The Diversity Program Consortium
Evaluation:
Creating a Body of Evidence through Evaluation

TWD Conference
June 2017
Session Outline

• Description of the Diversity Consortium
• The Role of the Coordination & Evaluation Center (CEC)
• What is Evaluation (vs. Research)
• The Diversity Consortium Evaluation
  • BUILD - students, faculty, institution
  • NRMN – mentors, mentees/trainees
Diversity in the Biomedical Workforce
A National Focus

While the NIH has funded individual intervention programs for years, multiple factors contributed to the DPC development as a focused effort.

- Inadequate program evaluation
- Concerns about Program Sustainability
- Education and Social Science Research
- National Reports on Science Training
- Persistence of low #s of minority & women in academia, especially at senior levels
- Low R01 Grant Attainment Among Black and URM scientists
  - “Ginther” report

Ginther report
Persistence of low #s of minority & women in academia, especially at senior levels

Support: National Institutes of Health
The Consortium takes a scientific approach to enhancing the diversity of the biomedical research workforce

- Three levels of simultaneous impact: student, faculty and institution
- Integration of social science research and psychosocial interventions into the process of training and mentoring students and faculty
- Rigorous assessment and evaluation of the training and mentoring interventions across the program
Coordination & Evaluation Center
Coordination & Evaluation Center (CEC)

- **Consortium-wide Coordination**
  - Linking (e.g. annual meetings, executive steering committee, working groups)
  - Dissemination (e.g. newsletter, website, coordination with NIH communications)
  - Technical assistance (e.g. Implementation teams)

- **Consortium-wide Evaluation**
  - Design and implementation
  - Hypothesis generation and testing
  - Reporting and dissemination
What is Evaluation?
Evaluation vs. Research

- Study purpose
  - Research - to add knowledge to a field - conclusions
  - Evaluation - to make decisions - judgments

- Who sets the agenda
  - Research - the researcher
  - Evaluation - significant stakeholders

- Generalizations
  - Research - maximize for applicability to many settings
  - Evaluation - contextually grounded

- Training
  - Research - in depth in a single discipline - methods accepted by the discipline
  - Evaluation – interdisciplinary - wide variety of methods
Why Evaluate?

_Evaluation is carried out for different reasons._

_The unique purpose of each evaluation impacts its design._

_Some of the more general reasons for evaluation include:_

- _To gain insight about a program and its operations_ – To learn how a program has been operating and how it is evolving, and to establish what works and what doesn’t

- _To improve practice_ – to modify or adapt practice to enhance the success of activities

- _To assess effects_ – to see how well a program is meeting it’s objectives and goals, how it benefits participants, and what evidence there is for its effectiveness
Specific reasons for evaluating an NIH TWD Program

• Learn “what works” and “what does not work”
• Showcase the effectiveness of a program to the campus community, NIH, Congress and other policy-makers
• Improve faculty practice, campus leadership, and promote institutional development
• Increase a program or campus’s capacity to conduct a critical self assessment and plan for the future
• Build knowledge for more effective programs
Internal vs. External Evaluation

- **Internal: Program employees**
  - More familiar with organization and program history
  - Knows decision-making style of organization
  - Present to remind others of results now and in the future

- **External: Outsiders**
  - Can bring credibility and perceived objectivity
  - Can bring more breadth and depth of technical experience
  - Has knowledge of how other similar programs and organizations work
Single Project vs. Program Scale Evaluation

• Single Project: Evaluation focused at the local level
  – Provides valuable specific project level information for immediate improvement
  – Often focuses more heavily on program activities, processes, outputs, and more immediate (proximal) outcomes
  – Can be limited by project level sample sizes
  – Is selected by the project personnel (typically the PIs)

• Program Scale: Evaluation focused on the overall program
  – Provides valuable information about the overall program impact that is often desired by policy makers
  – Often focuses more heavily on outcomes and is more likely to be funded to provide a longer term look at participants
  – Often is more technically sophisticated
  – Typically funded by the program sponsor through competitive bid
The CDC Model for Evaluation

www.cdc.gov/eval
Step 1. Engage Stakeholders
Why Engage Stakeholders?

Engagement of Stakeholders is essential to successful evaluation.

Engagement assures that evaluation is useful and credible. It clarifies roles and responsibilities and avoids real or perceived conflicts of interest.

Successful engagement further enhances cultural competence and increases protection for human subjects who may be involved.
Step 2. Describe the Program
What Should a Program Description Include?

An effective Program Description should include a strong statement of need that describes the problem that the program addresses. This includes:

- *Expected effects* are what the program must do to be successful.
- *Program activities* are what the program does to effect change.
- *Resources include the* time, talent, technology, equipment, information, money, and other assets available to conduct program activities.
- The program’s *stage of development* reflects its maturity.
- *The context* should describe the setting within which the program operates.
Why Develop a Program Theory

Theory-based evaluations help to get at the why and how of program success or failure.

Weiss, p. 158, Evaluation Roots, 2004

Why do people expect the program to work?

How do they expect to accomplish its ends?

What do they expect to happen and through what sequence of microsteps?
Theory of Change

Identifies the causal processes generated by a program and through which a given type of social change is expected to occur

Goals and outcomes (needs and measurable results)

Determinants (leverage to meet a need)

Intervention or treatment (agent of change)

In the social sciences, often examined using quasi-experimental designs
Logic Model

Systematic and visual way to present and share your understanding of the relationships among the resources you have to operate your program, the activities you plan, and the changes or results you hope to achieve.

The W.K. Kellogg Foundation Logic Model Development Guide

Graphical depiction of a program theory
BUILD Student Logic Model

Independent Variables
- Gender
- Race/Ethnicity
- Disability Status
- Institutional Factors
- SES
- Major
- Cumulative GPA
- High School GPA
- HS Characteristics
- Standardized Test Scores

Activities
- Financial Support
- Novel Curricula (Enrollment)
- Diversity Training
- Academic Advising & Support
- Mentoring
- Research Training & Support
- Career Advancement & Development

Outputs & Short-Medium-Term Outcomes
- Training and Engagement in Research
- Social Integration/Perceived Fit with Univ. Setting & Participation with Academic & Professional Student Organizations
- Satisfaction with Faculty Mentorship
- Pursuit, Retention & Persistence of/in Biomedical Science Degree/Discipline
- Scientific Conference Presentation and (Co-) Authorship of Peer-Reviewed
- Intent to Pursue Biomedical Research Career

Medium-Long-Term Outcomes
- Completion of Undergraduate Degree in Biomedical Science
- Evidence of Biomedical Career Preparedness
- Application & Acceptance to Attend and Entrance to Graduate Program in Biomedical Science Discipline
- Submitted Applications & Receipt of Awards, Including Research Fellowships & Scholarships

DPC Hallmarks of Success
Step 3: Focus the Evaluation Design
Determining the Evaluation Purpose & Questions

It is very important that the evaluation's purpose is clear.

This step in the evaluation process addresses the question:

- Why is this evaluation being conducted?
  
  For example:
  
  Will this evaluation be used to make improvements to the program?
  Or
  Will the evaluation be used to make a decision about the program’s expansion?

Engaging stakeholders in focusing the program evaluation purpose and questions to be addressed as part of the study will help to ensure your study will be relevant, meaningful, and culturally responsive.
Questions Related to the Purpose of the Study

<table>
<thead>
<tr>
<th>Formative Evaluation (Improve)</th>
<th>Summative Evaluation (Prove)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic reports</td>
<td>Demonstrate results to stakeholders</td>
</tr>
<tr>
<td>Share quickly</td>
<td></td>
</tr>
<tr>
<td>Monitor Progress</td>
<td>Intermediate outcomes and impact</td>
</tr>
<tr>
<td>Mid-course corrections</td>
<td>Determine value and worth based on results</td>
</tr>
<tr>
<td>Helps to bring suggestions for improvement to the attention of the staff</td>
<td>Describes quality and effectiveness by documenting impact</td>
</tr>
</tbody>
</table>
Process and Outcome Questions

PROCESS
Ask about the operation of the program.
- Examines what is going on with the program
- Describes what the program is doing, by whom and for whom
- Asks the questions: What produced the outcomes and Why?
- How did/does it work?
- How was it implemented?

OUTCOME
Ask about how the program is affecting recipients.
- Measures effects, results, impact on participants
  - These can be intended or unintended
- Asks the questions: What was the impact? and Compared to what?
- How does this look in the short-term and long-term?
How Many Evaluation Questions Should be Addressed?

An evaluation requires the right number of questions. Too few makes an evaluation vulnerable to being weak, not worth it. Too many questions can overwhelm evaluation resources and confuse the final results.

An evaluation requires one clear purpose statement, and a set of clearly worded evaluation questions

FOR EXAMPLE: The purpose of this evaluation is to explore the reasons why participants successfully complete a Summer Bridge Program.

- How many & for what reasons do participants attend a Summer Bridge Program?
- What factors contribute to participants completing the Summer Bridge Program?
- What factors are in place in participants’ lives at Program completion that lead to continued success?
Key BUILD Student Evaluation Questions

1. Are BUILD under-represented group (URG) students more likely to show increased early predictors (hallmarks) of success in pursuing a biomedical science career when compared to non-BUILD students at the same institution (URG and non-URG) and non-BUILD students at other similar institutions (URG and non-URG)?

2. Are BUILD URG students compared to non-BUILD students (URG and non-URG) and students at non-BUILD institutions (URG and non-URG) more likely to show increased:
   - Completion of undergraduate degree in biomedical sciences
   - Intent to apply to graduate program in biomedical sciences
   - Application, acceptance, & enrollment in a graduate program in a biomedical sciences

3. What is the student experience of BUILD activities and how does that impact program goals?
Key BUILD Faculty Evaluation Questions

1. Are BUILD faculty compared to non-BUILD faculty and faculty in non-BUILD institutions more likely to show increased mentor self-efficacy, mentoring, and quality of mentoring?

2. Are BUILD faculty compared to non-BUILD faculty and faculty at non-BUILD institutions more likely to show increased research self-efficacy, research, and scholarly productivity?

3. What is the faculty experience of BUILD activities and how does that impact program goals?
Key BUILD Institutional Evaluation Questions

1. How have BUILD and partner institutions developed the capacity for biomedical science research training and mentoring and in what ways is this sustainable?

2. How have BUILD institutions embraced organizational changes that promote institutional diversity?

3. Does the number and/or diversity of students graduating in biomedical sciences in BUILD institutions increase over time?
NRMN Process Evaluation Questions

**NRMN responsibility (internal)**

1. Do NRMN programs create an increasing cadre of culturally responsive & certified mentors?
2. How do NRMN programs enhance the mentorship experiences of increasing numbers of persons from Under-Represented Groups (URG)?
3. How do NRMN programs enhance the career development of increasing numbers from URGs?
   - Focus on both number and quality
NRMN Outcome and Long-Term Evaluation Questions

**CEC Responsibility (external)**

1. Does the effect of NRMN programs on participants (improved mentoring, grant skills, etc.) persist over time?

2. Are those who are mentored/coached by NRMN participants more satisfied & successful over time (biomedical persistence, etc.) than those not mentored/coached by those NRMN-trained?

3. Are those who use NRMN career development programs more successful over time (in scientific careers, NIH-funding) than those not in those programs?

4. How well do NRMN components collaborate with each other and external partners and how does that impact program success and sustainability?
CEC Evaluation Activity: Consortium-Wide Evaluation
BUILD Student Logic Model

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**DPC Hallmarks of Success**
Consortium-wide Evaluation Design

Time 1
Grantee institution
BUILD
non-BUILD

Times 2, 3, ...
Grantee institution
BUILD
non-BUILD

Comparison institution
non-BUILD

Comparison institution
non-BUILD
BUILD Data Sources

CEC Annual Follow-Up Surveys
- Students
- Faculty
Institutional Records
- For individuals

Higher Education Research Institute (HERI) Surveys
- Freshmen
- Seniors
- Faculty

Tracker “Exposure” Data
- Activity descriptions
- Participation rosters

Integrated Case Studies
- Focus Groups (Students, Faculty)
- Interviews (Leaders)
- Documents
- Institutional Records
- IPEDS

Comprehensive Individual & Institution Data
BUILD Student Interventions and Surveys

**Intervention Participation Data (Tracker)**

**Intervention Timing Varies by BUILD Program**

Freshmen | Sophomores | Juniors | Seniors | Graduate School
---|---|---|---|---
HERI Freshmen Survey | DPC AFS* | DPC AFS* | DPC AFS* | HERI Senior Survey
DPC AFS* | DPC AFS* | DPC AFS* | DPC AFS* | DPC AFS*

*DPC AFS: Annual Follow-up Survey
Tracker Demonstration
Logical Entities & Attributes
### BUILD Programs

**At-a-Glance Reports**

<table>
<thead>
<tr>
<th>Program Code</th>
<th>Program Name</th>
<th>Main Institution</th>
<th>PI</th>
<th>Add Note/Call Log</th>
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<tr>
<td>CSULB</td>
<td>California State University, Long Beach (CSULB) : CSULB BUILD</td>
<td>CSULB</td>
<td>Kingsford, Laura</td>
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<tr>
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Add live demo/screenshots of demo

https://diversity-tracker-test.ctrl.ucla.edu
### Hallmark Categories

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<th>Individual</th>
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<td>other</td>
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<td>6 BG 0 INT 0 ADV</td>
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**Hallmarks with no question mapping:** 10

### Type Breakdown

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<td>Collaborations</td>
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<td>HM-147A-104</td>
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<td>Individual</td>
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<td>IND-B11</td>
<td>Entrance to Graduate Program in Biomedical Science Discipline</td>
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<td>IND-B2</td>
<td>Pursuit of Biomedical Science Undergraduate degree</td>
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<tr>
<td>IND-B3</td>
<td>Retention and Persistence in Biomedical Science Discipline</td>
<td>Individual</td>
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Assessment/Dataset: Annual Student Tracking

Question: questiond37a

Assessment/Dataset: Annual Student Tracking

Question Name: questiond37a

Description:

Response Values: Select 1=Essential 2=very important 3=Somewhat Important 4=Not Important

Prompt Text: Indicate the importance to you personally of each of the following: Obtaining recognition from colleagues for contributions to my special field

Data Type: text

Preview
Indicate the importance to you personally of each of the following: Obtaining recognition from colleagues for contributions to my special field:

Associated Hallmarks & Constructs

Show 25 entries

Search for Code/Title/Comment:

Code Title

IND-B1 Psychosocial Variables (Including Perceptions of Culture and Environment, Identity, Attitudes, Aspirations

Comment Association Date

02/11/2016 Edit Remove
### Institutions

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<td>University of Maryland Medical Center</td>
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Showing 1 to 3 of 3 entries
### MSU: Activities Catalog

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<th>Type</th>
<th># of Sessions</th>
<th>Roster Required?</th>
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<tbody>
<tr>
<td>Active Learning Centers, Workshops: Critical Thinking, Writing, Interdisciplinary Seminars, Experiential Learning</td>
<td>Student</td>
<td>3</td>
<td>Yes</td>
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<tr>
<td>Annual Faculty Mentor Trainings</td>
<td>Faculty</td>
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<td>Yes</td>
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<tr>
<td>Attendance at Professional Meetings</td>
<td>Student</td>
<td>0</td>
<td>Yes</td>
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<tr>
<td>Basic Science Courses</td>
<td>Faculty</td>
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<td>CBPR</td>
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</tr>
<tr>
<td>CBPR Awards</td>
<td>Faculty</td>
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</tr>
</tbody>
</table>
### SF State University (SF State) : SF BUILD (SFU) SFSU Workspace

**Name (Short Name):** San Francisco State University (SFState) : SF BUILD (SFU)

**Description:**

**PI:** [Redacted]

**NIH Institutional Number:** [Redacted]

**Recruitment/Enrollment Targets:**

**# of Institutions:** 2

---

**Grants/Awards (0)**

---

**Institutions**

**Activities**

**Social Media**

**Participants**

**Key Contacts**

**Notes/Call Log**

**Workspace Access**

---

**Active**

**Archived**

---

**Show 10 entries**

**Search for Title/Type:**

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<table>
<thead>
<tr>
<th>Title</th>
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<td>BUILD Scholars</td>
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</table>
Session: 2015 SF Build Scholars Cohort 1
Activity: Cognition and Social Equity (CaSE) Lab

Title: 2015 SF Build Scholars Cohort 1
Active?: Yes
Open Date: 06/11/2016 12:00 am

Upload Roster for Session

Program: SFSU
Activity: Cognition and Social Equity (CaSE) Lab
Session: 2015 SF Build Scholars Cohort 1
Roster File: (required) Choose File No file chosen

[ Instruction ] [ Roster Template ]
File must be delimited by tab.

Participant Name          Email                      Role(s)      Association Date
A********a A**x            a**************a@gmail.com    Student      07/05/2016
L************a
C*****a P****z            c*****z@mail.sfsu.edu      Student      07/05/2016
Student
Student Participation Report
Across All BUILD Programs (06/20/2016 - 06/20/2017)

- Mentoring (Mentee)
- Career Advancement & Development (CAD)
- BUILD Financial Support (FS)
- Novel Curricula (NC) (Enrollment)
- Diversity Training (DT)
- Research Training & Support (RTS)
- Academic Advising & Support (AAS)
Student BUILD Activity Participation: # of Students in Activities (Tracker)

(08/01/2015-03/01/2017)

Note: Latest snapshot of data – ongoing cleaning and upload
BUILD Scholar App details

• Calendar of events from local institution
• Outcomes
• Clicker (ARS)
• Notifications
• Other:
  • Geo-location and event/class sign in
  • Posting to Facebook
ScholarApp Outcomes reporting
ScholarApp Outcomes reporting

Tracker

Outcomes reported to DPC Tracker

Outcomes posted to Facebook
Scholar App - Notifications

Notification from Diversity Consortium
You are invited to participate in the Diversity Program Consortium Research Study. Please Click the button below to begin.

START

Notifications sent to Scholar App
Scholar App - Notifications

Notification from Diversity Consortium

You are invited to participate in the Diversity Program Consortium Research Study. Please Click the button below to begin.
Who can use the App?

• BUILD Scholars & Biomedical students
• Non BUILD Students
• Instructors

• Under review with Apple App Store
Current Data Trends: Students
BUILD Student Hallmarks via Longitudinal Surveys

*Intervention Participation Data (Tracker)*

*Intervention Timing Varies by BUILD Program*

- Freshmen
- Sophomores
- Juniors
- Seniors
- Graduate School

HERI Freshmen Survey
DPC AFS*
DPC AFS*
DPC AFS*
HERI Senior Survey
DPC AFS*
DPC AFS*

*DPC AFS: Annual Follow-up Survey*
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- Application & Acceptance to Attend and Entrance to Graduate Program in Biomedical Science Discipline
- Submitted Applications & Receipt of Awards, Including Research Fellowships & Scholarships

DPC Hallmarks of Success
Interim Hallmark: Science Identity

➢ Survey Items
   Answer scale: 1=strongly disagree, 5=strongly agree
   ✓“ I have a strong sense of belonging to a community of scientists”
   ✓“ I derive great personal satisfaction from working on a team that is doing important research”
   ✓“ I think of myself as a scientist”
   ✓“ I feel like I belong in the field of science”

Hypothesis 1 (short-term outcome): Exposure to BUILD research training and experiences will result in stronger “science identity”

Hypothesis 2 (longer-term outcomes): Stronger science identity will in turn predict (a) persistence in biomedical major, (b) graduation with biomedical bachelors degree and (c) matriculation to graduate school in biomedical science

Faculty
BUILD Faculty Logic Model

Independent Variables
- Gender
- Race/Ethnicity
- Disability Status
- Socioeconomic Status
- Institution
- Institutional Characteristics
- Department Affiliation
- Courses Taught
- Academic Rank
- Years Since Degree
- Years Since Sabbatical
- Time at Institution
- Prior NIH Support
- Prior Research & Mentoring Experience.

Activities
- Financial Support
- Novel Curricula (Development/Teaching)
- Diversity Training
- Mentor Training
- Mentoring
- Research Training & Support
- Evaluation Training & Activities

Outputs & Short-Medium-Term Outcomes
- Change/Increase in Self-Efficacy as Instructor, Mentor and/or Researcher
- Increase in Participation in Professional Development Activities in Programs Relevant to BUILD
- Increase Participation in Mentorship Activities in Programs Relevant to BUILD
- Increase in the Numbers of Trainees Mentored in Programs Relevant to BUILD

Medium-Long-Term Outcomes
- Increased Research Productivity in Grant Submissions & Awards in Programs Relevant to BUILD
- Increased Quality of Mentoring
BUILD Faculty Interventions and Surveys

Intervention Participation Data (Tracker)

Intervention Timing Varies by BUILD Program

2015  |  2016  |  2017  |  2018  |  2019

HERI Faculty Survey | DPC AFS* | DPC AFS* | HERI Faculty Survey | DPC AFS* | DPC AFS*

*DPC AFS: Annual Follow-up Survey
BUILD Institutional Level
Institutional Evaluation Questions

1. How does the campus increase biomedical students graduating and enrolling in graduate school?

2. How are the activities and new partnerships increasing capacity and is this sustainable?

3. How have institutions embraced organizational changes that promote institutional commitment to diversity and advancing the biomedical workforce?
Case Studies Focus on Organizational Issues

- Identifies the role of multiple contexts
- Clarifies how all work together in synergy on a campus
- Identities areas of concern for sustainability and productivity
- Assesses campus commitment to diversity
National Research Mentoring Network (NRMN)
NRMN Interventions and Surveys

Time from enrollment in NRMN

12 mos 18 mos 24 mos 36 mos

NRMNNet
- NRMN Eval
  - Pre tests
- CEC Consortium-Wide Eval
  - Post tests

Mentor Training
- NRMN Eval
  - Pre tests
- CEC Consortium-Wide Eval
  - Post tests

Professional Development
- NRMN Eval
  - Pre tests
- CEC Consortium-Wide Eval
  - Post tests

12 mo Follow-up 18 mo Follow-up

= DPC AFS: Annual Follow-up Surveys
NRMN Data Sources

Comprehensive Data for Individuals, Institutions, and the Network

- NRMN Portal Registration
- NRMN Program Data (Interventions and short-term outcomes)
- Interviews/Focus Groups
- CEC Follow-Up Surveys
NRMN CEC Evaluation Design

Time 2/3

Times 3/4…
Intentionally creating opportunities for my mentees to bring up issues of race/ethnicity when they arise

Encouraging mentees to think about the research relates to their own lived experience

Going outside of my comfort zone to help mentees feel included in the lab

Respectfully broaching the topic of race/ethnicity in my mentoring relationships

Source: Culturally Aware Mentoring (CAM) Subgroup, NRMN Mentor Training Core

Note: Pre-publication materials. Please do not copy, cite, or distribute without permission.
Race/ethnicity of NIH grant applicants: 2000 - 2006

N = 205,106 Grant Applicants

Source:
Race/ethnicity of trainees who submitted grant applications post-NRMN training* N = 66 Grant Applicants as of March 24, 2017

- Black: 37%
- White Non-Hispanic: 21%
- Hispanic-White**: 19%
- Asian: 7%
- American Indian/Alaska Native: 7%
- Hawaiian Pacific Islander: 2%
- Hispanic-Other**: 3%
- Not Reporting: 1%
- Unknown: 3%

*NOTES: Demographic data is collected from participants via the NRMN Portal registration and is all self-reported.
**In this sample, Hispanic includes Mexican-Chicano, Puerto Rican, Hispanic from Spain, and Cuban.
Evaluation of NRMN as a Network

• Qualitative approach
  • Interviews of leaders, mentees, and mentors/coaches
  • Observation of programs and Key Personnel Meetings

• Early observations and interviews
  • NRMN is increasingly working as a network
  • Developing the infrastructure for this national network has taken time and evidence about how all these interventions work is just now accumulating
Break-out Session Questions

• **Key Program Activities** – What are the primary activities that your program offers to address the goals of the program (i.e., to achieve the desired outcomes)?
  • E.g., research training & experiences
  • E.g., enhanced mentoring

• **What are the Most Important Measureable Outcome(s)?**
  • E.g., Enhanced research skills?
  • E.g., Higher rates of graduation? Of pursuit of graduate studies?

• **What are the primary hypotheses of the program regarding its outcomes?**
  • E.g., Students receiving travel grants present more posters and develop broader networks.
  • E.g., Students with broader networks are more successful in graduate school
Thank You

Questions?
Future Outcomes for Hallmarks: BUILD vs non-BUILD Comparisons

<table>
<thead>
<tr>
<th>By 2019</th>
<th>By 2024</th>
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</thead>
<tbody>
<tr>
<td>Students</td>
<td></td>
</tr>
<tr>
<td>• UG biomed degree (%)</td>
<td>• Advanced biomed degree (%)</td>
</tr>
<tr>
<td>• Accepted to grad school (%)</td>
<td>• Scientific productivity (%)</td>
</tr>
<tr>
<td>Mentees</td>
<td></td>
</tr>
<tr>
<td>• Scientific productivity (%)</td>
<td>• Career transitions</td>
</tr>
<tr>
<td>Faculty</td>
<td></td>
</tr>
<tr>
<td>• Mentor quality</td>
<td>• Involvement in research (%)</td>
</tr>
<tr>
<td>• Submitted grants (%)</td>
<td>• Scientific productivity (%)</td>
</tr>
<tr>
<td>Mentors</td>
<td></td>
</tr>
<tr>
<td>• Number of mentees</td>
<td>• Number of mentees</td>
</tr>
<tr>
<td>Institutions</td>
<td></td>
</tr>
<tr>
<td>• Mentoring culture</td>
<td>• Degrees completed</td>
</tr>
<tr>
<td>• Curriculum advancements</td>
<td>• Diversity in leadership</td>
</tr>
</tbody>
</table>
Testable Interventions

Establish the value of:

- Providing financial assistance
- Providing authentic research experiences
- Implementing active learning courses
- Forming supportive cohorts and learning communities
- Mentor training
- Creating professional networks
- Reducing stereotype threat
- Diminishing imposter syndrome
- Overcoming microaggressions
- Mitigating unconscious bias
- Increasing cultural awareness and sensitivity
- Emphasizing cultural assets
- Engaging family and support systems
BUILD Student Logic Model

Independent Variables
- Gender
- Race/Ethnicity
- Disability Status
- Institutional Factors
- SES
- Major
- Cumulative GPA
- High School GPA
- HS Characteristics
- Standardized Test Scores

Activities
- Financial Support
- Novel Curricula (Enrollment)
- Diversity Training
- Academic Advising & Support
- Mentoring
- Research Training & Support
- Career Advancement & Development

Outputs & Short-Medium-Term Outcomes
- Training and Engagement in Research
- Social Integration/Perceived Fit with Univ. Setting & Participation with Academic & Professional Student Organizations
- Satisfaction with Faculty Mentorship
- Pursuit, Retention & Persistence of/in Biomedical Science Degree/Discipline
- Scientific Conference Presentation and (Co-) Authorship of Peer-Reviewed
- Intent to Pursue Biomedical Research Career

Medium-Long-Term Outcomes
- Completion of Undergraduate Degree in Biomedical Science
- Evidence of Biomedical Career Preparedness
- Application & Acceptance to Attend and Entrance to Graduate Program in Biomedical Science Discipline
- Submitted Applications & Receipt of Awards, Including Research Fellowships & Scholarships
- DPC Hallmarks of Success
BUILD Institutional Logic Model

**Independent Variables**
- Institutional Characteristics:
  - Public/Private Research
  - Research Intensiveness
  - Admission Rate
  - Selectivity Level
  - Average SAT
  - Average ACT
  - MSI Designation
  - Faculty Diversity
  - Student Diversity
  - Total Student Body
  - % Pell Grants
  - % Transfer Students
  - % Graduate Students
  - Number & Nature of Partnerships
  - Geographic Location
  - Average NIH RPG Funding
  - Average BUILD Funding

**Activities**
- Building & Development of Facilities
- Recruitment & Retention Strategies & BUILD Financial Support
- Collaboration & Communication (Inter- & Intra- Institutional)
- Mentor Training & Mentoring & Diversity Training
- Research Training & Support
- Development/Teaching & Enrollment in Novel Curricula
- Academic Advising & Support & Career Advancement & Development
- Structures & Procedures for Evaluation & Administration of Programs

**Outputs & Short-Medium-Term Outcomes**
- Increase Enrollment and Participation of Underrepresented Students in Biomedical Research Fields
- Increased Participation in Mentor Training & Mentoring Activities in Programs Relevant to BUILD (Faculty & Students)
- Improved Undergraduate Retention Rates of Students in Programs Relevant to BUILD
- Increase in Number of Underrepresented Students Enrolled & Retained in BUILD Biomedical Research Programs

**Medium-Long-Term Outcomes**
- Increase, Enhance, and/or Develop Inter-Institutional Collaborations to Achieve BUILD Outcomes Related to Research, Mentorship, and Faculty Development
- Increase in Number of Research Training Opportunities (Faculty & Students) in Programs Relevant to BUILD
- Increased Institutional Commitment to Sustaining Activities of BUILD, Changing the Academic Culture, Culture of Faculty Promotion, Tenure, Research Development, Stronger Emphasis on Student Mentoring and Advising to Increase Institutional Outcomes, and Curriculum Improvements
- Institutional Commitment to BUILD Sustainability Evidenced by Site Maintenance of Key Elements of Program Interventions after Grant Period