

Summer Academy to Inspire Learning (SAIL) 2017 Evaluation Report

The Summer Academy to Inspire Learning ([SAIL](#)) is a week-long summer camp for high school students organized in collaboration between faculty at PSU and the Youth Engaged in Science (YES!) program in the Fair Neuroimaging Lab ([FNL](#)) at OHSU. SAIL at PSU was launched in summer 2011 and is modeled after the SAIL program at the University of Oregon which was started in 2006. The program is free to students and led by volunteer faculty with the aim of increasing the number of low-income and underrepresented minority students enrolling and succeeding in college. Faculty work closely with administrators and teachers at the lowest socio-economic status (SES) middle and high schools in the Portland area to recruit students who have the potential to succeed in college, but are at risk of not realizing this potential due to low family income, parents without college educations, or related factors. To ensure success in the long run, SAIL follows students throughout their high school education inviting them back to a new camp each year.

The SAIL curriculum at PSU is designed to allow students to experience the college environment through activities ranging from academic talks by volunteer faculty from different disciplines, to sessions on financial aid and admissions, to academic tutoring and SAT preparation. An integral part of the curriculum includes activities that educate and inform about socially responsible practices related to financial and environmental sustainability.

The Fair Neuroimaging Lab's YES! program has been leading the SAIL summer camp at OHSU for the past 6 years, providing educational programs and tours of various OHSU institutions and research labs. This year, YES! welcomed 12 students from [Reynolds](#), [Park Rose](#), [Gresham](#), and [David Douglas](#) high schools for our annual SAIL program held between July 17th – July 20th at OHSU. The SAIL curriculum at OHSU focuses on introducing students to Science Technology Engineering and Mathematics (STEM) careers.

VirtuOHSU Simulation and Surgical Training Center Tour

SAIL 2017 at OHSU kicked off the afternoon of Monday July 17th with a tour of the [VirtuOHSU Simulation and Surgical Training Center](#). Prior to the tour, our group attended a "Surgery 101" presentation provided by Dr. Donn Spight, Medical Director of VirtuOHSU and Associate Professor of Surgery in the Division of Gastrointestinal and General Surgery at the OHSU School of Medicine. Dr. Spight provided an engaging presentation describing different surgical procedures and their clinical applications, including minimally invasive surgery, which is his Dr. Spight's specialty. His presentation included an interactive discussion about the various tools used in surgery, which the students got to hold, learn how to use, and pass around. Towards the end of his presentation, Dr. Spight, along with Patrick Corran, Simulation Operations Specialist and Bryan Shryner, Simulation Assistant at VirtuOHSU held a career discussion with the students. The students learned about the steps they would need to take, including college courses as well as research/internship experience that would lead to medical careers.

The group was then split in two; half the group attended a hands-on suturing lesson led by Bryan Shryner and Patrick Corran, while the other half attended a hands-on laparoscopic surgery simulation using VirtuOHSU's state-of-the-art tools and laparoscopy simulators.

EEG demonstrations in Dr. Sarah Karlunas' Lab

The morning of Tuesday, July 18th the group headed to Dr. Sarah Karlunas' lab to get a demonstration of the research applications of Electroencephalography (EEG). EEG is a noninvasive brain imaging tool that records electrical activity using multiple electrodes placed on the scalp. Christiana Smith, a research technician in the lab gave the students a brief description of how the electrodes measure voltage fluctuations generated by neural activity.

Through the process, students had a chance learn about the different components of, and the electrical properties that govern nerve cells. The discussions also touched on the different clinical applications of EEG, such as in diagnosing epilepsy and sleep disorders, as well as the research applications in the Karalunas lab investigating the brain-basis of



developmental disorders such as Attention Deficit Hyperactivity Disorder (ADHD). Finally, the students had a chance to learn about and participate in a variety of neuropsychological assessments that the Karalunas lab usually administers to research subjects, giving the students a glimpse of what being a research subject entails.

Advanced Imaging Research Center Tour

Next, before heading out to lunch, our group headed to the [Advanced Imaging Research Center](#) to get a tour of the MRI facilities used for research purposes. Dr. Alex Stevens welcomed our group with a big smile, escorted us to the restricted rooms housing the 7-tesla MRI machine. Before getting a chance to see the scanners, Dr. Stevens provided an MR safety check to ensure that all of us were de-magnetized. Keys, cellphones, credit cards and all metals had to be taken out of our pockets and put away. He also ensured that none of us had MRI-contraindications, such as metallic devices in our body which would become lethal if placed close to the powerful magnets in the MRI machines. The students had a chance to learn how MRI machines work, the types of MR images that can be generated using different sequences, and the types of clinical and research applications that those MR images can be used for.

Portland Alcohol Research Center Presentation

On Tuesday afternoon, the group attended a presentation by Dr. Mark Rutledge-Gorman from the [Portland Alcohol Research Center](#). Mark's lecture focused on the effects of alcohol (and

other drugs such as methamphetamine) on the nervous system. Students learned about the neurotransmitter pathways and brain regions that are affected by alcohol, as well as the effects of acute and extended alcohol use on brain functioning. The students had a chance to experience the effects of alcohol on visuo-motor tasks (walking in a straight line) using prism goggles that were designed to



simulate the effects of alcohol on the visual system. Mark's presentation concluded by turning the students into young scientists. The students conducted an interactive simulated experiment to examine the dose-dependent effects of alcohol on spatial exploratory behavior of different genetic strains of mice.

Medical Tools Station

Following Mark's lecture, the group attended a "Medical Tools Station" organized by Mollie Marr, MD. PhD. candidate in



Behavioral Neuroscience and Natalie Virell, 3rd year medical student in the School of Medicine. In the hands-on demonstration, Mollie and Natalie demonstrated how stethoscopes are used to assess lung and heart health. The students also learned how to use reflex hammers to test for tendon reflexes, a simple neurological exam used to test for central and peripheral nervous system abnormalities. Other demonstrations included the use of otoscopes and tuning forks to assess auditory function. Despite attending the demonstrations late in the day, the students were enthusiastically engaged by Mollie and Natalie's dynamic and interactive presentation.



Oregon National Primate Research Center Tour

The next day, the group boarded a shuttle bus and headed for a tour of the [Oregon National Primate Research Center](#). Our tour began with a presentation by Lynda Jones that provided a brief history of the primate center, the types of animals present, and the types of scientific research conducted at the center. For instance, the group learned how a condition resembling multiple sclerosis developed in the Japanese macaque population at the primate center, offering the center scientists a unique opportunity to study the neurodegenerative disorder

using primate models. Following Lynda's presentation, our group was split into two and given tours of the outdoor corrals housing the primates. Students had a chance to observe group interactions in different primate species, which operate under a hierarchical social structure that dictates play and amicable relationships as well as settles disputes when they occur.

Human Performance Labs Tour

The group returned in the afternoon for a tour of the [Human Performance Labs](#). We were greeted by Alex Kanable, exercise physiologist and research technician in the lab. Alex explained how experts in sports medicine help their clients, often elite athletes, reach their fitness potential and how they help improve the athletes' performance. Next, Alex recruited one of us to volunteer for a hands-on demonstration of the health and fitness evaluation procedures in the lab. Dr. Binyam Nardos, organizer of the SAIL program at OHSU, was the lucky contender for the demo. Alex, and Dr. Kerry Kuehl, Section Chief and Director of the Lab, conducted the evaluation process via monitoring of Binyam's resting and active blood pressure, as well as monitoring heart rate at rest and during exercise using electrocardiography (ECG). Following discussion of how they assess heart and lung function, Dr. Kuehl and Alex discussed healthy nutrition and exercise habits, and gave each of us a pedometer as a parting gift.



Brains & Art with NW-NOGGIN

The final day of the SAIL camp started with a "Brains & Art" session with the North West Neuroscience Outreach Group Growing In Networks (NWNNOGGIN, <http://nwnoggin.org/>). NWNNOGGIN volunteers and Dr. Bill Griesar, co-founder of the outreach program, came equipped with real human brains and supplies for constructing neuroscience inspired art, such as pipe-cleaner neurons. The SAIL students spent the morning talking about a variety of neuroscience topics ranging from how alcohol and other psychoactive drugs such as methamphetamine affect the brain, to discussions of neurodevelopmental disorders such as ADHD, and conversations about the effects of emotional context and race on face perception.

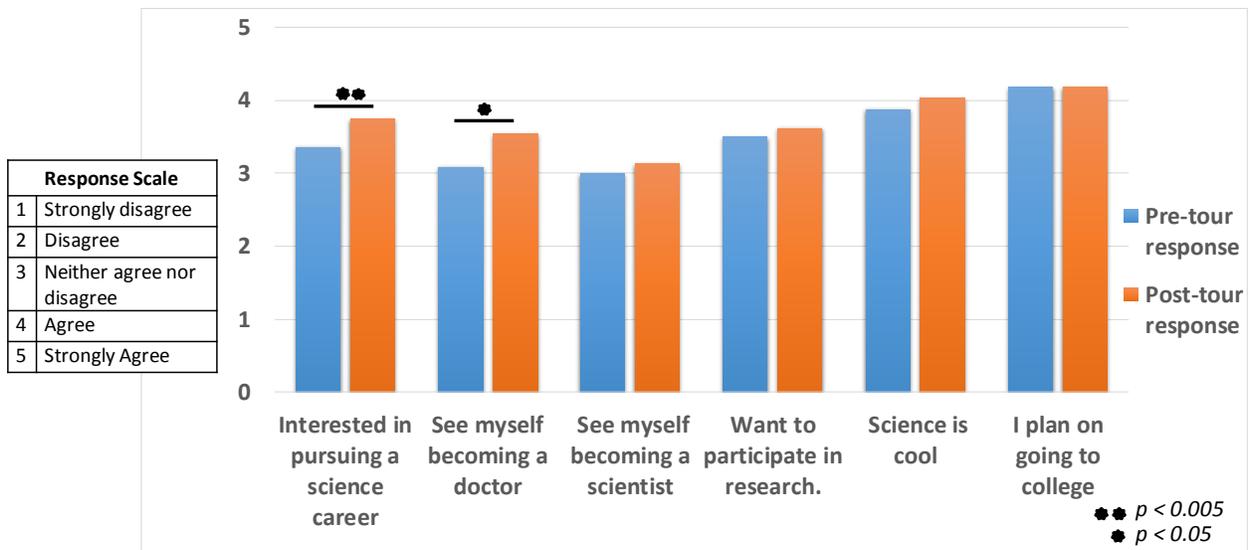


SAIL 2017 culminated with conversations between the SAIL students and a career panel composed of several members of the NW NOGGIN outreach group as well as members of the Fair Neuroimaging Lab who were at different stages of their careers. The SAIL students had a chance to hear about the different trajectories followed by each of the

panel attendees that led to their current juncture. The students learned that there was no clearly defined path to becoming a neuroscientist; instead different types of training, be it in computer science, biological sciences, psychology, and biomedical engineering can all prepare one for a successful career as a neuroscientist. Another constant theme that emerged from the discussions was the importance of identifying and establishing close connections with multiple mentors, be it for career advice or just to discuss challenging life issues. The students learned the instrumental role that mentors played in the lives and careers of the panel attendees. Our discussions concluded with a message from Dr. Nardos encouraging the SAIL students to maintain the connections established in SAIL 2017, and affirming that the door is always open for the students if ever they need career guidance in the future.

Survey-based evaluations

To facilitate evaluation of SAIL 2017, the 12 student participants filled out surveys at the beginning and end of the program. The chart below summarizes responses to survey questions that allow paired comparison of pre vs. post-tour sentiments. Students' attitudes towards science were generally impacted positively, with students expressing greater interest in pursuing science careers following the SAIL tour, relative to the beginning of the tour (paired $t(11) = 3.20, p < 0.005$). The SAIL tour also boosted student confidence in pursuing STEM careers; students saw themselves becoming doctors with greater confidence following the tour relative to before (paired $t(11) = 2.42, p < 0.05$).



Students also indicated that the SAIL tour was a great learning opportunity, as indicated by their attitudes about what they learned during specific tours.

Survey questions	Post tour mean response
I learned something new about the brain	4.45
I learned something new about how scientists study the brain	4.55
I learned something new about how alcohol affects the brain	4.45
I learned something new about human anatomy	4.42
I learned something new about surgery	4.75

Response Scale	
1	Strongly disagree
2	Disagree
3	Neither agree nor disagree
4	Agree
5	Strongly Agree

Finally, students were also provided with open ended questions to further assess the program. The questions, and selected student answers are below:

What was your favorite part of the tour? Least favorite part?

- “The suturing and robotic arms were very entertaining”
- “My favorite part of the activities was when we did the virtual reality playground....least favorite part was the suturing and my hands getting sore”
- “My favorite part was learning about the MRI”
- “My favorite part was messing with the aluminum in the MRI tour”
- “I loved seeing the MRI machine...no least favorite part”
- “My favorite part was learning about the brain”
- “My favorite part was the hands on experience with the medical tools”
- “How the goggles make you see how drunk and how delusional you could be”

How can we we make the program or activities better?

- “two different games on the robot tools”
- “more people to teach us on the suturing...one was not enough”
- “More time...it was way too fun!”
- “more hands on experience”
- “It was a lot of fun...but may be have more handouts”
- “improve overall aesthetics”

Give an example of something new you learned during the week.

- “many surgeons can work on one person in an accident”

- “I learned how there are different ways of suturing depending on where the wound is or how serious it is”
- “I learned that being a surgeon is rewarding but also a lot of commitment and hard work”
- “Aluminum is not usually magnetic ...but can be if the magnet is super strong”
- “The MRI is cold because they have to cool it down with liquid helium”
- “Something new I learned is how EEG measures brain activity”
- “How scientists use tools to study electrical waves in the brain”
- “Women have a higher chance of dying when consuming alcohol”
- “You don’t need to choose or know your career yet...it’s OK”
- “That there are more than one place where you can find reflexes”
- “X-rays are read in different ways depending on the problem”