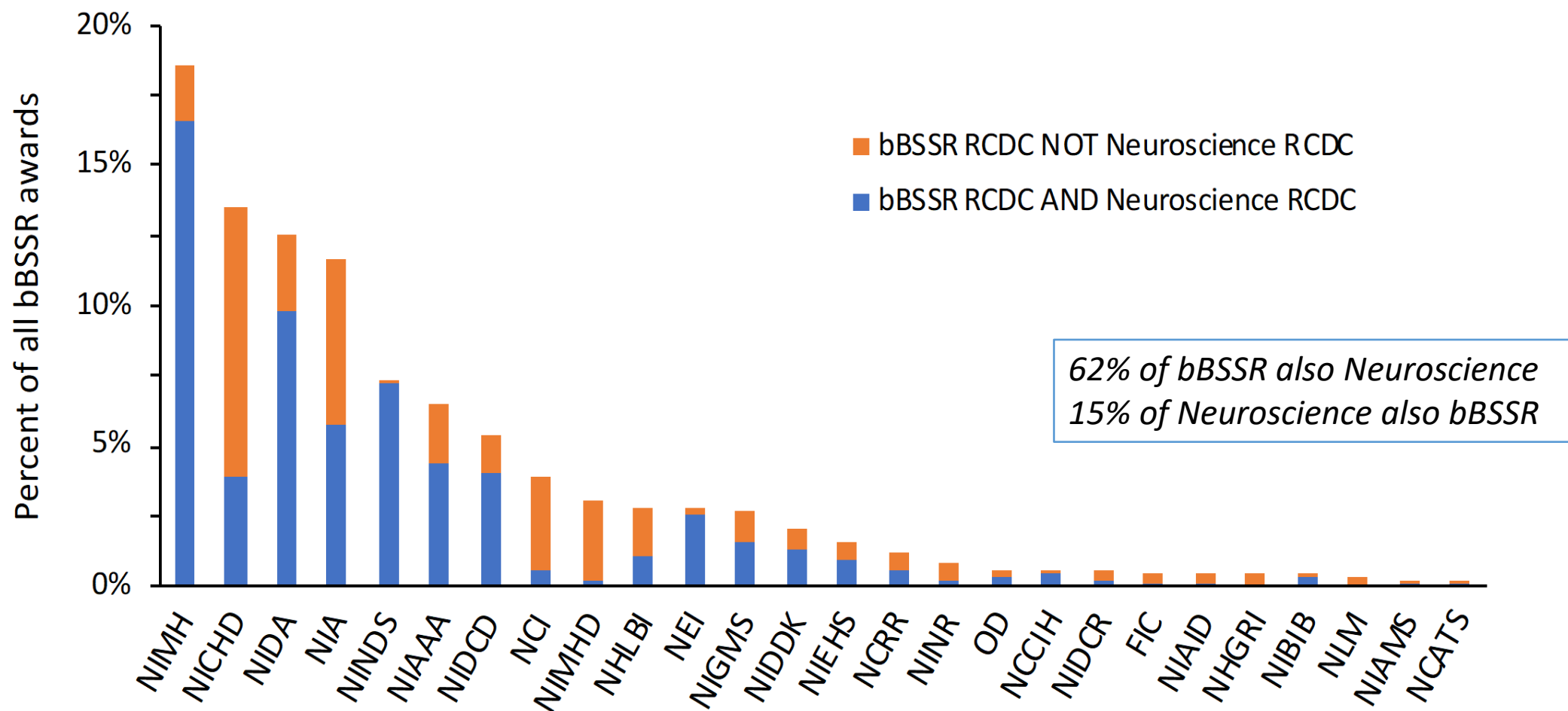
- Six meetings were held from September 2020 through May 2021.
- Office of Portfolio Analysis (OPA) provided analyses of the NIH bBSSR portfolio.
- WG members considered bBSSR areas that should be prioritized (and deprioritized) from their perspectives as journal editors, reviewers, and researchers.
- Input from NIH program staff was obtained via crowdsourcing input and town halls (55 program staff from 20 ICs).
- WG generated the report based on discussions from presentations, data analyses, program staff input, and other materials.

NIH bBSSR investment by fiscal year*

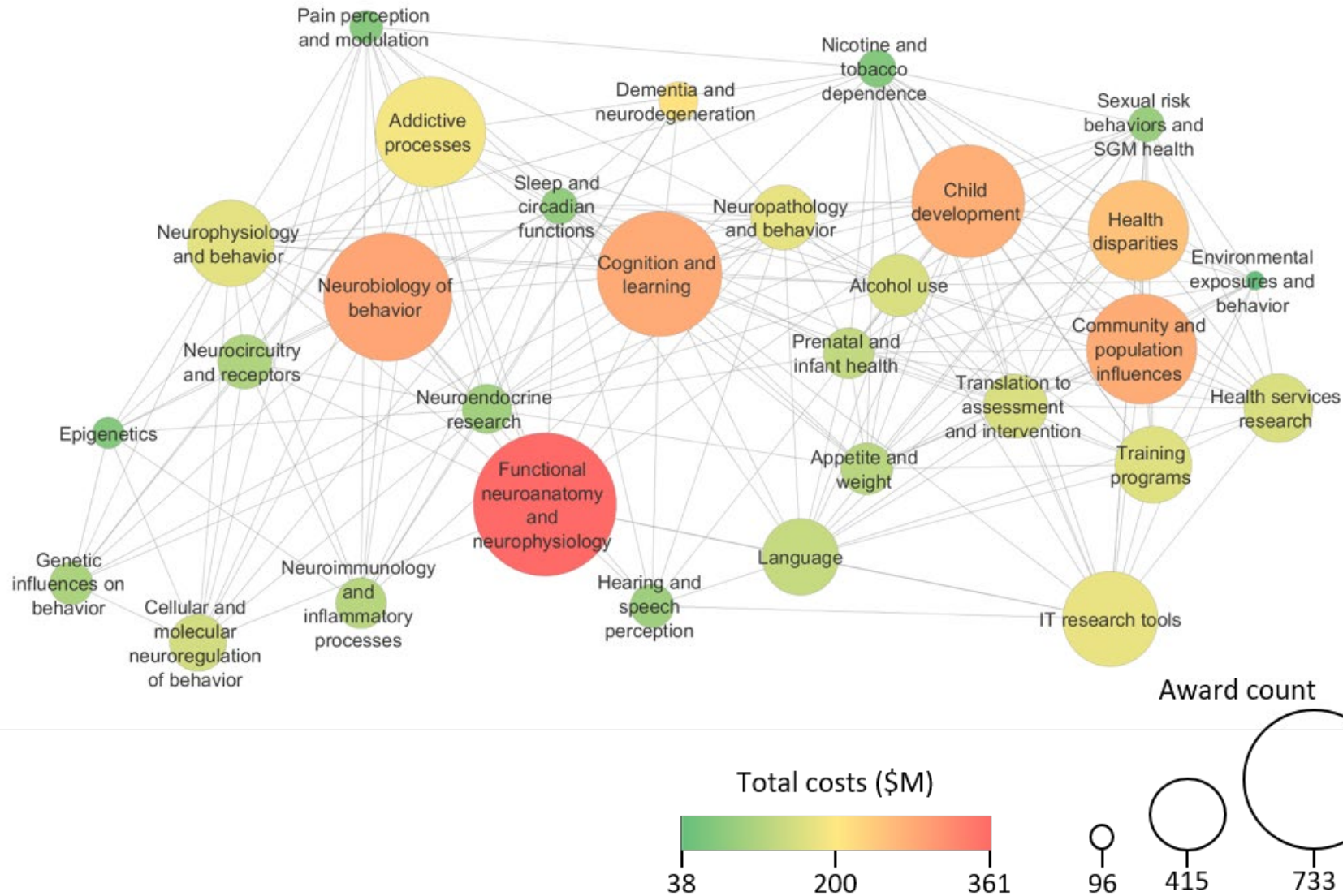


* American Recovery and Reinvestment Act (ARRA; 2009) funds are presented in orange

NIH bBSSR awards by Institute/Center - RCDC categories (FY2008-FY2019)



NIH bBSSR investment by topic area (FY2008-FY2019)



NIH bBSSR award counts by topic area (word2vec_{OPA}) (FY2008-FY2019)

Topic area	Award count		
Functional neuroanatomy and neurophysiology	733	Cellular and molecular neuroregulation of behavior	291
Neurobiology of behavior	656	Neurocircuitry and receptors	277
Cognition and learning	639	Appetite and weight	265
Child development	577	Prenatal and infant health	260
Addictive processes	565	Neuroimmunology and inflammatory processes	259
Community and population influences	564	Neuroendocrine research	252
Health disparities	513	Hearing and speech perception	223
IT research tools	487	Genetic influences on behavior	220
Neurophysiology and behavior	443	Dementia and neurodegeneration	199
Training programs	393	Nicotine and tobacco dependence	193
Language	392	Sleep and circadian functions	186
Health services research	352	Sexual risk behaviors and SGM health	180
Neuropathology and behavior	332	Pain perception and modulation	169
Translation to assessment and intervention	328	Epigenetics	161
Alcohol use	319	Environmental exposures and behavior	96

NIH bBSSR award rate by topic area (word2vec_{OPA}) (FY2008-FY2019)

Topic area	Award rate		
Training programs	26.2%	Sleep and circadian functions	15.7%
Translation to assessment and intervention	25.1%	Prenatal and infant health	15.5%
IT research tools	24.3%	Environmental exposures and behavior	14.9%
Cellular and molecular neuroregulation of behavior	22.3%	Neurophysiology and behavior	14.9%
Community and population influences	20.4%	Alcohol use	14.6%
Health services research	20.4%	Dementia and neurodegeneration	14.2%
Neurobiology of behavior	20.2%	Epigenetics	14.0%
Functional neuroanatomy and neurophysiology	20.1%	Neuroendocrine research	13.9%
Hearing and speech perception	18.7%	Child development	13.9%
Addictive processes	18.2%	Genetic influences on behavior	13.8%
Nicotine and tobacco dependence	17.2%	Neuropathology and behavior	13.7%
Cognition and learning	16.3%	Pain perception and modulation	13.3%
Health disparities	16.2%	Neurocircuitry and receptors	12.3%
Appetite and weight	15.9%	Neuroimmunology and inflammatory processes	11.5%
Language	15.8%	Sexual risk behaviors and SGM health	11.4%

Promising and Emerging Areas of bBSSR

Responses to Questions 1 & 2 of Charge

1. Behavioral, cognitive, and social neuroscience, specifically event representation, understudied brain regions, and integration of brain–body processes
2. Epigenetics
3. Basic functions of sleep and sex
4. Infectious disease–related basic behavioral and social processes
5. Social interactions and influences on health
6. Maintaining behavior change
7. Positive health processes
8. Science of science



Behavioral, Cognitive, and Social Neuroscience

- Increased focus on event representation
 - In perception, learning, and memory
 - Developmental changes
 - Computational models
- Greater focus on understudied brain regions (e.g., cerebellum)
- Increased integration of brain and periphery processes for embodying the behavioral and social environment
 - Pain perception and modulation
 - Neuroimmunology and inflammatory processes



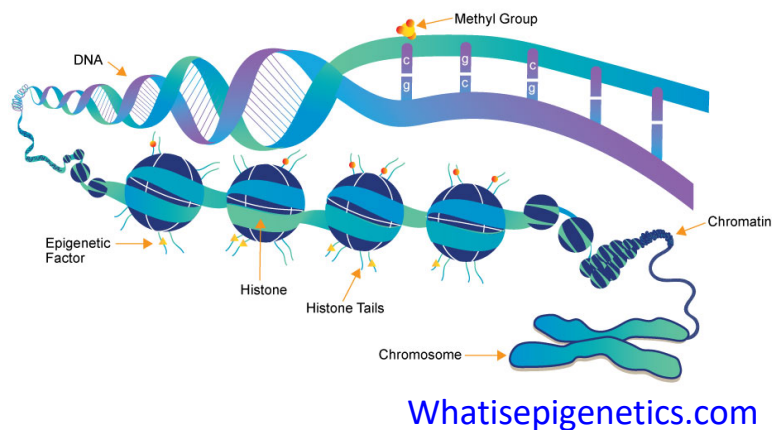
[Slate.com](https://www.slate.com)



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Epigenetics

- One of the smaller clusters of bBSSR, but also among the more influential
- Small, trans-NIH effort via OppNet—area needs greater support
- Would benefit from an interdisciplinary collaboration of epigenetics and behavioral/social processes



Children raised in poorer neighborhoods exhibited differential DNA methylation in genes related to chronic inflammation, tobacco smoke, air pollution and lung cancer. Associations between neighborhood disadvantage and methylation were small but robust to family-level socioeconomic factors and to individual-level tobacco smoking. Because children raised in disadvantaged neighborhoods enter young adulthood epigenetically distinct from their more privileged peers, this study suggests the epigenetic effects of childhood neighborhoods on adult health but also research for future mechanistic research on processes that may ameliorate these disparities and increase health equity (Reuben et al., 2021).

Basic Functions of Sleep and Sex

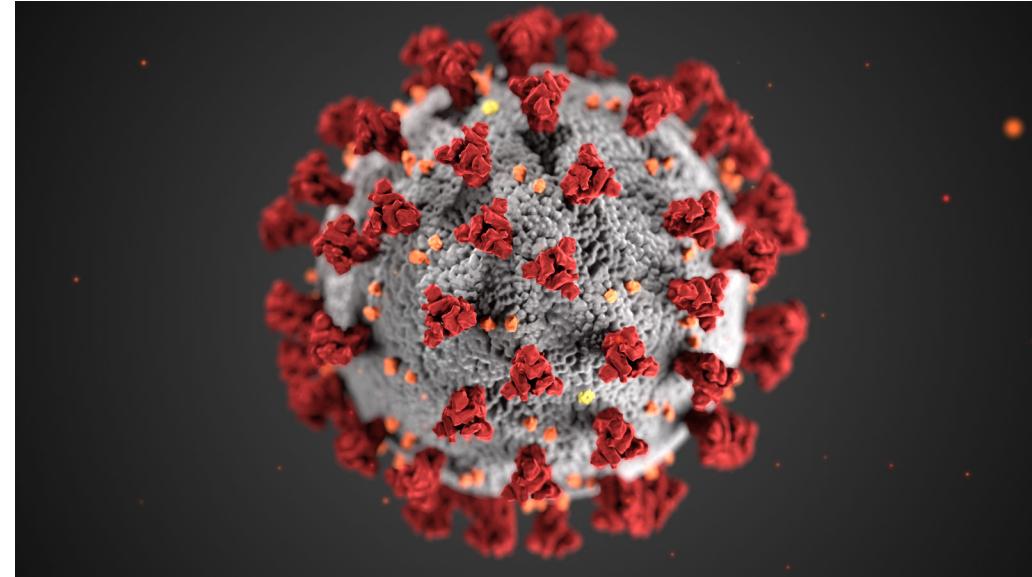
- Sleep and sex are basic functions.
- Represent a small proportion of NIH bBSSR support
- Limited “home” for these key basic functions
 - National Center for Sleep Disorders
 - Sexual & Gender Minority Health Office
 - Neither has adequate scope and resources to address basic research on sleep and sexual function.
- Need for further study to identify key research gaps and devise programs to address these gaps



Sleep Foundation

Infectious Disease–Related Basic Behavioral and Social Processes

- COVID-19 pandemic clearly demonstrated the insufficient research base for the social and behavioral processes that influence infectious disease transmission and mitigation.
- Key areas such as—
 - Adherence to initiating and maintaining public health recommendations
 - Risk communications
 - Persuasion
 - Decision making in uncertainty
- This research is applicable beyond COVID-19 to a range of infectious diseases (e.g., flu, measles).



Social Interactions and Influences on Health

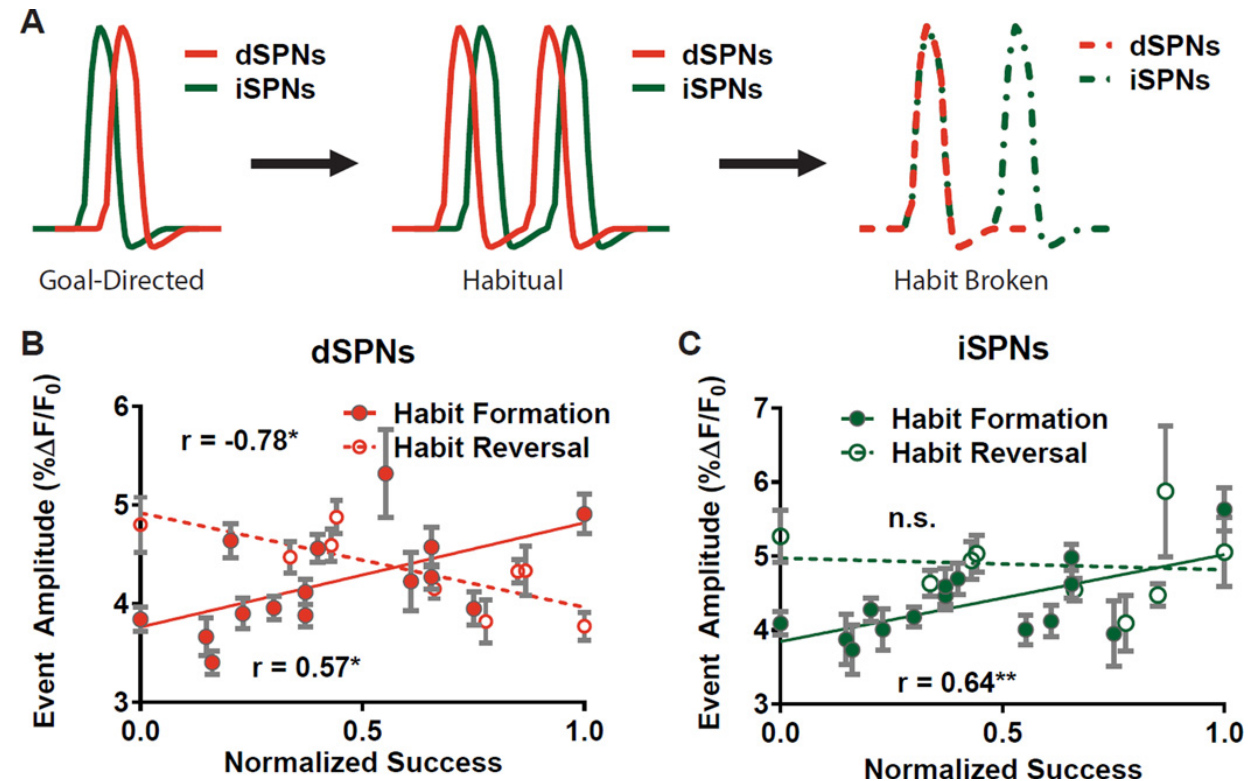
- Gap between individuals and broad social units
- Relatively little research on the influence of dyads, families, and small social groups on health
- OppNet recently released a FOA on the influence of social connectedness and isolation on health (PAR-21-144).
- Clear need for a larger trans-NIH investment in this area of research



American Psychological Association

Maintaining Behavior Change

- More bBSSR focus on behavior change initiation than on maintenance
- Different processes for maintenance than initiation
- Basic processes, such as goal-directed vs. habitual learning and implicit learning, need to be more extensively studied.
- Provide the basic research that influences novel intervention strategies to maintain behavior change.



Distinct DLS plasticity mechanisms for expression and suppression of a habit (O'Hare et al., 2016)

Positive Health Processes



- Tendency for the NIH to focus on disease processes
- Inadequate attention to basic processes that support improved health and well-being
- “Health . . . not merely the absence of disease or infirmity” (WHO)
- Increased support for positive health processes improves our understanding of positive health and provides useful insights into mechanisms of illness susceptibility and resilience.

WHITEPAPER

Positive Health and Health Assets: Re-analysis of Longitudinal Datasets

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Executive Summary

Most approaches to health over the centuries have focused on the absence of illness. In contrast, we are investigating *Positive Health*—well-being beyond the mere absence of disease. In this article, we describe our theoretical framework and empirical work to date on Positive Health. Positive Health empirically identifies *health assets* by determining factors that predict health and illness over and above conventional risk factors. Biological health assets might include, for example, high heart rate variability, high levels of HDL, and cardiorespiratory fitness. Subjective health assets might include positive emotions, life satisfaction, hope, optimism, and a sense of meaning and purpose. Functional health assets might include close friends and family members; a stable marriage; meaningful work; participation in a social community; and the ability to carry out work, family, and social roles.

Robert Wood Johnson Foundation



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Science of Science (Metascience)

- Many of the practical challenges of conducting research with humans are social and behavioral in nature.
- Ethical and social issues are often considered.
- Many other bBSSR applications to conducting research—
 - Altruism
 - Trust
 - Persuasion
 - Reinforcement
 - Behavioral economics
 - Counterfactual thinking
- Need for a robust basic metascience portfolio

PARTICIPANTS NEEDED



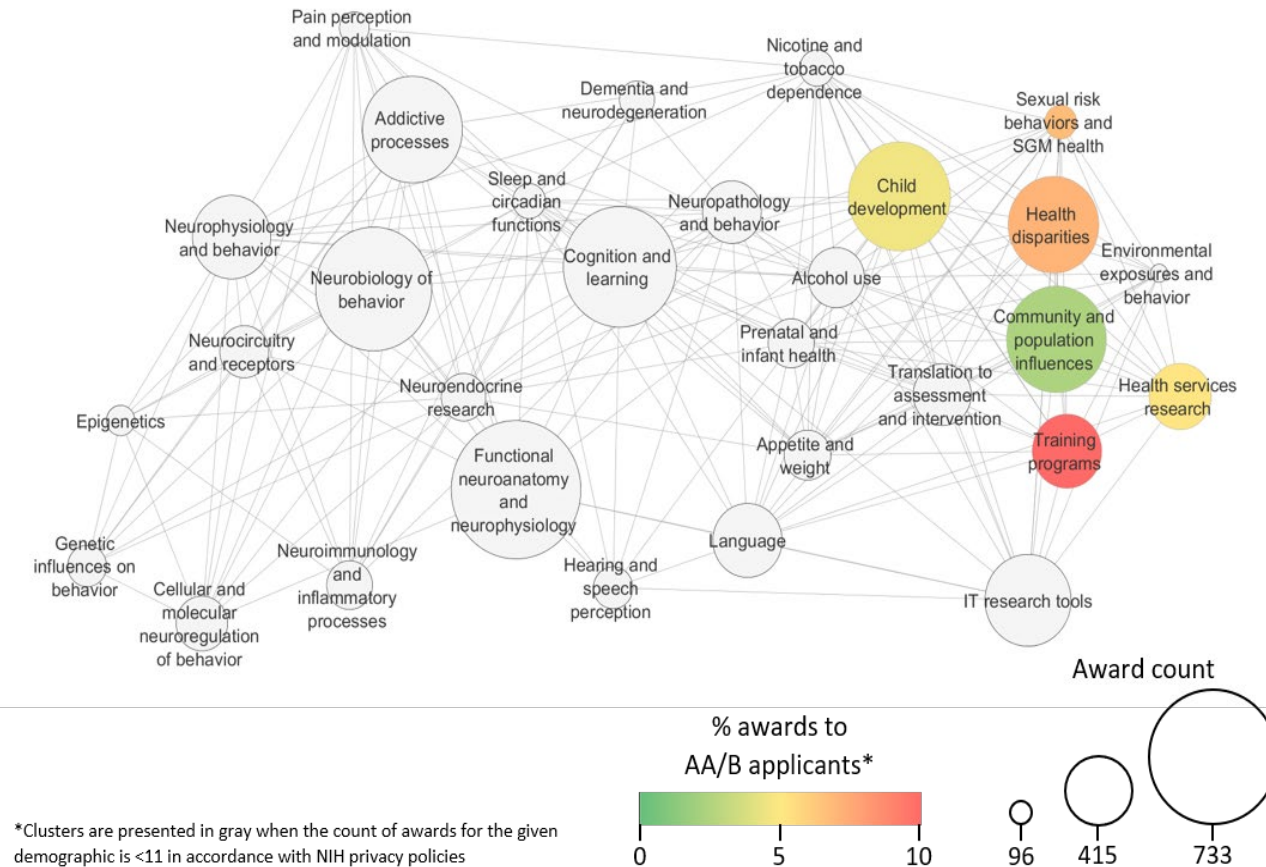
How can these inadequately addressed emerging areas of research be addressed – by individual ICs or a trans-NIH effort?

Response to Question 3 of the Charge

Increase Workforce Diversity

- The NIH has taken considerable strides to address workforce diversity (e.g., UNITE).
- bBSSR have been leaders in workforce diversity, particularly gender diversity.
- Continued need to focus on early-stage investigators (ESIs)
- Some bBSSR areas include URM investigators.
 - Encouraging bBSSR in some areas encourages diversity.
 - But there are many areas of bBSSR that need to strengthen workforce diversity (particularly more lab-based research areas).

NIH bBSSR awards to African American/Black (AA/B) applicants



Strengthen Workforce Capacity and Training

- Increase data science capabilities.
- Build capacity for assessing small populations with sufficient power.
- Expand understanding of causal inference beyond the RCT.
- Expand T32s into more bBSSR areas.



Foster Team Science and Transdisciplinary Integration

- Strengthen the incorporation of basic behavioral and social sciences with neuroscience.
- Encourage an expanded role for bBSSR in genetics research.
- Integrate knowledge generated through animal models and human subjects more readily.
- Support skills in interdisciplinary research and team science.



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Strengthen Research Infrastructure and Processes

- Encourage more multilevel research.
- Strengthen basic–applied translational integration.
- Accelerate advances in epidemiology and population health approaches.
- Expand support for the collection of large bBSSR data repositories and resources.
- Strengthen trans-NIH bBSSR initiatives and coordination with NIH ICs and with the NSF.

OPPNET Basic Behavioral & Social Sciences
Research Opportunity Network

Questions and Comments