

Testimony Before the House Research and Technology Subcommittee
(Chair Rep. Haley Stevens)

Introduction

Good morning Chairwoman Stevens, Ranking Member Baird and members of the subcommittee, and thank you for allowing me to address you today. My name is David Stone, I am the vice president for research at Oakland University. I also hold full professorships in public health and philosophy.

Oakland University sits proudly in Chair Stevens' district and provides undergraduate, graduate, professional, and medical education to about 19,000 students, who come largely from the surrounding counties in Southeast Michigan. Oakland is classified as a Research 2 university and does provide doctoral training in the physical and mathematical sciences and engineering that is supported by federal funding. But for the purposes of my comments today, Oakland is representing, and speaking to the challenges of, the nearly 400 regional public universities around the nation that are neither State flagship or Land Grant institutions.

Individually, regional universities do not have the same size research footprint as our states' flagship and land grant institutions, but collectively, we educate and train a larger share of the nation's scientists and engineers, and the scientific achievements of our faculty are not to be gainsaid. Regional universities, which include our historically black colleges and universities, and many of our Hispanic and minority serving institutions, are the backbone of the US science, engineering, and technology workforce pipeline. We accomplish this, in large part, by focusing effort and resources specifically on providing meaningful research experiences for our undergraduate students that engage them directly with faculty, solving real problems, and contributing to the scientific record by publishing their results. Through this effort, we also serve as the launching pad for the vast majority of the underrepresented minority students and first generation college students who bring a diversity of experiences, perspectives, and goals to our science and engineering workforce.

In my testimony today, I want to briefly provide you with a sense of the initial negative impacts of the pandemic shutdown in the spring, the ongoing challenges to research and training, and the likely future harm of the pandemic on research and the STEM pipeline. I will then discuss the importance of addressing these consequences and what may happen if we fail to act to address these impacts. Finally, I will discuss some of the steps we might take and comment on pending legislation to overcome these challenges and ensure that the US maintains a robust research enterprise and an unbroken pipeline of students into careers in science and engineering.

Initial Impact

In Michigan, the initial Impact of the COVID-19 Pandemic arrived on March 13 with Governor Whitmer's emergency stay at home order. From that moment, with the exception of essential activities and research on COVID-19 itself, all laboratory-based research, all field research, and all face-to-face human subjects research at Oakland and on campuses across Michigan stopped. Faculty, research staff, and students were all forced to put down their pipettes, shut down their fMRIs, turn off their computers, say goodbye to their subjects and colleagues, and walk away from their unanswered hypotheses.

The shutdown lasted 2 and a half months. At that point, on June 5, laboratory research was permitted to restart under strict public health guidelines to protect the health and safety of faculty, research staff, and students. These guidelines included specific limitations on the density of personnel in labs, the use of personal protective equipment, the times individuals could remain in shared indoor space, and specific requirements for cleaning and disinfecting surfaces. As seems to have been true for most universities across the country, initial reopening guidelines prohibited undergraduates from returning to labs. While this posed less of a challenge to larger research universities, which tend to rely more heavily on graduate students and post-doctoral researchers, it posed a significant challenge to regional institutions, which tend to rely heavily on undergraduates to assist faculty with their research.

During this period, we estimate that more than 90% of lab, field, and human subjects research were forced to shut down. As was the practice at other universities, Oakland University investigators continued to expend federal grant funds to pay their students and their staff to conduct whatever other project-related work they could during the shut-down, but in most cases, direct progress toward project goals ceased entirely.

Identifiable losses from this period include the loss of specimens and reagents, the canceling of industry contracts (which entailed the loss of funding to support students working on those projects), and the loss of the planting and growing season for our organic garden. Also lost are a whole category of social and behavioral studies looking at factors such as nutrition, weight gain, sleep patterns, education, child development, and exercise. These studies are lost not simply because pandemic protections inhibit methodologies for data collection, but because the normal conditions against which interventions were to be tested are no longer in place, and without those normal baselines, social circumstances, and behavior patterns, results of these studies cannot be compared to prior (or future) studies in the literature. The loss of such studies affects not only the results of these efforts, but they delay, and in some cases derail long-standing research trajectories and plans for, and the timing of, future, larger-scale studies.

While we are still working through the COGR Research Impact Metric model to determine the full financial costs of our immediate losses, it is clear that delays and barriers to full productivity will add significantly to those losses as we move forward.

Examples of pandemic effects on research:

Our chemistry department has a very successful and productive NIH-funded study that has been continuously funded for 33 years. The study looks at DNA damage in cells produced by gamma rays, which is important during long-duration space flights. When faculty for this project were allowed back into their labs in June, they began to prepare for their next use of the National Superconducting Cyclotron at Michigan State University. They quickly realized, however, that the only person on their team who knew how to fabricate their nanoparticle samples, one Mr. Alex Stark, was an undergraduate who was not allowed back in the lab. The Principal Investigator petitioned me to make an exception, but alas, I could not contravene the Governor's executive order. In the end, this high-powered team had to wait six more very unproductive weeks to get their expert undergraduate back in the lab.

A second example tells a very different kind of story. In many states, regional universities train the bulk of the local nursing workforce. When the pandemic came to Michigan, nursing research at Oakland ceased immediately; not because we closed the labs, but because every nurse grabbed a mask and a gown and ran to the hospital. Our medical students and faculty did the same, and we couldn't be prouder. However, while these students and faculty stepped up to care for the community, the work they had been doing to further research and complete the students' education came to a halt.

Current Impacts

As we invite students back to campus for the fall semester, most of our science and engineering labs should have been able to reopen. However, the ongoing constraints imposed by pandemic precautions, including limitations on density and proximity, are limiting productivity and, in some cases, prohibiting certain kinds of experiments and training opportunities.

Currently, three months after the Governor permitted reopening, only 53% of all of our research labs have filed plans with the Research Office and resumed work in their labs. Forty-seven percent of our labs have not even filed plans at this point. In terms of our funded research, only about 35% of our funded research personnel are back at work. These figures no doubt reflect challenges posed by social distancing requirements, personnel density limitations, and supply shortages. However, they also reflect our inability, as yet, to be able to restart projects that require face-to-face data collection, research that requires travel, research that involves collaborators from other institutions, including international colleagues, and engagement with specialized facilities (off campus labs, zoos, nature conservancies).

These trends, coupled with the frank losses of specimens, cell lines, reagents, seasons, and in some cases, normalcy, indicate that the level of need among our faculty for agencies to provide so-called for-cost extensions is going to be much greater than was predicted by the length of the shutdown. For many, if not most labs, the return to full productivity in the near term may be impossible.

And perhaps more importantly, for institutions like Oakland, the immediate effects of these limitations on the research effort will be the costs to undergraduate students looking for the research experiences that they need to compete for medical school or graduate school admissions, to connect with a mentor to help them navigate the undergraduate experience, or to demonstrate to an employer that they have the latest skills or the ability to see a complex set of activities through to completion. We, like many other regional institutions, have large numbers of undergraduate Honors College students who rely on lab and research placements to complete capstones and honors theses that are required for graduation. Already, just a week into the semester, I am hearing from faculty that their inboxes and voice mails are filling up with frantic student requests for placement in a lab or involvement on a project. One faculty member told me she has already agreed to take five honors students into her research program on disabilities. In a “normal” year, this faculty might take one honors student at most.

I would be remiss if I did not also point out that the impacts on the university extend well beyond the laboratory. OU has incurred more than \$25 Million in financial losses connected to the pandemic, and those costs are growing as we work to operate in a hybrid educational model for our undergraduates. These losses have been significant, and while we appreciated the CARES act funding of universities, those funds made up for less than half of the costs we have already incurred.

Future/ongoing impacts of pandemic

These challenges, which so far are only consequences of the shutdown during the onset of the pandemic and the protective requirements of pandemic response, will soon be greatly exacerbated by impending State revenue losses (for FY20 *and* FY21); and that assumes we do not see a legitimate second wave of the virus or combinations of COVID-19 and influenza that push us back into full or partial shutdowns.

At regional universities, while some undergraduate research takes place through federally funded research, for example on NIH R15 grants or NSF Research for Undergraduate Experience programs, the majority is funded internally and at the margins. At Oakland University, which strives to keep tuition as affordable as possible, State appropriations provide only about \$3,000 per student. Per capita funding levels like these at regional institutions allow for very little support for undergraduate research. Significant cuts in State higher education funding will dramatically limit our ability to provide those opportunities, which in turn, will cause significant damage to the science and engineering workforce pipelines. And if these cuts become the basis for future State appropriations, it will take years for current funding levels to be restored, further exacerbating the damage.

Let me give one example of the kind of undergraduate research program that Oakland University supports from its State appropriation that reveals the importance of such programs and the angst we feel at the prospect of losing them. The Summer Undergraduate Program in

Eye Research (SUPER program) has been in place at Oakland University's world renowned Eye Research Institute (ERI) for the past 20 years. Over that time, the program has trained approximately 100 exceptional undergrads in research techniques. The students work one-on-one with ERI faculty for 12 weeks during the summer and receive a stipend of \$4,000. In the early 2000s, an undergraduate named Cristina Kapustij conducted vision research in the ERI and co-authored a scientific paper with an ERI faculty member and a faculty member in the Department of Physics. She presented results of her work at an undergraduate research conference at the University of Michigan at Dearborn. She later went on to attend Law School at Georgetown, serve as a Congressional Health Fellow in the office of Representative John Dingell, and be a policy analyst at Duke University's Center for Genome Ethics, Law and Policy. She is currently Chief of Policy and Program Analysis at the National Human Genome Research Institute in Bethesda, MD. Others have gone on to scientific careers at places like Pfizer or in academe, and many used their experience to attend medical school and are now practicing ophthalmologists with a bent toward research. This is the kind of highly successful program we fear will be lost if our State funding is diminished.

Undergraduate research is a high impact practice that has been shown to support retention and completion among all students, and can be critical for students from underrepresented minority populations and first generation students. As we think about the significant contributions that regional institutions make to the science and engineering workforce pipelines, it is important to remember that even with the current levels of support for undergraduate research, only 40% of all students who pursue a STEM degree actually graduate in STEM, and that figure is only 20% for students from underrepresented minorities (Altman, et al.). It has also been shown that students who get exposure to STEM disciplines through undergraduate research projects are "more likely to remain in college and persist in STEM majors" (Ibid.). Without additional support to both universities and to State budgets, the combined effects of pandemic precautions and reductions in funding at the State and Federal levels will significantly damage the science and engineering workforce pipelines, especially for women, minorities, and first generation students.

What do we need?

We need a national plan to address the pandemic – we cannot move forward until the pandemic is handled. We need a coordinated federal and state response that includes: increased rapid testing capability that is less expensive and tied to aggressive and effective contact tracing; clear and consistent messaging on mask-wearing, social distancing, density restrictions, and the risks posed by aerosols; transparency with regard to vaccine development, testing, selection, and deployment; and policies that support people who choose to self-isolate and quarantine out of concern they may be spreading the virus.

Oakland University fully supports passage of the Research Investment to Spark the Economy (RISE) Act to cover the costs of the pandemic directly on research, including funding for the research agencies. It becomes clearer by the month that the limitations imposed by pandemic

precautions are significantly limiting research productivity. At Oakland, where most of our research facilities were constructed in the 1960s, a high proportion of our labs can now accommodate only two people, which in many cases is too few to accomplish essential tasks. It has also rendered impossible most of the hands-on training elements so critical to graduate student apprenticeship. Workarounds for all of these barriers will be more time-consuming than old methods and will require additional resources.

Beyond the resources provided to our funded investigators through the Rise Act, a deal is needed on the fourth stimulus bill – the university funding in both the House and Senate proposals is vital to shoring up the financial condition of universities across the nation. This is funding necessary to keep many institutions viable.

In addition, it is essential that the stimulus bill include funding relief for State governments. State funding of public universities is a critical element to the financial health of these institutions. Michigan just announced in August that they will reallocate resources and tap rainy day funds to shrink a \$3B funding gap down to \$1 Billion for the next fiscal year. That figure is just shy of 10% of the state's discretionary budget. It is a budget shortfall that has already resulted in an 11% cut to public universities, which we felt just last month when the cut was imposed on our state payment. Importantly, the cuts get worse in the next two fiscal years – as current expectations are that the state is facing an approximately \$2 – 3 Billion cut for the next fiscal year and some estimate another \$2B for the year after that. These cuts will have to be passed onto the universities and we will be put in the untenable position of raising tuition during a serious financial crisis – preventing access, and losing students – or absorbing the cuts, which will require massive cuts to programs and people. Every state is facing this same dilemma.

Thus, the stimulus funding MUST include support for State budgets, or our ability to provide the research opportunities for undergraduates will be severely limited. Let me say that again, if the federal government does not provide substantial relief to both universities and the States in the next stimulus, the budget cuts facing regional public universities around the nation will effectively eliminate our capacity to provide research opportunities for undergraduate students, negatively impacting the workforce pipeline in critical areas, and diminishing their capacity to contribute to new knowledge for years to come.

For those already in the pipeline, we also need to ensure that there are opportunities for them to go on to graduate programs. To that end, Oakland University endorses the Supporting Early Career Researchers Act (H.R.8044). This innovative bill would establish a pilot program to award grants to qualifying early investigators to conduct independent research for 2 years. While this bill limits its support to investigators whose work can be supported by the National Science Foundation, it is an important proposal because, as identified above, these new investigators are currently experiencing great difficulty in advancing their research.

In fact, all research agencies need to place greater emphasis on early investigator grants. There is a tendency during a crisis to rally funding for large facilities, initiatives, and institutions. And

while this is understandable, keeping the *entire* research enterprise healthy is critical to both the national economy and health of our people. It is imperative that research funding be distributed more widely. We all know that life circumstances distribute talent such that great ideas often come from unexpected places. This lesson should show us the value of distributing resources across the spectrum of institutions so that we imbue our science and engineering workforce pipeline with the full diversity of experiences, perspectives, talents, and goals.

Finally, we must resist the temptation to concentrate all research funding increases on bio-medical responses to the COVID-19 virus itself. Yes, we need significant investments in NIH, CDC and FDA. However, we cannot forget the other areas and agencies that are playing critical roles in addressing the pandemic, particularly computational/modeling research, human behavior research, and improved testing/detection and tracing activities.

In conclusion, I am here asking for your help. America must maintain a robust research enterprise and a healthy workforce pipeline for science, engineering, and technology. It is therefore imperative that you act now to pass these two bills and complete a fourth stimulus that includes direct university funding, funding for the research agencies, AND the relief for state governments. Failure to do so will have huge negative impacts on our economy and on the students across our country who have committed their lives and livelihoods to science, and who are working hard right now to serve our nation and the world through their talents, their energy, and their ideas.

In that spirit, I ask each of you to support these proposals.

Thank you.

References:

CUR Whitepaper #1: *Undergraduate Research: A Road Map for Meeting Future National Needs and Competing in a World of Change*, Joanne D. Altman, Tsu-Ming Chiang, Christian S. Hamann, Huda Makhluף, Virginia Peterson, and Sara E. Orel, 2019.