Resource and Capacity Building to Advance the Science of Aggression across Species and Disciplines

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Office of Behavioral and Social Sciences Research (OBSSR)

Council of Councils Meeting
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National Institutes of Health
Office of Behavioral and Social Sciences Research

Overview of concept

Concept clearance: New

Title: Resource and Capacity Building to Advance the Science of Aggression across Species and Disciplines (mechanism: R24)

Objective/purpose: To support resource and capacity building in research on the mechanisms of aggressive behavior, through activities that build cross-disciplinary and cross-species bridges, including but not limited to new experimental paradigms and tools, data consortia, team science, training, and outreach

Funds available and anticipated number of awards: Contingent upon NIH appropriations

Award project period: 5 years

Council action: Vote for approval of the concept Resource and Capacity Building to Advance the Science of Aggression across Species and Disciplines (R24)

Rationale: aggression & public health

Aggression is interpersonal behavior aimed at intentionally harming another individual (Anderson & Bushman, 2002)**.** Aggressive behavior is a significant and increasing threat to public health (e.g., in 2021 there were 1.4 million emergency department visits for assault and over 26,000 homicide deaths in the United States, per the CDC), making understanding, preventing, and treating aggressive behavior a critical challenge.

A few challenges:

- Diversity of research foci and complexity of aggression make determining mechanisms difficult - research often considers only the individual level rather than the full social ecology
- Behavior cannot be separated from the environment; focusing only on individual or family levels misses larger, intertwined social contexts
- Environmental factors can change biology to increase or decrease aggression over time
- Major challenge is to integrate complex human research with precise animal research and improve communication between two
- Complex subtypes of human aggression that map onto developmental patterns and uniquely human experiences are difficult to replicate in animal models, overlapping phenotypes are hard to separate in humans, mechanisms of naturalistic aggressive behavior can be difficult/unethical to study in humans

Source: 2023 NIH workshop *Advancing the science of aggression across species & disciplines*

Rationale: support for aggression research

Mechanistic understanding of aggressive behavior has been an under-resourced area of research despite the public health costs (e.g., Cunningham et al., 2020; Williams et al., 2022). An internal NIH portfolio analysis found that among violence-related awards across 2013-2021, **only about 14% were aggression-related**. Most violence-related awards were on applied topics (e.g., youth violence, violence against women, child abuse/neglect) and were in humans, leaving a large growth opportunity for animal and translational science.

Aggression is a BSSR topic without a central home at the NIH, leading to splintered and inconsistent support for research and workforce development. Disciplinary siloing—in both academia and funding agencies—has created gaps in cohesive understanding of mechanisms across animals and humans, stages of the lifespan, levels of influence from biological and individual to social and structural, and disorders and diseases.

OBSSR-led NOFO development activities

- Multi-ICO subgroup of NIH Violence Research working group
- Request for information in December 2021 – summary on OBSSR website
- "Hub-and-spoke" workshop in June 2023 addressing central topic from multiple disciplinary approaches across both human and animal research
  - Multiple federal/external partners also participated – NIJ, NSF, NASEM
  - Agenda and recordings on OBSSR website, workshop summary document

Aggression research has NIH-wide relevance

Aggression is a heterogenous set of behaviors with many proximal and ultimate causes, emerging within a variety of multi-level biopsychosocial ecosystems

- Transdiagnostic of mental health and neurological disorders
- Varies across lifespan, can persist from childhood into adulthood
- Affected by exposure to adverse psychosocial environments
- Exacerbated by substances and alcohol, environmental toxicants
- Emerges in Alzheimer's Disease and other related dementias
- Causes or exacerbates health inequities and disparities
- Adverse effect of various disease states or side effect of interventions

Need for resource and capacity building

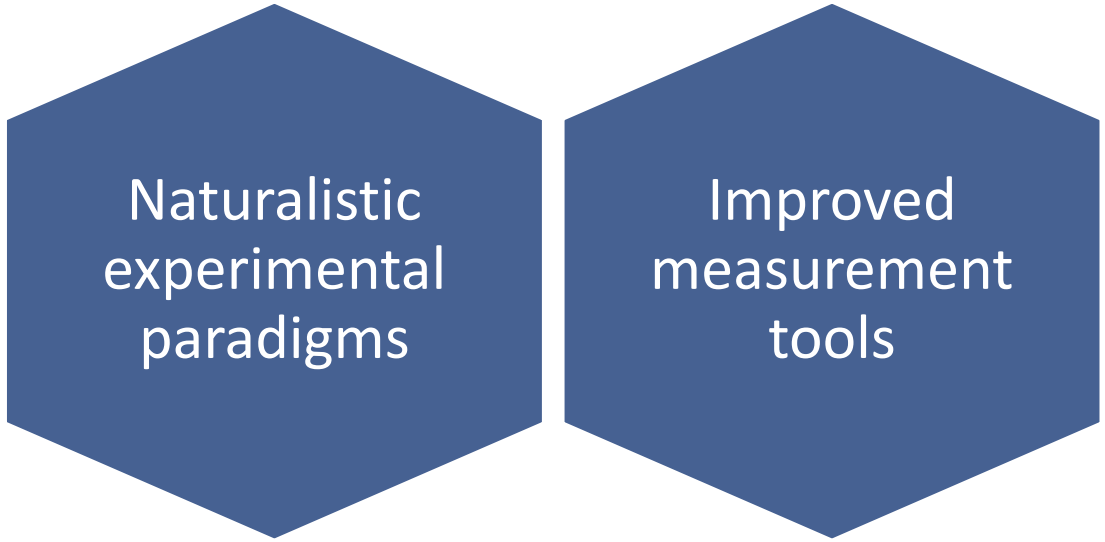
Building bridges to advance aggression research across species and disciplines requires:

Naturalistic experimental paradigms

that can be applied analogously across both animal and human research to bridge disciplinary silos and translational gaps

Need for resource and capacity building

Building bridges to advance aggression research across species and disciplines requires:



(e.g., social behavior classified by computational modeling) to yield consensus on taxonomies and ontologies to catalyze progress

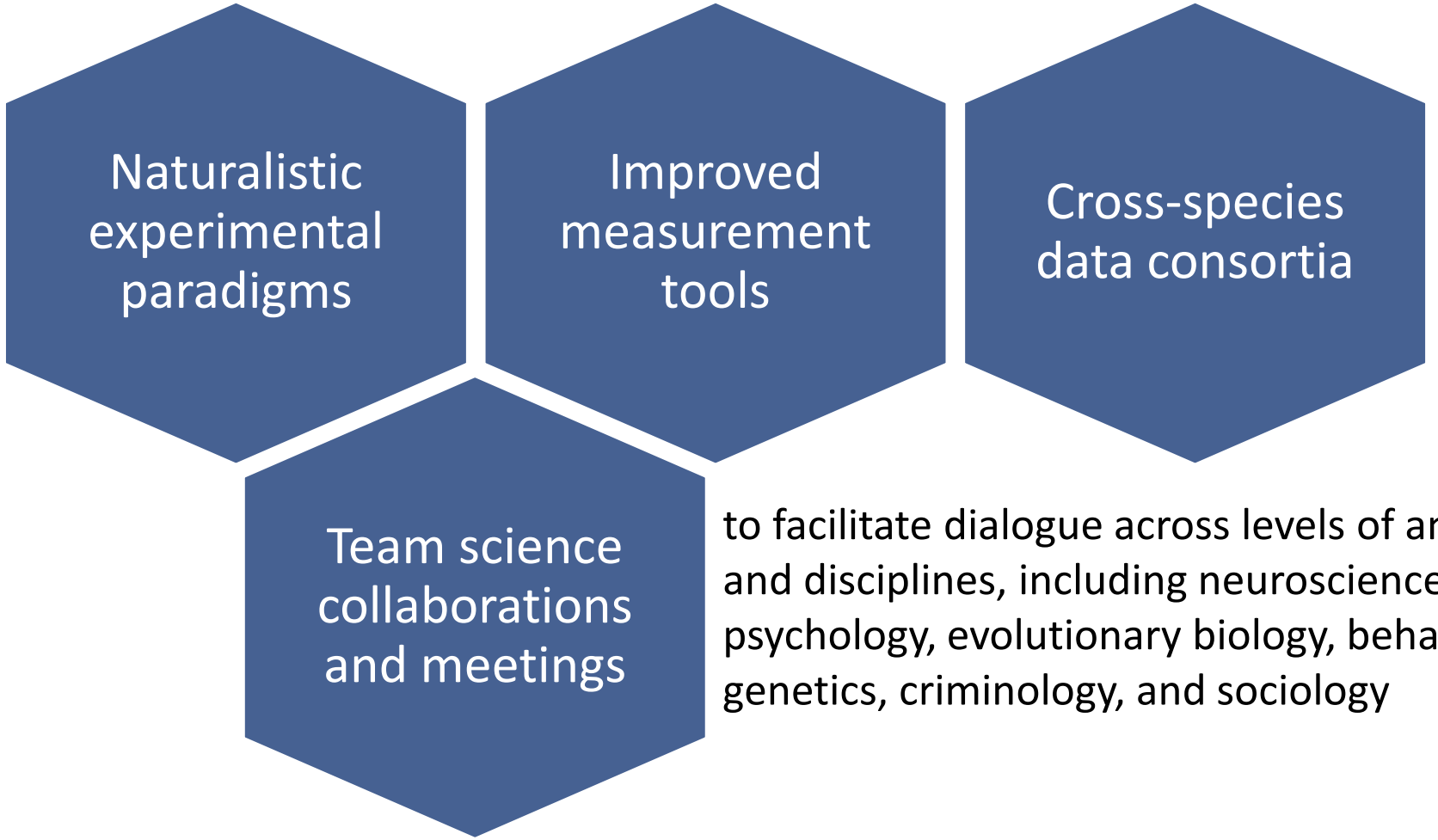
Need for resource and capacity building

Building bridges to advance aggression research across species and disciplines requires:

(e.g., behavioral data, brain data, genetic data) to accelerate research advances

Need for resource and capacity building

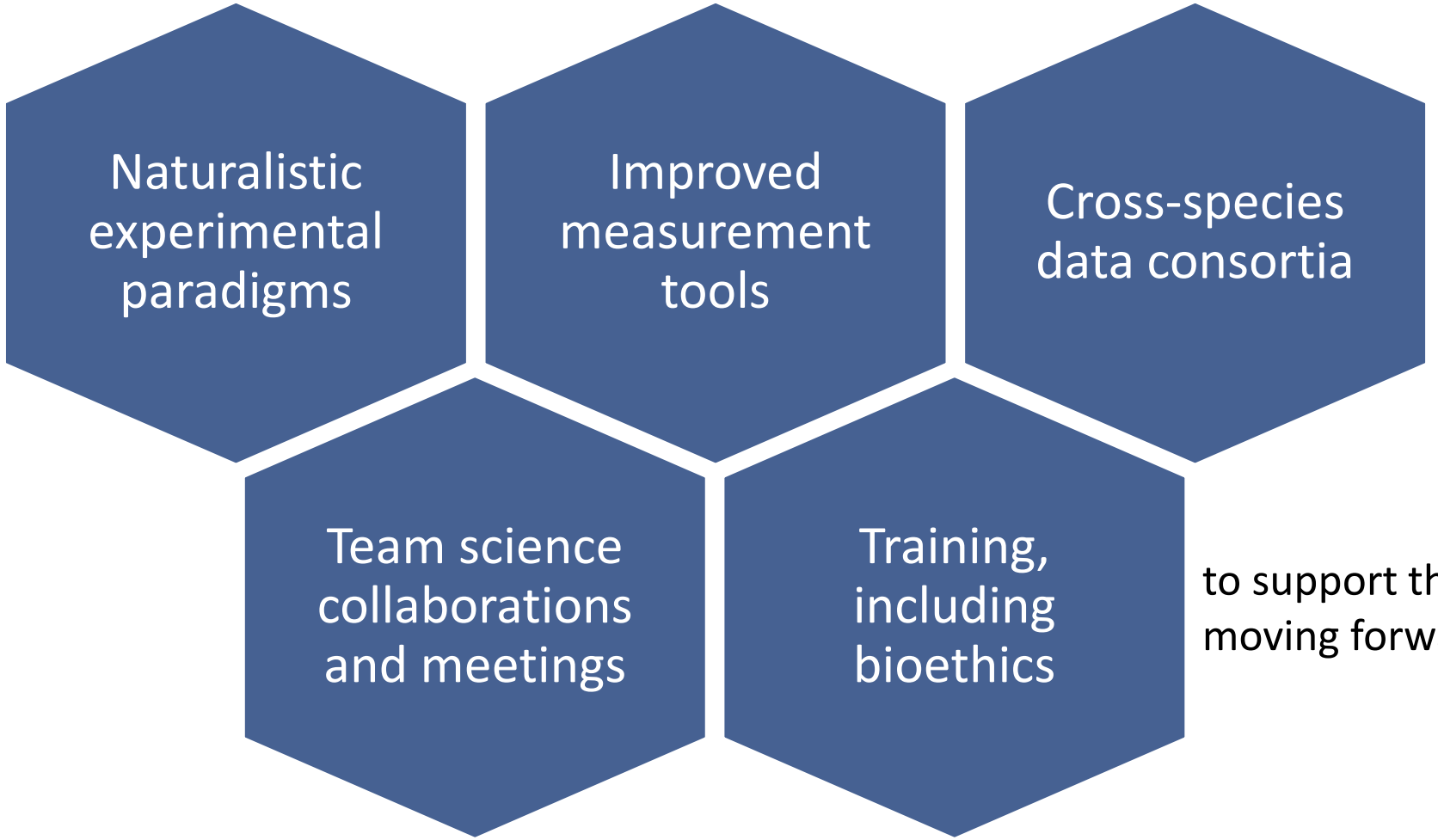
Building bridges to advance aggression research across species and disciplines requires:



to facilitate dialogue across levels of analysis and disciplines, including neuroscience, psychology, evolutionary biology, behavioral genetics, criminology, and sociology

Need for resource and capacity building

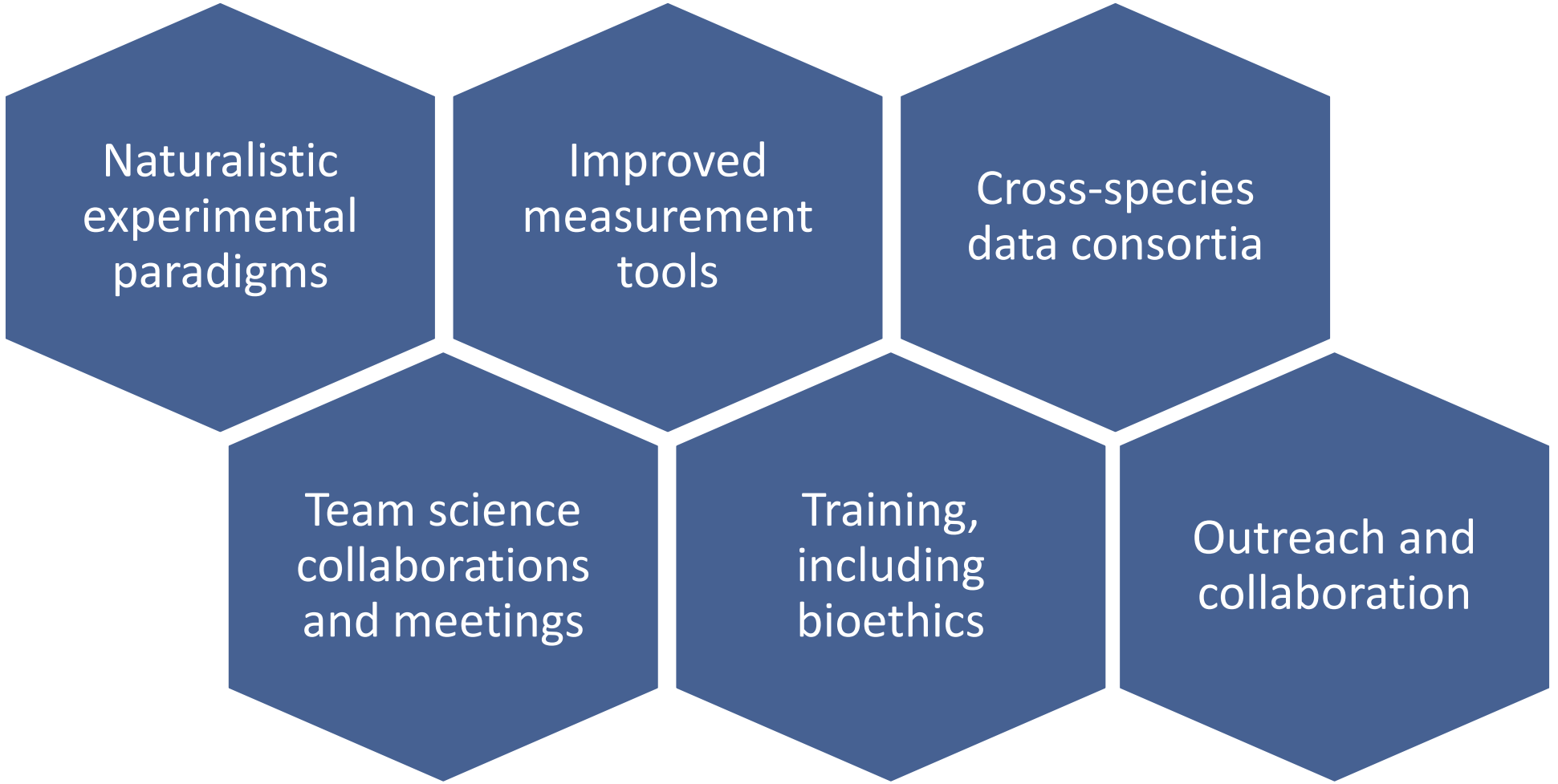
Building bridges to advance aggression research across species and disciplines requires:



to support the field moving forward

Need for resource and capacity building

Building bridges to advance aggression research across species and disciplines requires:



across the translational research continuum, practitioners, and those in need of treatment to ensure use-inspired research with a strong foundational basis

Example projects for aggression

- Innovative experimental paradigms to examine naturalistic reactive aggressive behavior analogously across species
- Creative modeling of complex human experiences in animal models through direct collaboration between human and animal researchers
- Novel methods for the computational modeling of social behavior that can be applied across species and paradigms
- Meetings of experts across disciplines and species to build consensus on a taxonomy of aggressive behavior and how to best model complexities of human aggression and social context in diverse organisms
- Repository of behavioral and brain data across species to facilitate research on conserved mechanisms

R24 resource-related research projects

The R24 is intended to support projects that will enhance the capability of resources to serve biomedical research and is an ideal mechanism to advance aggression research.

"While typical research grants support research and data production for many areas of behavioral and social science in aging, some **emerging, transdisciplinary, and high-priority research areas require more nimble resources to flourish**. These areas are typically developing rapidly and **require ongoing, flexible, and dynamic infrastructure in order to advance the production of high-quality research, to maintain and enhance data collection efforts, to develop new tools and methods, and to facilitate transdisciplinary collaborations**. They also require **training new investigators and recruiting the best scientists** to aging research to ensure continued growth in these fields." (NIA High-Priority Behavioral and Social Research Networks RFA-AG-22-013)

R24 example NOFOs

R24s have been successful in supporting resource and capacity building in BSSR :

NIA High-Priority Behavioral and Social Research Networks (RFA-AG-22-013)

"To develop **new research and research infrastructure** for life course research on aging; **attract new researchers** in aging; infuse a focus on health disparities into aging research; and address ongoing needs for harmonization and biomarker collection in large population panel studies. **Network/infrastructure-building activities include but are not limited to meetings to develop novel research areas and interact on the development of infrastructure; small-scale pilots; dissemination and outreach activities; and educational activities**."

NICHD Consortium for Research on Pediatric Trauma and Injury Prevention (PAR-14-324)

"To encourage **multidisciplinary collaborations to target gaps in research** on pediatric trauma and injury prevention. The **team science approach** encouraged by this FOA could be used to **generate a research resource, which may include discovery-based or hypothesis-generative approaches**, to advance the relevant area of biomedical research or to devise breakthrough ideas, concepts, and approaches to therapies in pediatric trauma and injury prevention research."

Responsiveness to Council recommendations

Integration of Behavioral and Social Sciences Research at the NIH (2022)

- Increase centers, resource grants, and trial networks that include BSSR capacity and focus
- Foster team science and multidisciplinary integration

Trans-NIH Research Opportunities in the Basic Behavioral and Social Sciences (2021

- Strengthen support for research on behavioral, cognitive, and social neuroscience & social interactions and influences on health
- Strengthen workforce training and capacity building
- Foster team science and multidisciplinary integration (strengthen integration of bBSSR and neuroscience; improve animal-human research integration; support skills in interdisciplinary research and team science)
- Strengthen research infrastructure and processes (encourage more multilevel research; strengthen basic-applied translational integration; develop and expand bBSSR data repositories)

Council action

Vote for approval of the concept Resource and Capacity Building to Advance the Science of Aggression across Species and Disciplines (R24)

NIH working group members

OBSSR: Kristin Brethel-Haurwitz, Dana Schloesser, Erica Spotts

NCCIH: Erin Burke Quinlan

NIA: Melissa Gerald, Matthew Sutterer

NIAAA: Robert Freeman

NICHD: Layla Esposito

NIDA: Kimberly LeBlanc

NIEHS: Jonathan Hollander

NIGMS: Michael Sesma

NIMH: Andrew Breeden, David Leitman, Aleksandra Vicentic

NIMHD: Olga Herren

NINDS: Nsini Umoh

NINR: Dara Blachman-Demner

SGMRO: Irene Avila

R24 example projects

NIA High-Priority Behavioral and Social Research Networks (RFA-AG-22-013)

- Research Network on Animal Models to Understand Social Dimensions of Aging (R24AG065172)
- Advancing Psychosocial and Biobehavioral Stress Measurement to Understanding Aging (R24AG048024)

NICHD Consortium for Research on Pediatric Trauma and Injury Prevention (PAR-14-324)

- Building Research Capacity for Firearm Safety Among Children (R24HD087149)
- The Value of Pediatric Readiness in the Emergency Care of Injured Children (R24HD085927)