Supports and Challenges in an Educational Crisis: The Impact of the COVID-19 Pandemic on Youth STEM Pathways

American Museum of Natural History
with
SRI International

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RESEARCH QUESTIONS

In this mid-project report, we share initial, emerging findings in relationship to two key questions from our surveys of science-interested youth during the pandemic:

What is the impact of the educational disruptions and loss of opportunities due to the pandemic upon youth who are typically underrepresented in science?

What types of supports and resources are youth drawing upon to mitigate these disruptions as they formulate new plans and make decisions during the pandemic in relationship to their academic and professional pursuits?
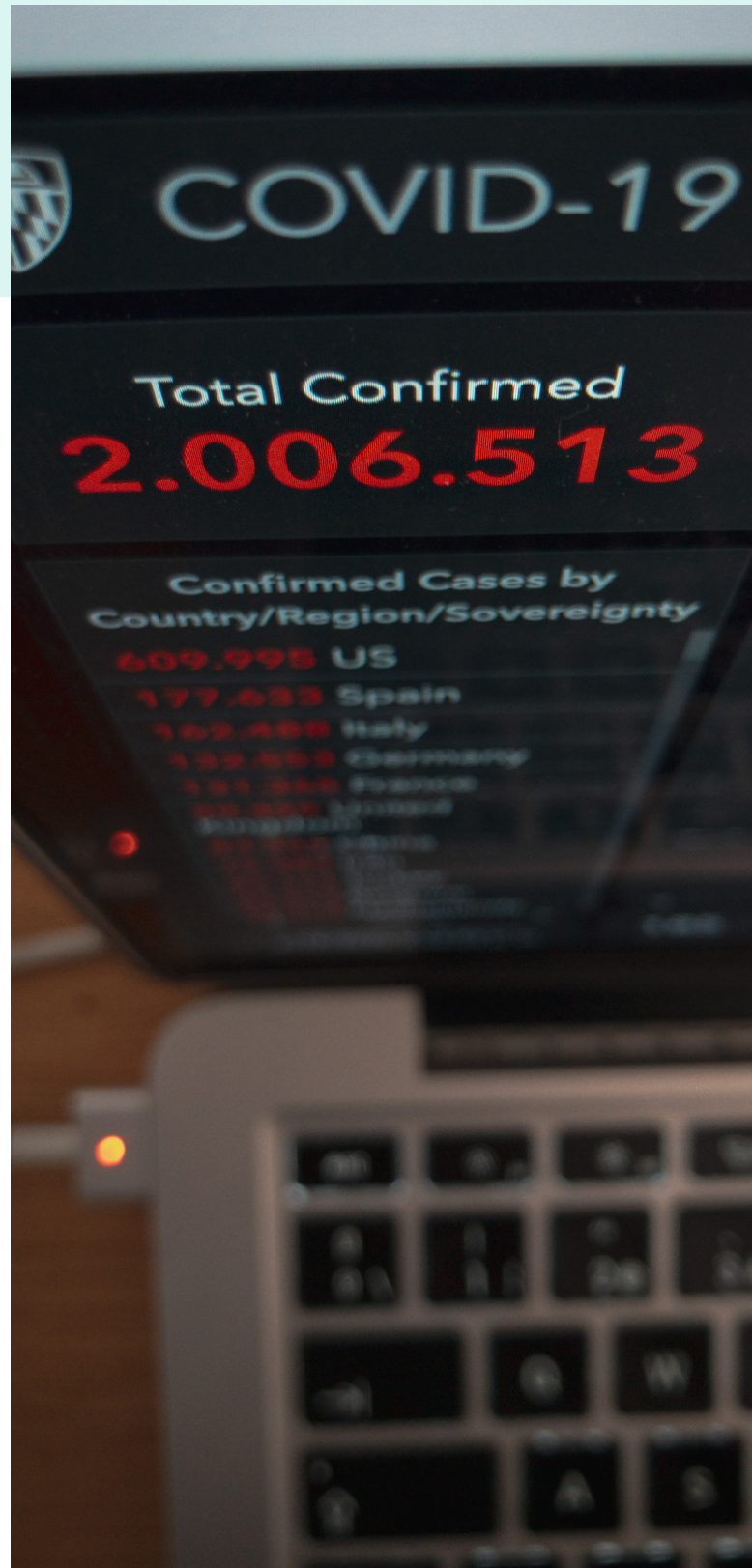
OUR RESEARCH ON YOUTH PATHWAYS

The American Museum of Natural History (AMNH), in partnership with SRI International (SRI) is asking these questions in a RAPID project building on our current NSF study, "Staying in Science: Examining the Pathways of Youth Mentored in Science Research" (#1561637) which examines the STEM pathways of 560 youth who have participated in authentic research with a scientist mentor as part of a New York City Science Research Mentoring Program, a consortium of 23 programs that provide science research mentoring to high school youth who are both high potential and historically underrepresented in STEM.

The COVID-19 pandemic has greatly affected the youth in our study, as well as students like them across the country.

Remote classes, moving home, limited or no access to valuable social, technological, and educational supports, loss of income and competing demands for attention and time are unprecedented interruptions to these students' academic pathways.

Just as the medical impacts of COVID-19 disproportionately impact minorities, the social, economic, and educational impacts are disproportionately impacting consortium program graduates in their STEM academic and professional pursuits. Based on findings from our summer 2020 alumni survey, more than 65% of program graduates were seeking or had secured internships and summer jobs in STEM fields to provide critical professional experiences and boost their networks in STEM; these employment opportunities have since been cancelled.

Program graduates, who until last year had been pursuing or planning to pursue STEM majors and careers (77% (n=293)) are suddenly in a far more precarious position.

EDUCATION IN EMERGENCIES

Literature on education in emergencies, especially prolonged crises, suggests the critical importance of research that can lead to better preparation (and even prevention) of crises and their impacts. This work of "amelioration, reparation and preparation" (Hallgarten, 2020) is a critical framing for this RAPID proposal. Key lessons from this literature include maintaining a focus upon long-term goals as opposed to short-term solutions, mitigating unforeseen impacts (i.e. the differential impact of disease-related crises upon lower income communities), supporting students during long-term recovery (which includes attending to trauma, isolation, ensuring students remain in school, and the need for emotional support), and conducting research and evaluation to be better prepared for - or even prevent - subsequent crises.

This RAPID grant is designed to understand the impact of this deeply disruptive experience upon our youth participants and to identify critical supports that could help counteract the repercussions of the pandemic upon their trajectories.

RESEARCH GOALS

This past spring - and into the school year - our participants were forced to make hard decisions about how, and perhaps if, to continue their academic pursuits and STEM-related work. Study participants, and other students like them, will need some formal engagement in STEM fields in Summer 2020 to replace lost internships and in-person supports and resources. Through anecdotes, study participants have reported that they are also concerned about not being able to return to campus where they can have the safe and supportive learning environment to study, and may be questioning returning to college via online learning in the Fall.

Our RAPID grant focuses upon just-in-time data collection when students must seek alternate Summer programs and plan for higher education attendance in the Fall. Data collection during this critical moment, as participants navigate major disruptions to their academic experience, enables us to investigate and understand student decision-making at an unforeseen juncture in their careers. Importantly, our regular working relationship with the consortium of programs means we can capitalize on these findings to develop programmatic responses that can better support and assist students at a large scale quickly.
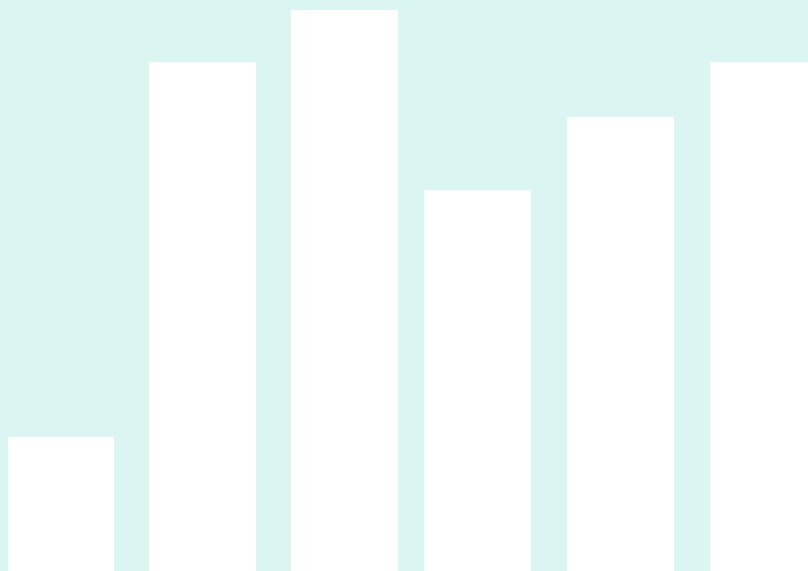
METHODS

To examine the impact of the COVID-19 pandemic upon the college students in our current study, we focus on ways current pathways are disrupted, diverted, or fractured, and turn particular attention to newly emergent obstacles, supports, sources of information, and input to decision-making about immediate and future academic and professional pursuits.

Building upon the study's current methods, we are utilizing our close-working relationships with the 23 NYCSRMC partners, their alumni networks and robust social media presence, and our currently established 3-year relationship with program alumni to collect data specific to this educational crisis through surveys and interviews with students. In order to have youth voice and draw in their standpoints so that our research is with youth rather than on youth, we also have two Youth Co-Researchers, alumni of mentoring programs and current college students, working with us (and who are co-authors of this report).

We designed an 48 item survey which asked questions about participants current living and learning situations, the way in which the COVID-19 pandemic affected their decisions and their plans for Fall 2020, the resources they sought and individuals they reached out to for support during the pandemic, and demographic information.

A bank of questions that were specifically asking students to map particular resources to significant adults and peers who were helpful to them in attaining those support and resources was analyzed using two-mode social network analysis. The survey was sent to a pool of 676 participants; the final sample included 190 participants. Responses were summarized using basic descriptive statistics. Key items were segmented according to demographic categories, including year in school, major, and race/ethnicity.

In this first working paper, based on our initial analysis of our data from the first round of surveys (n=190) we share early findings.

PRELIMINARY FINDINGS

n190

Completed surveys from program alumni who took a science research mentored program in either 2017, 2018, or 2019

80%

Identify as BIPOC:
26% Hispanic, 13% Black, 21% East Asian, 17% South Asian, 3% identified as multiracial.
15% identify as White, 5% of participants declined to identify their race.

These students are representative of the racial diversity of New York City, though our sample includes a higher percentage of Asian identifying students and a lower percentage of Black and Hispanic students, compared to the population of students in the entire New York Department of Education.

50%

NEARLY 50% OF THE COLLEGE STUDENTS IN THE STUDY REPORT THAT THEIR ACADEMIC TRAJECTORY HAS BEEN GREATLY OR MODERATELY AFFECTED BY THE PANDEMIC.

When asked about the specific concerns that have affected their decision-making, students reported that challenges related to remote learning (e.g. learning virtually, fears about performance in a remote setting), physical displacement (e.g. moving out of dorms; moving location during the pandemic), and loss of opportunities (e.g. to in-person learning experiences; relationships and networks; internships and jobs) were the most frequently mentioned. **Concerns around "remote learning" were mentioned most frequently among participants who reported the greatest amount of impact from COVID-19.**

Students who are closer to completing their degree are more likely to report that the pandemic is presenting challenges to degree and major requirements.

first year 21.4%

four year 28.6%

second year 25%
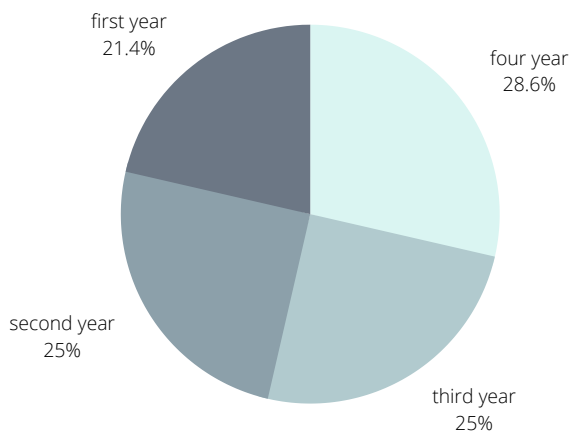
third year 25%

For example, 28.6% of fourth year students report these concerns compared to 21.4% of first year students; 25% of second and 25% of third year students report these concern. These findings suggest that COVID-related disruptions are more likely to be an obstacle to completion of advanced level coursework and degree requirements as one gets closer to completing a declared major.

76%
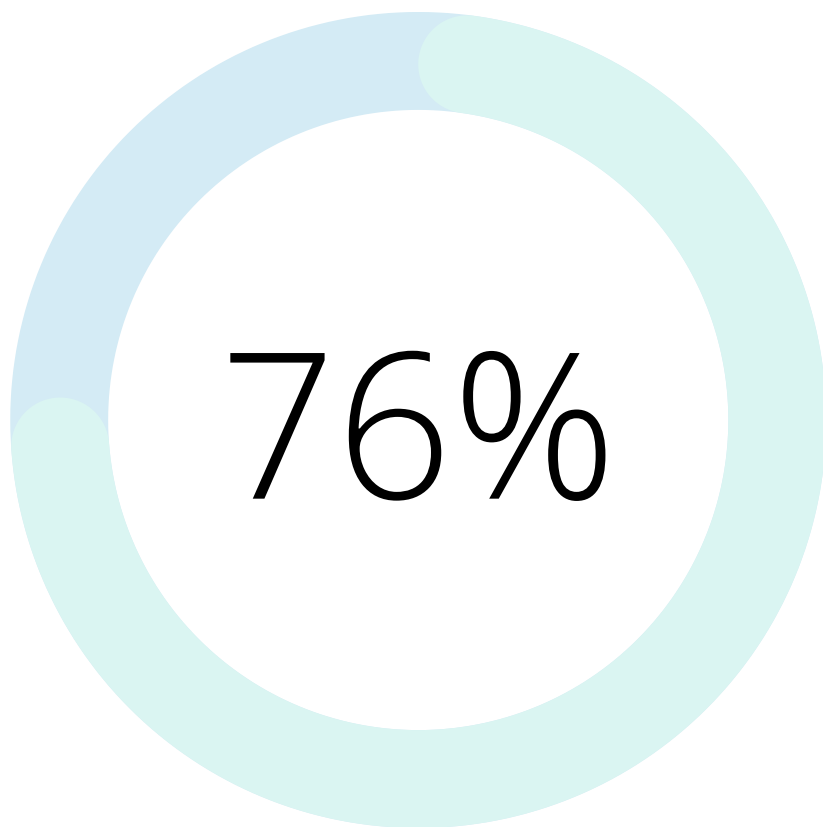
78% (n147) of the college students in the study maintain that they are planning to or have declared a STEM major. Of this group, 26% (n38) are reporting that the pandemic is affecting their ability to complete degree requirements.

Some students (11%, n21) are considering changing their majors; 17 of those students are STEM majors. 5% (n9) have already switched majors with six of these nine students leaving a STEM major for another discipline. In total, 23 students who were persisting with STEM degrees have or are considering leaving STEM for other disciplines.

It's becoming more difficult to stay engaged in my stem courses, especially without people to work on problems with.
-Hispanic identifying female, Engineering major

I struggled to keep up with the fast pace online classes and had to switch from a physics major to business,
-Hispanic identifying female, Physics major

It's becoming more difficult to stay engaged in my stem courses, especially without people to work on problems with.
-Hispanic identifying female, Engineering major

STEM MAJORS IN OUR STUDY RATE FINDING A PAID RESEARCH OR INTERNSHIP OPPORTUNITY, GRADES,THE QUALITY OF LEARNING STEM CONTENT IN A VIRTUAL ENVIRONMENT, AND ISOLATION AS THEIR HIGHEST-LEVEL CONCERNS.

Many feel concerned about their grades and academic performance due to family distractions/responsibilities. Although many note that faculty are trying to get all of the content delivered in an online format, students report that STEM course work often does not translate in accessible ways to online learning environments and many report struggling to learn rigorous material online.

Students are also concerned that even if they are successful in completing online STEM coursework, they will be ill-prepared for advanced courses and onsite lab courses when they become available. This concern is coupled with feelings of isolation and not being able to form or maintain study groups which is critical in STEM studies.

Other information deemed relevant to stakeholders may be included, such as a report on operations for manufacturing firms or corporate social responsibility reports for companies with environmentally or socially sensitive operations. In the case of larger companies, it is usually a sleek, colorful, high-gloss publication.

I am most worried that the workload will get to me and that I will underperform. Especially, I fear that due to the disconnection there is nowadays, that I won't have friends to help guide me through these difficult times. I have been on campus but I have also felt alone. I fear that I will still be alone next semester. Also I am realizing the toxicity present within premeds and I am stuck in their classes for the time being.
-White & multiracial identifying female, Physics & Astronomy major

PARENTS WERE RELIED ON HEAVILY FOR EMOTIONAL, FINANCIAL, PHYSICAL SUPPORT AS WELL AS ON ADVISING ON COLLEGE AND CAREER CHOICES/TRAJECTORY.

Although it is expected that students will depend on friends, faculty, and academic advisors as well as significant adults from their science research mentoring programs and their former high schools for resources related to their academic trajectories, due to quarantine conditions, parents have become an important resource.

I wish I had access to libraries, my household gets loud and toxic sometimes and that time alone with quite would really help. In my situation, my college's library is not open. I also tried looking at my local New York Public Libraries which are also closed because of COVID-19. Also, I wish I had access to tutors who actually wish to teach the material and aren't just barely putting in work to get paid.
- White & Black identifying female, Business Administration major

WHEN ASKED WHAT ACADEMIC AND/OR NON-ACADEMIC RESOURCES STUDENTS WISHED EXISTED OR THEY HAD ACCESS TO AT THIS TIME, THE MAJORITY IDENTIFIED ACCESS TO QUIET STUDY PLACES SUCH AS LIBRARIES AS THEIR MOST DESIRED RESOURCE, FOLLOWED BY MENTAL HEALTH SUPPORT AND MORE INDIVIDUALIZED SUPPORT FROM FACULTY AND ACADEMIC ADVISORS.

Students expressed concerns with the lack of these quiet study spaces for both technical (printing/access to computers) and social functions (community building, networking). The lack of these traditional campus spaces has distanced students from their access to educators, other students, and mental health services that they would normally find on campus. With limited access to these supports in virtual settings, students also show concerns with individualized college and career planning opportunities. Additionally, the most commonly desired resource of mental health support may indicate that campus offices are not adequately providing students with services, or assistance with finding other mental health support off campus. Alumni also expressed their desire for time management and studying resources as well as for tutoring/self-paced classes. This suggests that some students are not being adequately supported for transitions to online coursework.

IMPLICATIONS

Our findings point to key shifts, additions and adjustments that faculty members, advisors, department chairs, and STEM mentors can make at the university level; key mentoring strategies mentors can draw upon at this time, and important supports family members of STEM-interested students can use to help support and ameliorate the impact of the pandemic and move to remote learning for students. While all students have struggled to shift to remote learning, there has been an assumption that college students may be more able to make that shift and may be more easily able to accommodate and adjust to online learning because of their age and agility with technology. However, our research shows that college students are struggling in a number of arenas in online learning, exacerbated by multiple other concerns that have emerged during the pandemic. In addition, while colleges as a rule make an important effort to treat students as young adults, we find that students are really relying upon their parents and families at this time, so including family members in communication, outreach and advocacy must be especially important right now - even as colleges work to ensure that students have agency and independence. Because we also want to support and advocate for students themselves, we also include key findings for students.

1. **Know that you are not alone.** You and your peers are facing many challenges: reach out to peers and colleagues, and parents for support at this time. Consider creating or joining existing online peer networks, peer study groups, and any social supports that might help you at this time; know that being a part of a community (remote or even at a distance) can be a really important support for you. Create set times to study together online with your peers, even friends who are in different majors - use this shared study time to provide you and your peers with structure and motivation that can support you in your studies.

2. **Advocate for yourself** in terms of course requirements and your major requirements. Check in with faculty members, department chairs and your advisors, and let them know about any concerns you have about fulfilling your major and your work, and ask for their support and help. Point to specific concerns about missing courses, unavailable options and gaps in your requirements and ask for help fulfilling those.

3. **Suggest supports that your department and advisor can include** as you return to in-person coursework and continue your pursuits in STEM. Ask for flexibility, additional time on key ideas, and longer review of key ideas from earlier courses. Encourage your department to increase/offer access to free tutoring, and peer supports.

4. **Use your networks!** Reach out to former high school science teachers, high school STEM mentors, friends of parents - anyone in your network who might know about opportunities for you for the summer, or for gaining research and science and STEM-related experience. Often adults and friends and family members want to help and will help if they can.

5. **Reach out to your peers** - even if you were not friends before - and make sure they are okay.

6. **Share the results of this study** with your STEM supports so they know this is part of a larger challenge!

IMPLICATIONS FACULTY MEMBERS IN STEM WORKING WITH UNDERGRADUATES AND DEPARTMENT CHAIRS IN STEM

1.

Because STEM students are feeling disconnected from school and have a number of concerns about staying in their majors, send explicit messages that staying in science matters and you care about your students pursuing STEM. This might mean reaching out and letting majors in your department know you will support them and that their participation matters and offering to work closely with upper class students. In particular, making explicit efforts to transparently underscore the importance of BIPOC students in STEM, and the role they can play in solving challenging important scientific, engineering and socio-scientific problems facing our world today: to your students, can be especially important.

2.

Because students express a range of concerns and are sharing a considerable amount of stress and emotional impact, reach out to juniors and seniors and let them know that you are aware of their concerns and that you care about their future and progress, and want them to continue their STEM pursuits. Provide ways for juniors and seniors to support and connect with current first year students as near-peer mentors; these efforts could support first year students in developing a sense of community with your college or university that many first year students are missing due to campus shutdowns and remote learning.

3.

Because upper class students are especially concerned about having access to required courses, and potentially missing important requirements, work closely and individually with upper class students to help them ensure they can complete their course requirements.

Assess carefully major requirements and consider adjusting them so students can complete requirements, or ensure that course requirements are made available, or additional sections of required courses are added so that concerned students are able to complete their degrees.

4.

Because students reported considerable concerns about preparation lagging during remote learning, consider additional adjustments to upcoming in-person courses to accommodate for and acknowledge student concerns about preparation.

Consider adding in review of earlier material, increased time for coverage of key ideas, and accommodations for students to take student concerns into account

Consider offering tutoring and additional support by well-trained and supportive tutors.

IMPLICATIONS FOR MENTORS OF STEM-INTERESTED YOUTH

1. **Reassure your mentees that they are not alone in their concerns and challenges in this moment. Consider actively reaching out to mentees to check in on them and ask if they need help at this time.**
2. **Help students seek out internships and summer opportunities.** Support students in thinking about work and internship opportunities that might be non-traditional and/or outside of their intended major, but are equally useful for skill-building.
3. **Advocate for extra support** and course adjustments at the college level that help accommodate and support students who are worried about fragile understandings from remote learning.
4. Because your students are reaching out to you and leaning on you for support at this time, **help your student review requirements, examine course requirements, and maintain clarity around course requirements.**
5. **Help them connect** to friends, peer groups, and any free or additional tutoring that could help them as they transition to 'back to school' in person.
6. **Affirm their concerns and share your support and advocacy for them, underscore their abilities and potential and the important role they can play in STEM in the future.**

IMPLICATIONS FOR PARENTS AND FAMILY MEMBERS OF COLLEGE STUDENTS

1. **Understand that your student is not alone** in their concerns and challenges in this moment; offer reassurance that they are not alone.
2. **Get to know college resources** to help your student seek out internships and summer opportunities.
3. **Advocate for extra support** and course adjustments at the college level that help accommodate and support students who are worried about fragile understandings from remote learning.
4. **Help them review requirements**, examine course requirements, and maintain clarity around course requirements.
5. **Help them connect** to friends, peer groups, and any free or additional tutoring that could help them as they transition to 'back to school' in person.
6. **Affirm their concerns** but also share your support and advocacy for them, underscore their abilities and potential.

IMPLICATIONS FOR NON-PROFIT ORGANIZATIONS THAT SERVE HIGH SCHOOL STUDENTS

1) **Send regular messages to your alumni** ensuring them that they are not alone and they can reach out to you.

2) **Develop ways for alumni to connect and support each other** regardless of major.

3) **Reach out to the parents of your community** to share the findings from this report and ask if there are particular resources or supports you can provide them so they can guide their college-aged children.

4) For those high school students who are about to enter college next year, **create structures for them to reach back out to you** as they encounter challenges.

STAY CONNECTED WITH US!

Findings from this study will be shared via social media platforms through the
NYC Science Research Mentoring Consortium.

Follow us! @nycsrmc