<table>
<thead>
<tr>
<th></th>
<th>FY 2020 ($k)</th>
<th>FY 2021 ($k)</th>
<th>FY 2022 PB ($k)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base</strong></td>
<td>$1,191,362</td>
<td>$1,210,014</td>
<td></td>
</tr>
<tr>
<td><strong>HEAL</strong></td>
<td>$266,321*</td>
<td>$270,295*</td>
<td>TBD</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$1,457,683</td>
<td>$1,480,309</td>
<td></td>
</tr>
</tbody>
</table>

*NIH’s total HEAL funding is split evenly between NIDA and NINDS
FY 20 Funding Overview

**Non-HEAL Research**
- Clinical Trials Network, 4%
- Office of the Director, 8%
- Therapeutics and Medical Consequences, 11%
- Epidemiology, Services & Prevention Research, 32%
- Neuroscience & Behavior, 45%

**HEAL Research**
- Office of the Director, 5%
- Neuroecience & Behavior, 0.1%
- Clinical Trials Network, 19%
- Epidemiology, Services & Prevention Research, 49%
- Therapeutics and Medical Consequences, 26%

*Includes all NIDA HEAL projects regardless of funding source*
Drug Use Trends Among U.S. Teens
Monitoring the Future 2020 Survey Results
Legal Status of Cannabis Varies by State

- 2020 Recreational Marijuana
- 2020 Comprehensive Medical Marijuana
Adolescent Brain Cognitive Development Study

98.7 Percent Retained

PUBLICATIONS USING ABCD DATA

As of February 2021

NUMBER OF PUBLICATIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>ABCD investigators</th>
<th>Non-ABCD investigators</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>2019</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>2020</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>2021</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
COVID-19 Adjustments

- Resumed 2-year follow-up visits (either virtually or hybrid)
  - In-person - brain imaging, select neurocognitive assessments and sensitive questionnaires
- No biospecimen collection
- 3-year follow-ups continuing virtually
Adolescent Brain Cognitive Development Study: COVID-19 Supplements

Surveys (Youth and Caregiver) -
- May, June, August, October, December
- Surveys measure:
  - Family situation
  - Youth routines (school, activity, sleep, screen media)
  - Relationships
  - Attitudes/adherence to public health directives
  - Mental health, stress, substance use
  - Media/news exposure
  - COVID-19 status
- Data released from surveys 1-3: Dec 2020

FitBit extension – Pre- and during pandemic data on activity, sleep, heartrate

Community level data (e.g., COVID prevalence, hospital resources/utilization, state/local policies, unemployment data, stimulus payment, social distancing)
HEALthy Brain and Child Development Study: COVID-19 Supplements

COVID-19 Perinatal Experiences (COPE):
Longitudinal survey battery of parent & infant
- 2190 Untested Pregnant Women
- 473 COVID-19 Negative Pregnant Women
- 401 COVID-19 Positive Pregnant Women

Biospecimen Collection:
Virus & antibody panels, stress, epigenetics
- 340 Untested Pregnant Women
  → Saliva, Nasal Swab, Blood, Hair, Breastmilk
- 413 COVID-19 Negative Pregnant Women
- 341 COVID-19 Positive Pregnant Women
  → Blood, Hair, Breastmilk, Fecal Matter

Additional Assessments:
~ 275-1021 participants
- Substance Use, Anxiety, Depression, Stress
- Qualitative remote interviewing (n=50)
- Home language/environment analysis (n=226)
- MRI/EEG brain structure and function (n=121)
Schizophrenia and Influenza at the Centenary of the 1918-1919 Spanish Influenza Pandemic: Mechanisms of Psychosis Risk

Adrianna P. Kępińska1, Conrad O. Iyegbe1, Anthony C. Vernon1,2, Robert Yolken4, Robin M. Murray1 and Thomas A. Pollak1

1Department of Psychiatry Studies, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, United Kingdom
2Department of Basic and Clinical Neuroscience, Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, United Kingdom
3MRC Centre for Neurodevelopmental Disorders, King’s College London, London, United Kingdom
4Stanley Laboratory of Developmental Neurovirology, Johns Hopkins Medical Center, Baltimore, MD, United States

Associations between influenza infection and psychosis have been reported since the eighteenth century, with acute “psychoses of influenza” documented during multiple pandemics. In the late 20th century, reports of a season-of-birth effect in schizophrenia were supported by large-scale ecological and sero-epidemiological studies suggesting that maternal influenza infection increases the risk of psychosis in offspring. We examine the evidence for the association between influenza infection and schizophrenia risk, before reviewing possible mechanisms via which this risk may be conferred. Maternal immune activation models implicate placental dysfunction, disruption of cytokine networks, and subsequent microglial activation as potentially important pathogenic processes. More recent neuroimmunological advances focusing on neuronal autoimmunity following infection provide the basis for a model of infection-induced psychosis, potentially implicating autoimmunity to schizophrenia-relevant protein targets including the N-methyl-D-aspartate receptor. Finally, we outline areas for future research and relevant experimental approaches and consider whether the current evidence provides a basis for the rational development of strategies to prevent schizophrenia.

A pregnant mom inhales SARS-CoV-2, and on rare occasions, the virus enters the blood.

Viral particles in blood travel to the placenta, where they can infect syncytiotrophoblast cells that line the placental villi.

This may trigger inflammation, with macrophages and other immune cells increasing in the maternal blood and inside the villi.

Viral particles may then move from syncytiotrophoblast cells into villous stroma and into the fetal capillary. If this happens near the time of birth, the baby can test positive for SARS-CoV-2.
Delayed Myelination in Children born to COVID+ Mothers

- Have not seen evidence of increased prematurity;
- Sample population highly skewed to Hispanic ethnicity;
- No serious illness (<1 day hospital stay);
- Still investigating results in COVID- Mothers to understand environmental contributions to results.

<table>
<thead>
<tr>
<th></th>
<th>Pre 2019</th>
<th>COVID-19+</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n)</td>
<td>40</td>
<td>21</td>
</tr>
<tr>
<td>Female (n)</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td><strong>Age Range (days)</strong></td>
<td>86 - 102</td>
<td>88 - 112</td>
</tr>
<tr>
<td><strong>Mean Gestation (days)</strong></td>
<td>273 ± 15</td>
<td>281 ± 19</td>
</tr>
<tr>
<td><strong>Birth Weight (g)</strong></td>
<td>3342 ± 642</td>
<td>3311 ± 538</td>
</tr>
<tr>
<td><strong>Birth Length (inches)</strong></td>
<td>20 ± 3.6</td>
<td>21 ± 3.5</td>
</tr>
<tr>
<td><strong>Maternal Education (Hollingshead Scale)</strong></td>
<td>6 ± 1.3</td>
<td>5.7 ± 1.6</td>
</tr>
<tr>
<td><strong>Paternal Education (Hollingshead Scale)</strong></td>
<td>5.9 ± 1</td>
<td>5.4 ± 1.6</td>
</tr>
<tr>
<td><strong>Family Size (# Children)</strong></td>
<td>2.3 ± 1.1</td>
<td>2.3 ± 1.5</td>
</tr>
</tbody>
</table>

Deoni et al, unpublished
Among the most vulnerable to COVID-19 are people with compromised respiratory and cardiovascular systems.

- Tobacco Smoking
- Vaping (Nicotine and/or THC)
- Opiate Use
- Psychostimulant use
- Cannabis

Structural Challenges for SUD During COVID-19

- Access to OUD medications
- Limited access to peer-support groups
- Social distancing
  - increases risk of relapse
  - interferes with overdose reversal
- Homelessness
- Loss of jobs
- Stress
- STIGMA
COVID-19 risk and outcomes in patients with substance use disorders: analyses from electronic health records in the United States

Quan Qiu Wang, David C Kaelber, Rong Xu, Nora D Volkow

Risk associations between recent SUD diagnosis and COVID-19

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Outcome</th>
<th>AOR (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUD</td>
<td>COVID-19</td>
<td>7.752 (7.04-8.536)</td>
<td>&lt;1e-30</td>
</tr>
<tr>
<td>CUD</td>
<td>COVID-19</td>
<td>5.296 (4.392-6.388)</td>
<td>&lt;1e-30</td>
</tr>
<tr>
<td>OUD</td>
<td>COVID-19</td>
<td>10.244 (9.107-11.524)</td>
<td>&lt;1e-30</td>
</tr>
<tr>
<td>TUD</td>
<td>COVID-19</td>
<td>8.222 (7.925-8.53)</td>
<td>&lt;1e-30</td>
</tr>
</tbody>
</table>

Death rates among COVID-19 patients with SUD

- African American
- Caucasian
Evolution of Drivers of Overdose Deaths, All Ages

Analgesics ➔ Heroin ➔ Fentanyl ➔ Stimulants

70,630 Deaths in 2019
49,860 from Opioids (Prescription and Illicit)

Source: The Multiple Cause of Death data are produced by the Division of Vital Statistics, National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC), United States Department of Health and Human Services (US DHHS).
Positive Urinalysis for Non-Prescribed Fentanyl Increased Sharply in Early 2020

Source: Millennium Health Emerging Threat Program
# Increased Overdose Death Rates During COVID-19 Pandemic

12-months Ending June 2020 Compared to 12-months Ending June 2019

<table>
<thead>
<tr>
<th></th>
<th>ALL DRUGS</th>
<th>HEROIN</th>
<th>NAT &amp; SEMI - SYNTHETIC</th>
<th>METHADONE</th>
<th>SYNTHETIC OPIOIDS</th>
<th>COCAINE</th>
<th>OTHER PSYCHO-STIMULANTS (mainly meth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June-19</td>
<td>68,711</td>
<td>14,856</td>
<td>12,148</td>
<td>2,863</td>
<td>33,164</td>
<td>14,894</td>
<td>14,583</td>
</tr>
<tr>
<td>June-20</td>
<td>83,335</td>
<td>14,480</td>
<td>12,966</td>
<td>3,195</td>
<td>48,006</td>
<td>19,215</td>
<td>20,318</td>
</tr>
<tr>
<td>% Change</td>
<td>21.3%</td>
<td>-2.5%</td>
<td>6.7%</td>
<td>11.6%</td>
<td>44.8%</td>
<td>29.0%</td>
<td>39.3%</td>
</tr>
</tbody>
</table>

*Predicted Number of Deaths  
Source: NCHS Provisional Drug Overdose Death Counts:  
Fentanyl overdoses (OD) reversal with naloxone

• Deaths from fentanyl or analogs are increasing in spite of naloxone (R Torralva and A Janowsky, 2019).

• OD from fentanyl frequently require multiple naloxone administrations (Schumann et al., 2007, Somerville et al., 2017)
  • Shorter duration of naloxone ($t_{1/2}$ 1.3–2.4 h) than fentanyl ($t_{1/2}$ 7-8 h)
  • Slower clearance of fentanyl in frequent users

• Rapid injection of fentanyl can result in chest wall rigidity, which is not MOR mediated and might reflect noradrenergic and cholinergic effects.
MOUD for Fentanyl

• Limited data on methadone or buprenorphine or naltrexone on fentanyl associated OUD

• Methadone maintenance therapy (MMT) is effective in fentanyl OUD.
  • Retrospective study in RI showed that 6 months of MMT protected against death and promoted abstinence, but relapse rates were high (Stone, et al., 2018).
  • Repeated exposure to fentanyl common while in MMT, but no deaths for those who remained in treatment, 4 deaths in those who left treatment (Stone, et al. 2020).

• Buprenorphine is effective in fentanyl OUD (Wakeman, et al., 2019).
  • Harder to initiate patients on buprenorphine

• MOUD can reduce demand for fentanyl in rats (Hammerslag, et al., 2020).
Combination Treatment (Bupropion + Naltrexone) For Methamphetamine Use Disorder

A Responses

Stage 1 Stage 2 Weighted average
Naltrexone-Bupropion Group

Stage 1 Stage 2 Weighted average
Placebo Group

Difference, 11.1 percentage points

B Methamphetamine-Negative Urine Samples

Visit

Percentage of Negative Urine Samples

NIH COVID-19 Extramural Research Survey: Objectives

Institutions

- What has been the impact of the pandemic on research activities at extramural institutions?
- What are the current and expected financial impacts to the institution, including on the research workforce?
- How are institutions currently planning for and prioritizing operations?

Individual Researchers

- What has been the impact of the pandemic on research productivity among individual researchers?
- How do researchers expect their career trajectory to be impacted by the pandemic?
- What external stressors are researchers experiencing?
- Are institutions providing effective support to researchers?
### NIH COVID-19 Extramural Research Survey: Overview

#### Researchers Survey

| Sample Selection | Domestic institutions:  
|                  | • eRA past two years  
|                  | • Are in a scientific role |
| Participants     | 45,348 out of 234,254 invites |
| Response Rate    | 19% |
| Timeline         | October 14 – November 13, 2020 |

#### Institutions Survey

| Sample Selection | Research leader (VP for Research or equivalent):  
|                 | • Top-funded 1,000 domestic institutions FY2019  
|                 | • Members of the AAMC  
|                 | • Minority-serving institutions |
| Participants    | 224 out of 705 invites |
| Response Rate   | 32% |
| Timeline        | October 7 – November 6, 2020 |

*Note: Missing data are excluded from the percentages shown throughout the analysis. Only percentages with more than 5 respondents are shown to protect privacy.*
## High-Level Findings – Extramural Institutions Survey

### Concerned About ...

<table>
<thead>
<tr>
<th>KEY QUESTIONS</th>
<th>Financial Status</th>
<th>Research Functions</th>
<th>Research Productivity</th>
<th>Loss in Endowment</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Respondents</td>
<td>66%</td>
<td>41%</td>
<td>83%</td>
<td>15%</td>
</tr>
<tr>
<td>Doctorate with Professional School (53%)</td>
<td>77%</td>
<td>49%</td>
<td>85%</td>
<td>19%</td>
</tr>
<tr>
<td>Doctorate without Professional School (17%)</td>
<td>74%</td>
<td>40%</td>
<td>82%</td>
<td>13%</td>
</tr>
<tr>
<td>Independent Research Institution (19%)</td>
<td>33%</td>
<td>29%</td>
<td>83%</td>
<td>-</td>
</tr>
<tr>
<td>Special Focus/Other Institution (7%)</td>
<td>-</td>
<td>-</td>
<td>87%</td>
<td>-</td>
</tr>
<tr>
<td>Minority-Serving Institution (24%)</td>
<td>77%</td>
<td>51%</td>
<td>74%</td>
<td>17%</td>
</tr>
<tr>
<td>Non-Minority Serving Institution (76%)</td>
<td>76%</td>
<td>44%</td>
<td>85%</td>
<td>15%</td>
</tr>
</tbody>
</table>

*Note: For certain dependent variables, higher percentages correspond to a more negative impact; whereas for other dependent variables, higher percentages correspond to a less negative impact. MSI = Minority Serving Institution, NMSI = Non-Minority Serving Institution. All percentages are out of valid totals, with missing values removed.*

[diversity.nih.gov](https://diversity.nih.gov)
Researchers: Executive Summary

**Career Trajectory**
- Majority (55%) reported negative effect; 14% said not
- Laboratory-based (61%) most likely
- Strongest predictor ability to apply for grants
- Underrepresented groups (women, racial/ethnic groups) reported varying impact, with Asian scientists most negatively impacted; differences between groups moderated by type of work and career stage*

**Mental Health**
- Over 66% cited societal/political events and physical/social isolation
- Women and other gender identity affected more
- Early career investigators affected more

**Research Productivity**
- Most (78%) reported lower productivity
- Most early (80%) and mid-career investigators (81%) reported lower productivity
- Access to labs, facilities, and colleagues were strongest predictors of lower productivity

* See appendix and full deck; additional analyses forthcoming
NIDA Strategic Plan 2021-2025 Update

• Drafting and design continue, based on input from NIDA staff and RFI
  • Scientific content has largely been drafted by NIDA OSPC
  • Currently undergoing review and revision within NIDA

• Overarching Goals
  • Advance Our Understanding of Drug Use, Behavior and the Brain
  • Develop and Test Novel Prevention, Treatment, and Recovery Support Strategies
  • Study the Implementation of Evidence-Based Strategies in Real-World Settings

• Areas of emphasis
  • Multi-directional translation between basic, clinical, and implementation research
  • Putting patients and end users at the center of NIDA’s mission
  • Using images and voices from NIDA research and NIDA stakeholders in the design

• Upcoming Milestones
  • A draft will be provided to Council members for feedback before the next meeting
  • Targeting release for the first half of 2021
Enhancing Health Disparities Research Related to Substance Use and Addiction: Research Gaps and Opportunities

February 16 (1pm ET):
SOCIAL DETERMINANTS OF HEALTH

February 17 (1pm ET):
HARNESSING BASIC SCIENCE TO UNDERSTAND RACIAL DISPARITIES AND THE IMPACT OF RACISM

To register: cdudevoir@leedmci.com
THANK YOU!