

Science in Society
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6 July 2014

Scientific Management Review Board
Pre-college Engagement in Biomedical Sciences (PEBS) Committee
National Institutes of Health
9000 Rockville Pike
Bethesda, MD 20892

Dear Committee Members,

I am writing to express my strong support for NIH's investment in K-12 education programs. As a NIH-funded investigator and PI of a Science Education Partnership Award (SEPA) award, I have seen first-hand the incredible difference that NIH funding can make in young people's lives, and for the teachers and community groups that support them.

As you're likely aware, the educational research literature clearly shows that interest in STEM and healthcare careers begins far before college. Robert Tai and colleagues at the University of Virginia have shown that the late elementary and middle school years are critical for shaping longer-term career attitudes and interests. The educational literature also highlights mentoring, educational support, and authentic science experiences during the K-12 years as important variables. Thus, if NIH is to fulfill its mission to prepare and diversify the biomedical workforce of tomorrow, investments in K-12 education today are essential.

Our NIH/SEPA-funded Science Club program uses a mentor-based approach to build science skills and foster interest in health careers among youth in grades 5-8 (summary attached). The program is in partnership with a youth-focused community group, the Pedersen-McCormick Boys & Girls Club in Chicago. Northwestern STEM graduate students serve as small group mentors, with mentor-mentee groups persisting from quarter to quarter and year to year. Some kids have been associated with our program for 6 years!

Does it work? Absolutely. One of our first students back in 2008, Myles, just finished his sophomore year at the University of Kentucky. He is majoring in biomedical engineering. As an eighth grader he was not considering science at all - his mind was set on business or accounting (influenced by his mother). He had not had an authentic science experience in school, or ever met a practicing scientist.

Science Club completely changed Myles' mind. Based on the engaging health-related activities and mentorship he received, he decided to take more math and science courses in high school, which led to his career-changing decision. And this spring, I helped Myles secure a summer internship with an orthopaedic surgeon/biomedical engineer studying artificial joints. Without Science Club's support, none of this would have happened.

Two Science Club alumnae, Lucy and Sandra, just finished their freshman year in college, majoring in exercise science, and nursing, respectively. Another Science Club alumna will start at the University of Iowa this fall as a biology major.

Prior to Science Club's inception, the Boys & Girls Club had seen virtually zero interest in science & health careers – only one student in the past 10+ years had gone on to post-secondary training in a health-related career. The four students I listed above, as well as a strong pipeline behind, are evidence that our approach really works to engage, inspire, and support underserved youth to pursue health careers.

In fact, one of our former eighth grade students, Sandy, a first-generation American whose annual family income is less than \$12,000, received a full-ride scholarship to attend high school at the Latin School of Chicago. Latin is the premier private high school in all of Chicago, with a tuition rate of more than \$40,000 per year. Without Science Club's involvement in pushing her academically, helping bring this opportunity to her attention, working to help educate her mother about the opportunity, physically driving her to the school for a required pre-test, helping her assemble and submit her mother's financial paperwork, and paying for application fees, the opportunity would have been lost. This year, we provided similar support to two more Science Club youth, Alice and Jennifer, who also received full-ride scholarships. In fall 2014 they will matriculate as high school freshmen at Latin. That's three students in the last two years.

Beyond those students who do not choose a career in science, they learn valuable critical thinking, data, and scientific skills (designing experiments, reading data tables, use of control variables, experimental error, scientific vs non-scientific questions, etc.). We use two independent methods to evaluate scientific skills learning, both of which show a 30% increase in skills for Science Club youth compared to well-matched controls. A school principal recently posted our data on her office wall as goal for what schools should be accomplishing. This data will be published in the coming year.

Finally, I would be remiss not to mention the tremendous impact of Science Club on our graduate student and postdoctoral mentors - the lifeblood of Science Club. The average time of mentors in our program is approximately 1.5 years (and rising). We provide deep training in pedagogy, community engagement, program design, and evaluation. Case/control surveys reveal that our mentors are better able to design goal-oriented, rigorously evaluated outreach programs. Science Club dramatically improves graduate students' science communication skills, and helps them emulate good scientific practices in their own research. Many mentors report that Science Club reignites their interest in science - helping them remember why they fell in love with science during their elementary and middle school years. These results, too, will be published in the coming year.

Finally, Science Club provides a much-needed opportunity for graduate students and postdocs to explore alternative career pathways. In the last three years, Science Club has produced three AAAS Science & Policy Fellowship winners. Many of our mentors have decided to pursue careers in teaching and science education. The Assistant Director of my office, Rebecca Daugherty, was a three-year mentor and made the switch to informal science based wholly on her Science Club experience. I know this is an important goal of NIH's, as your recent NIH-BEST program announcement attests.

All of this is to say that SEPA programs like Science Club are of exceptional value. They inspire and educate underserved youth. They support teachers and educators in urban, high poverty schools. They train our graduate students how to be engaged and effective science ambassadors in their community. All of these amazing outcomes are consistent with NIH's mission to train and educate the biomedical workforce of tomorrow. I respectfully ask that NIH continue and even expand this support.

Please do not hesitate to contact me if you have any questions or would like hear more from our students and mentors.

Most sincerely,

A handwritten signature in black ink that reads "Michael Kennedy". The signature is written in a cursive, flowing style.

Michael Kennedy, PhD
Director, Science in Society
Research Assistant Professor, Center for Genetic Medicine

engage



SCIENCE CLUB

A mentor-based after school program at the Pedersen-McCormick Boys & Girls Club

Science Club offers a new approach to urban science education, designed around long-term mentoring relationships. It integrates community expertise from the Boys & Girls Clubs of Chicago, dedicated teachers from Chicago Public Schools, and engaging scientist mentors from Northwestern University to form a powerful educational team.

On a weekly basis throughout the year, youth work in small groups with Northwestern scientists on fun, engaging curricula designed to foster creativity, critical thinking, writing, and analytic skills. Mentor-youth relationships persist from quarter to quarter and year to year, creating bonds and deeper learning that will last a lifetime.

Mentors benefit tremendously from the experience, too. They learn advanced teaching skills, strategies to design curriculum, and evaluation techniques that prepare them to be engaged scientists and informal science education leaders.

Visit us online at scienceclub.northwestern.edu

Science Club is an educational research study made possible by a Science Education Partnership Award (SEPA) from the National Institutes of Health (#R25OD011033-05 IRB #STU13112)

mentor



inspire

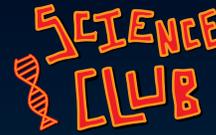


**BOYS & GIRLS CLUBS
OF CHICAGO**



**NORTHWESTERN
UNIVERSITY**

COMMUNITY IMPACT



INSPIRING AND TEACHING URBAN YOUTH

- Science Club mentors have inspired and trained more than 200 middle school students in Chicago Public Schools
- Each child in Science Club receives 50 hours of mentor-led, engaging, and challenging science instruction throughout the academic year. In many cases, this doubles the amount of classroom science instruction received in school
- The average student's time in the program is over one year; some students have been in the program for more than five years
- Rigorous evaluation data collected over the last three years at three separate schools show a dramatic increase of 30% in science skills compared to well-matched controls
- Science Club plays a critical role helping 8th graders apply to selective enrollment high schools. Since 2012, three students have received full-ride scholarships to attend high school at Latin School of Chicago, valued at \$130,000 each
- Science Club inspires youth to choose health careers. Alumni are pursuing college majors in biology, nursing, exercise science, physical therapy, and biomedical engineering

TRAINING GRADUATE STUDENT & STAFF MENTORS

- 80 Northwestern University science mentors - graduate students and staff - received training in advanced teaching skills, curriculum design, program evaluation, and community engagement. This not only makes them better scientists and teachers, but better citizens
- Average mentor time in the program is a year and a half and rising
- In the last four years, three Science Club Mentors have received prestigious AAAS Science & Policy Fellowships

SCHOOLS, COMMUNITY GROUPS, and JOBS

- Science Club supports science education at nine Chicago schools (Stewart, McCutcheon, Goudy, Bateman, Budlong, Nettelhorst, Thorp, St. Stans, Jahn) and two community sites (Pedersen-McCormick and General Wood Boys & Girls Clubs)
- Funding from the National Institutes of Health supports 9 jobs: three at Northwestern University, three at the Boys & Girls Club, and three at an evaluation firm

Science Club is supported by a Science Education Partnership Award from the National Institutes of Health

