

## Brain Research: Gap Analysis

Report prepared by Harvard University Effective Altruism Student Group Philanthropy Advisory Fellowship

Developed on behalf of One Mind

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### General recommendations and conclusions

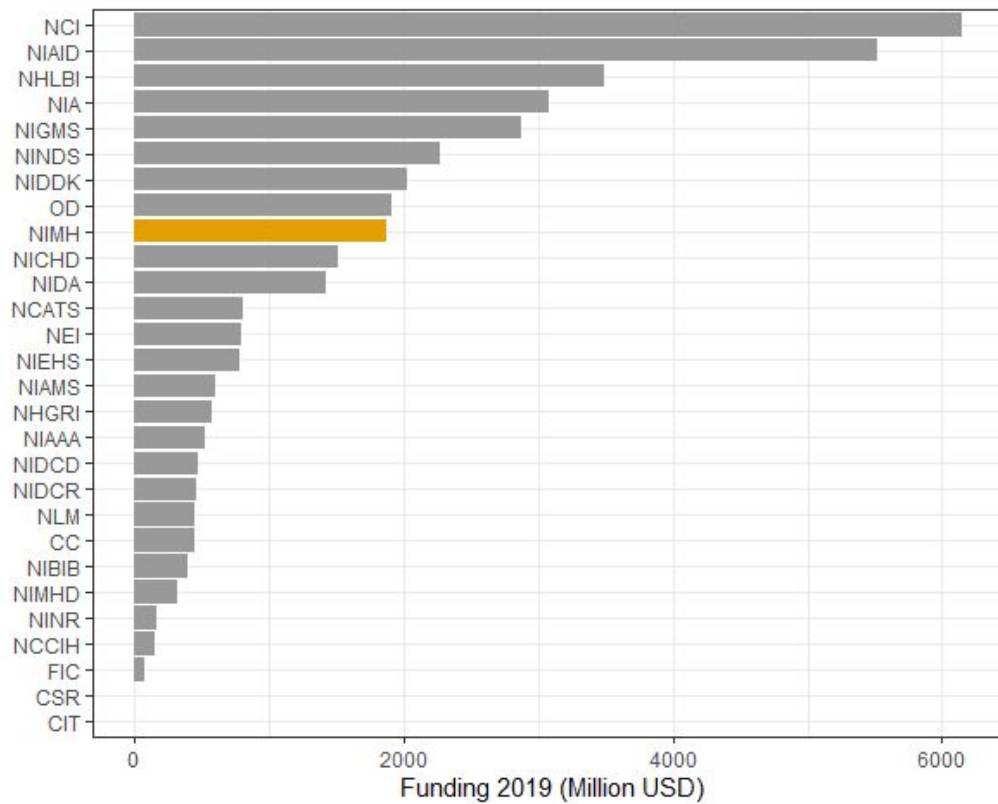
The experts we have interviewed, along with the literature we have reviewed, and the database analyses we have conducted have helped us come up with some general conclusions and recommendations. We believe that philanthropists could have the most impact with their donations by investing in two ends of the spectrum. On one hand, it could be very beneficial to invest in **pilot studies of innovative approaches with clear outcome measures**. Since the NIH requires pilot data as part of the funding application, investing in these studies could enable investigators to apply for further NIH funding and thus yield multiplicative effects. A type of study that could be particularly helpful in covering NIH gaps but would require more donors funding are **larger longitudinal studies**. On the other hand, a second gap seems to be in the **implementation side**, which is not usually funded by the NIH. Of particular use could be investing in approaches that target **increasing the well-being at a population level**. This could be cost-effective considering that some of these measures might be very cheap to implement per person, and thus the same amount of money could be directed to many people. By increasing the overall well-being by way of social, physical, and environmental factors, the entire population will experience lowered risks of mental illness. Since the majority of the disease is represented by people with low and moderate risks, a small reduction of population risks would dramatically reduce disease burden (this is [Geoffrey Rose's Prevention Paradox](#)). These interventions would help fill the gap currently seen in research/approaches to tackle the **prevention and early intervention** across mental illnesses, that are currently underfunded when looking at figures from the NIMH and also at Medicaid/Medicare.

We will next talk about the specific topics and dimensions that we've analyzed, and relate these conclusions to them.

### Analysis of funding gaps in mental health looking at different dimensions

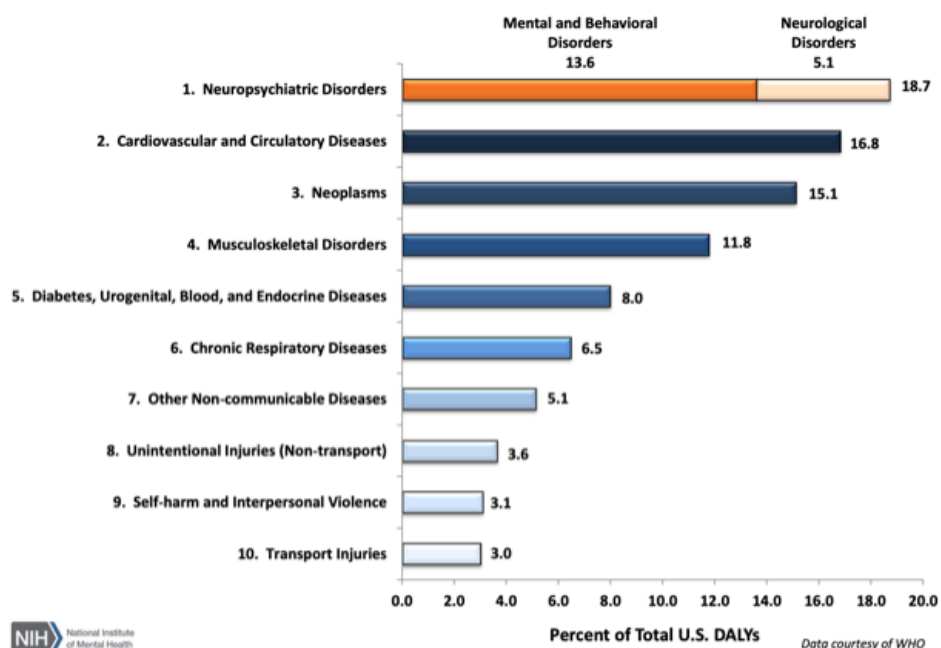
#### I-Mental health spending relative to other health conditions

The funding allocated to each agency within NIH is determined by Congress each year, and is [made public](#). If we look at the data from 2019, we can see how NIMH funding compares to the other institutes.

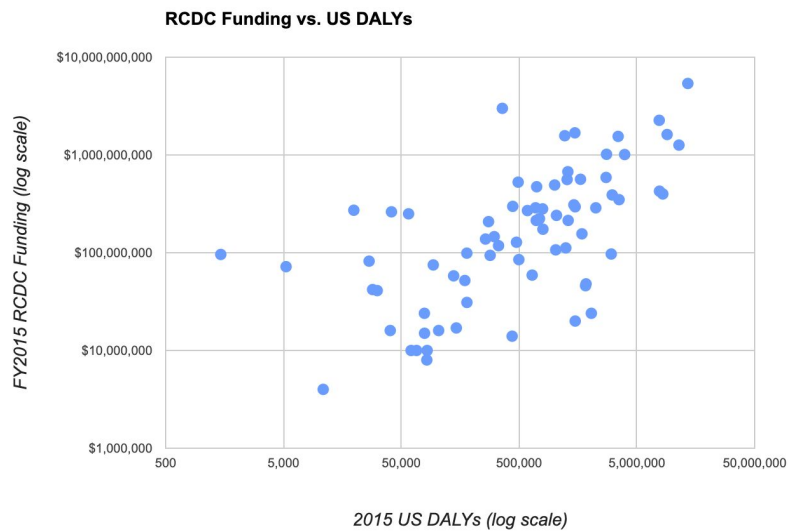


NIMH funding appears to fall behind by a substantial amount when compared to agencies such as NCI (for cancer research) and NIAID (for allergy and infectious diseases research). If we consider the burden of mental illness, neuropsychiatric disorders give rise to the [highest proportion of DALYs in the United States at 18.7%](#).

### Top 10 Leading Disease/Disorder Categories Contributing to U.S. DALYs (2010)

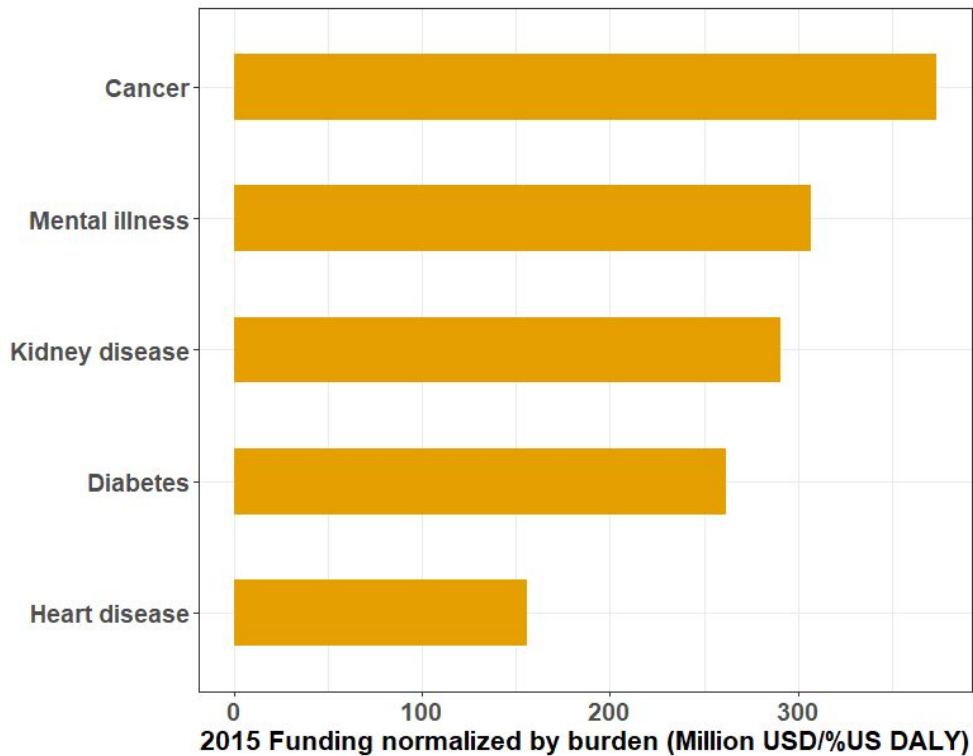


However, according to [2015 data from the NIH](#), funding takes into account the burden of disease, and rises proportionally with increased DALYs (note that the chart is in logarithmic scale; each dot represents a specific disease).



The report claims that ‘different diseases may impose different kinds of burdens on society, requiring different measurements of burden. Some diseases may cause premature death, while other chronic conditions may cause long-term disability and impose a great monetary burden on family members and society.’ It is therefore hard to compare very different diseases using the same burden metric, but if we use the DALYs as a tool, it appears as though the NIH funding is roughly taking into account the burden of the diseases.

We can narrow down the scope of the burden analysis by pulling a few examples of non-communicable diseases (diseases non transmissible directly from one person to the other). Using the few exemplars below, looking at the funding normalized by disease burden, we can see that mental health is one of the highest funded disease areas.



## **II-Cost of disease**

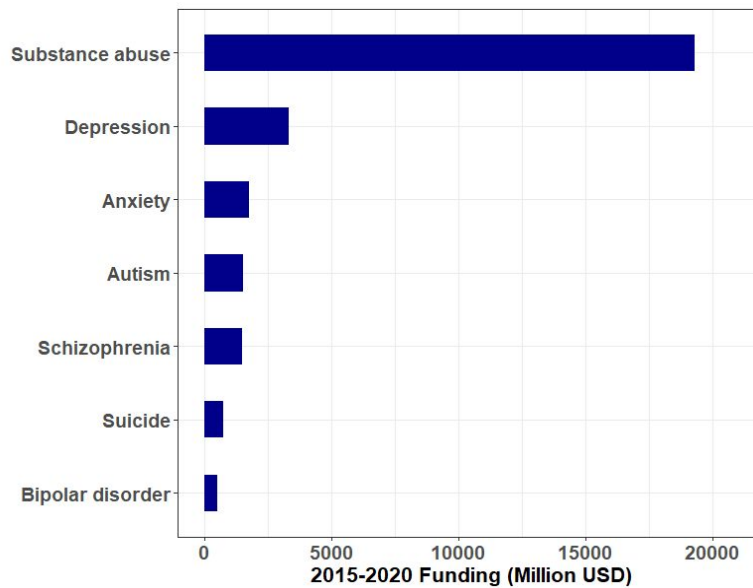
A [study conducted by the World Economic Forum](#) shows that the estimated cost of mental illness based on 2010 puts mental disorders as the largest cost driver at \$2.5 trillion in global costs in 2010 and projected costs of \$6.0 trillion by 2030. The costs for mental disorders were greater than the costs of diabetes, respiratory disorders, and cancer combined.

The Substance Abuse and Mental Health Administration estimated that the U.S. national expenditure for mental health care was \$147 billion in 2009 and an [estimate for the financial cost of mental disorders was at least \\$467 billion](#) in the U.S. in 2012.

A [meta-analysis](#) of many studies looking at MEDICAID shows that the cost of non-communicable diseases is high. Conditions such as schizophrenia and bipolar disorder have a mean annual cost of about 16000 dollars per patient. Other communicable diseases such as cancer and coronary heart disease have costs of twice as much. However, adding up to the medical expenses of mental illness and making up part of its large economic cost are Social Security disability benefits, including both Supplemental Security Income (SSI) and [Social Security Disability Insurance \(SSDI\)](#), paid to individuals who are disabled as a result of mental disorders. An additional large cost of the disease comes from [lost earning potential](#).

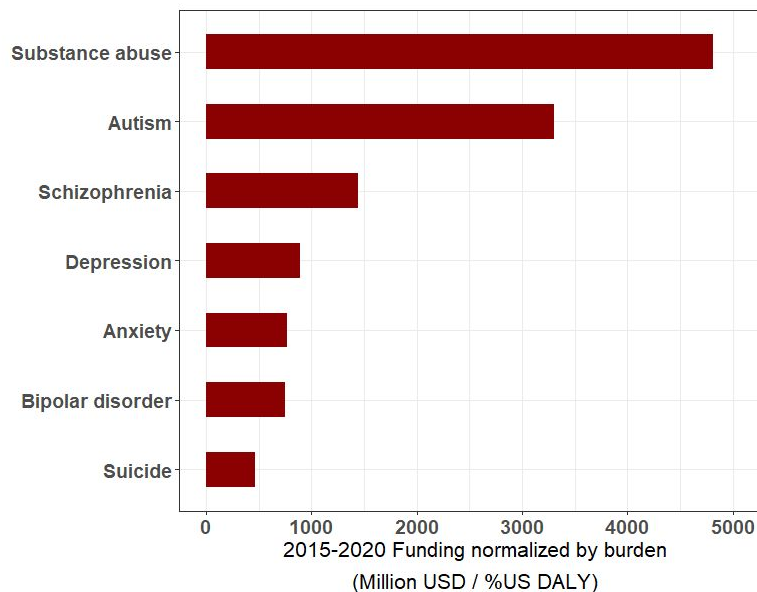
## **III-Funding by condition**

Using the [categorical spending data from the NIH](#), we calculated the funding allocated for research on different mental health conditions between 2015 and 2020. Next is a figure showing the information obtained.



We can see that substance abuse receives a much larger amount of money than the other areas. This is largely due to the fact that three different NIH agencies (NIMH, NIDA, AND NIAAA) contribute to fund this area. The amount of money allocated to each NIH agency is determined by congress, and given that the opioid epidemic is a major issue in America, they have decided to fund substance abuse related research pretty heavily in the last few years.

If we normalize this funding by the [DALYs associated to each of the conditions](#), then substance abuse still appears overfunded compared to the rest. Research related to suicide, bipolar disorder, anxiety and depression is underfunded with respect to the burden of those in the US.



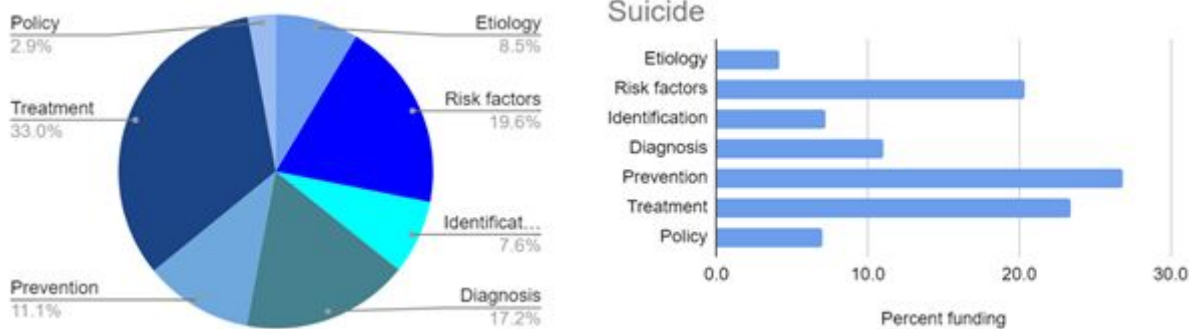
Talking to a few group leaders in NIMH (like Jane Pearson and Ann Wagner), each subgroup appears to operate in a different way. Some of them, for example the autism group led by Ann Wagner, set certain priorities for research to be funded before the cycle begins, and then after a first cycle of peer study selection of applications to fund, they use those priorities to select from that first pool. Others, like the suicide prevention group led by Jane

Pearson, have priorities in mind but usually don't use them to select applications. She claims that it rather works as an 'on demand' process, where the topics that have the most researchers working on them will get the most funding. She believes this to be the case across the board for funding conditions within NIMH as a whole. If that's the case, it could be that research in bipolar disorder appears underfunded because there are less scientists working on it, rather than the applications having a lower success rate. However, even if that was the case, funneling money to those underfunded areas could lead more scientists to study them, which could generate promising pilot data that then leads the NIH to further fund those, and getting more people working on them, thus generating a virtuous cycle.

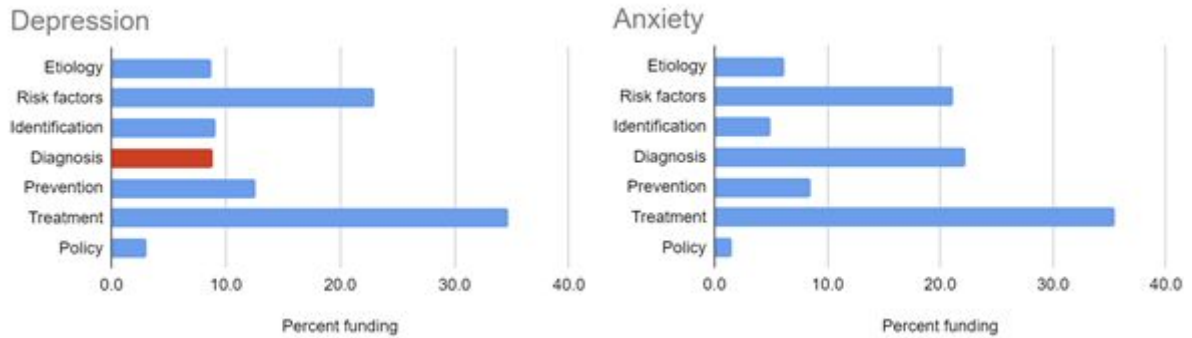
***We believe that it should be a priority to fund approaches in these areas that have a high burden of disease but receive less funding. Bipolar disorder and suicide have a huge burden based on the severity of the conditions, and depression and anxiety have a huge burden based on the number of people they affect each year. All of these would benefit from funding being invested in prevention and early intervention strategies, that could impact the most people and drastically reduce the burden of the conditions. Severe illnesses like bipolar disorder and suicide attempts could additional benefit from pilot studies of innovative approaches for studying their root causes and look for better treatments.***

#### **IV-Funding by focus of research:**

If we divide the research being conducted for each disease in specific categories (etiology, risk factors, identification, diagnosis, prevention, treatment and policy) we can identify trends in current funding querying the [NIH databases](#). Across the mental health landscape, the area of research that gets the maximum funding is treatment, whereas policy-focused research seems to be the least funded. This is true for different mental health conditions including substance abuse, anxiety, depression, autism, bipolar disorder, and schizophrenia. Suicide is an exception, wherein the predominant focus is on prevention.



When it comes to the differences in the other areas, a few observations stand out. For example, depression lags behind most other disorders in terms of share of funding for diagnosis research, particularly behind anxiety despite having significant overlap in terms of diagnosis and treatment approaches.



Moreover, autism is the only condition which has a double-digit percentage share for the identification area. For all other conditions, the share of funding invested in overall research in identification is quite small, indicating a relatively smaller focus on early identification as compared to treatment, even though early identification could be quite significant in addressing some of these conditions in time.

***Given these observations, in agreement with the observations we have made for the different dimensions and focus areas, we believe that philanthropists could have the biggest impact by funding interventions related to addressing the early stages of mental illness, focusing on prevention, identification and early interventions. Specific considerations could be made for the different conditions. For example, if interested in funding Depression, given that diagnosis seems to be underfunded, it could be useful to fund approaches to provide better diagnostics, such as the digital monitoring tools mentioned in the cross-diagnostics section, or community-based approaches providing training to different personnel such as the ones mentioned in the early identification section.***