

COVID-19 Graduate Research Impacts: Results and Report

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List of Abbreviations

We will commonly employ abbreviations for four of our Schools:

- SHASS = School of Humanities, Arts and Social Sciences
- SA+P = School of Architecture and Planning
- SoE = School of Engineering
- SoS = School of Science

GSC = MIT Graduate Student Council

I. Executive Summary

1.1. Survey rationale and methodology

More than a year after MIT shut down campus to ward off COVID-19, the pandemic continues to impact life, work, and research at MIT. This survey was designed to capture how graduate students' research has been affected by the pandemic. Key research questions included:

- How did the pandemic impact research overall?
- When the impact was negative, what factors drove that experience?
- How do differences in academic fields and work settings relate to research impact?
- To what extent have students been informed about research funding extensions?
- What other supports may be necessary? What are ongoing blind spots?

Jointly developed by the GSC Executive Committee, MIT COVID Relief, and with assistance from Institutional Research (IR), the survey was widely distributed by GSC through memos to all graduate students; GSC Council Reps; grad dorm representatives; and graduate program academic administrators. Flyers, designed to be agnostic to the direction of research impact, were also distributed through some parts of campus, though physical access was limited by pandemic restrictions. Survey responses were collected between April and May, 2021.

Following a brief section of demographic questions, respondents were asked about the direction (positive/negative) and the scope of COVID-19's impact on their research, as well as whether they had to make major changes to their research. Then, out of a list of commonly-reported research obstacles, they were asked which they experienced and to what degree. Finally, respondents were asked a series of questions relating to whether they were aware of and seeking research funding extensions. All questions were optional and responses were anonymous. Space for open-ended responses was also provided; respondents' qualitative, experiential reflections are included in sections below.

Analysis was performed in Microsoft Excel and Mathematica. Most plots were generated in Mathematica, and the code is available upon request.

1.2. Results summary and report outline

The survey netted **590 responses**, representing over 10% of MIT graduate students who pursue research. Of those, 83.5% of respondents were in PhD programs, while 16.5% were in MA/MS or other professional programs; 65.5% respondents were domestic students, while 34.5% were international students. A wide spectrum of program stages was captured (**Table 1**): 20.3% of respondents were "late-stage" (presumably PhD) students who began in 2016 or earlier, while 33.4% began in 2017-18, and the rest were early-stage PhD or master's students.

Table 1: Program years of survey respondents

Year started in program	% Respondents
2016 or earlier	20.3
2017	14.8
2018	18.6
2019	24.2
2020-21	22.2

I.2.a. Results that held across demographic groups

A substantial majority of respondents reported negative impacts to their research due to COVID-19: **34%** were **highly negatively impacted**, while **54.7%** were **somewhat negatively impacted**. Over 80% of respondents from every school reported highly or somewhat negative impacts on research, though, as we discuss further below, there were also substantial disparities between schools and fields. Similarly, the majority of respondents experienced negative impacts in each category of the four categories of work site (fully remote, in-person on campus, in person off campus and in person both sites), while those who worked in person naturally experienced some unique obstacles as well, i.e. difficulty accessing supplies. International and domestic students reported the same overall scale of impact on research, with international students reporting some specific issues – mostly financial and travel-related – at higher rates.

From the list of obstacles, three stood out as being commonly reported in all demographics:

- Lack of appropriate work space
- Difficulty collaborating with other researchers
- Mental/physical health issues

In theory, these represent a common set of conditions that researchers in general need to thrive: appropriate work space, ability to easily collaborate with others, and good health.

Indeed, about half (50.6%) of respondents report that they had to make significant changes to their research due to the pandemic. While research changes are inherent to the degree process, and may vary by field and specialty, we believe it is significant that such a large percentage of graduate researchers report pandemic-related changes to their research, i.e. difficulties in their original projects or emergency “pivots” to their foci. One respondent’s comment suggests that we may not have seen the end of COVID-19’s research impacts:

Some areas of my research were positively impacted by the pandemic. I was able to take time to more deeply think about my analysis and draft papers. I am approaching the time where I might be negatively impacted by the pandemic. In order to continue making progress, I need to start doing international user testing by the end of the summer, but I have a feeling that is going to be a challenge.

Most of the open-ended comments at the end of the survey detailed research processes that were disrupted by pandemic closures or changes. Commonly-mentioned issues included lack of access to needed resources like lab equipment and libraries, not having enough money to create a suitable work environment at home at the last minute, work expectations that were not reasonably adjusted for the realities of the pandemic, and research tasks that couldn’t conform to pandemic-imposed restrictions (i.e. lab shift schedules, travel lockdowns, etc.).

I.2.b. Positive impacts of COVID-19

A small percentage of students experienced **positive impacts** of the pandemic. Of all respondents, 2.7% reported being highly positively-impacted, and 4.6% reported being somewhat positively impacted. Open-ended responses about positive impacts especially emphasized the benefits of working from home: schedule flexibility, lack of commute, ability to optimize work environment, and so on. Like many other fields of work, we should ask whether

with today's technology, we can continue allowing those who work best from home to reap those benefits, while maintaining strong collaborations.

Finally, the proportion of MIT researchers who *can* benefit from remote work options may potentially be far larger than the 7.3% of respondents who reported a positive overall impact of COVID-19 on their research, since for some researchers the COVID-specific obstacles to research could have simply *outweighed* the benefits of work-from-home. For example, a social scientist might benefit from remote work but only when the libraries are open; a natural scientist may benefit from being able to do analytical tasks from home, but not until labs are fully open so they can obtain data to analyze. While the remainder of this report largely focuses on recommendations to mitigate negative impacts, we urge MIT decision-makers to consider how to preserve the positive aspects of work-from-home flexibility.

I.2.c. Report outline

Section II gives a high-level view of COVID-19's impact, including respondents' reports of **how COVID-19 impacted their research overall**, and whether they had to make significant changes to their research. It includes breakdowns of these pandemic impacts to research by School, citizenship status, and work style (on/off campus).

Section III examines the potential **sources of the pandemic's negative impacts** via respondents' reported obstacles to research. Respondents had the opportunity to mark each of 18 potential obstacles as a "Major obstacle," "Minor obstacle," "Not an obstacle," or "Did not experience or N/A." The section "buckets" pandemic obstacles into those directly related to work; logistical/life obstacles; financial hurdles; and the burden of other duties such as caretaking. The scope and severity of each obstacle "bucket" is **analyzed across schools, citizen status, and work types**. Taken together, these sections sketch out impacts on MIT graduate researchers.

Given the challenges of pandemic-era research, Section IV concludes with **tailored GSC and MIT COVID Relief recommendations** for campus efforts to alleviate these challenges. Town halls or other community-wide discussions should collectively acknowledge the scale of research impacts. Specific guidance should be developed for Schools and DLCs (departments, labs, and centers) to navigate these impacts. A COVID-19 Recovery Fund should be established, so that individual students or departments can access necessary resources to support delayed or restructured projects. As part of COVID-19 recovery, graduate students experiencing research challenges and delays should have access to funding extension support. Caregiver support should also be increased, to offset specific challenges faced by graduate student parents (and, we imagine, most parents on our campus). Finally, MIT should also draw on the experiences of its peer institutions - many of whom have instituted all or some of the recommendations below - to inform its responses to COVID-19 research impacts.

II. Research Impacts of the COVID-19 Pandemic

This section overviews researchers' reports of how COVID-19 impacted their work overall. Results are subsequently broken down by indicators such as school, citizenship status, program stage or type.

II.1. Overall impact of COVID-19 on respondents' research

Combined, **88.7% of respondents reported being highly or somewhat negatively impacted** by the COVID-19 pandemic, with the remainder reporting no impacts or positive impacts (see **Fig. 1** below).

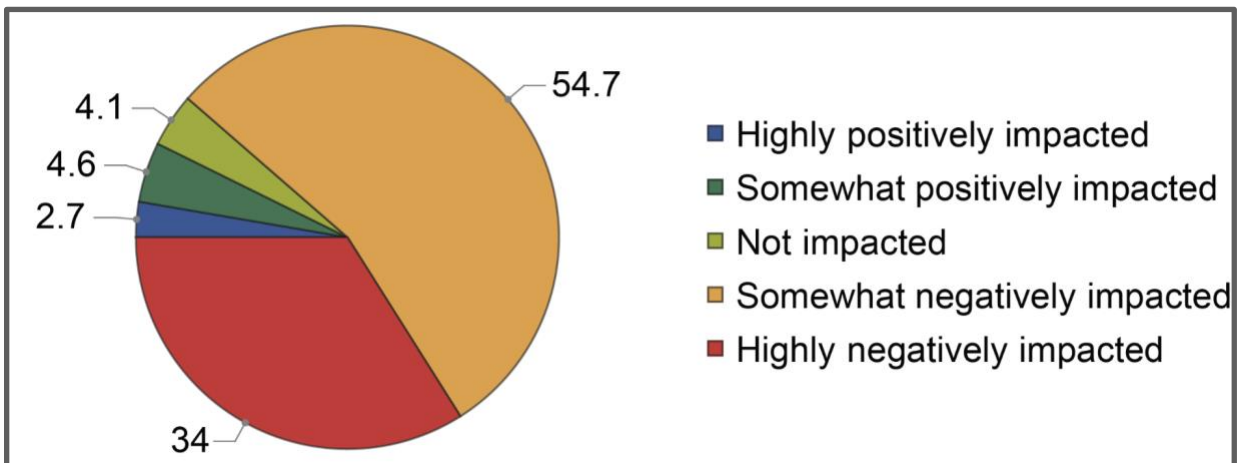


Figure 1: Breakdown of all respondents' assessment of COVID-19's overall impact on their research

A majority-negative impact on research seems in line with the reality of our time. As for how well the respondents represent the larger population of grad student researchers at MIT, we see the potential for opposing forms of sample bias. On the one hand, those whose research was negatively impacted may have been eager to complain about it on a survey; on the other hand, those who are deeply "in the trenches" struggling to get their research done may not feel like taking the time to complete a survey, or indeed even notice the emails and advertisements.

Around half of respondents reported that they had to make significant changes to their research (**Fig. 2 below**). Some respondents wrote in answers to this question rather than selecting "Yes" or "No." Common themes in those write-in answers include respondents who felt that some but not all of their projects were impacted; that their theses were intact but additional human-subjects experiments would have strengthened their work; that changes to their research were mild; and/or that their research began during the pandemic and so remained in flux.

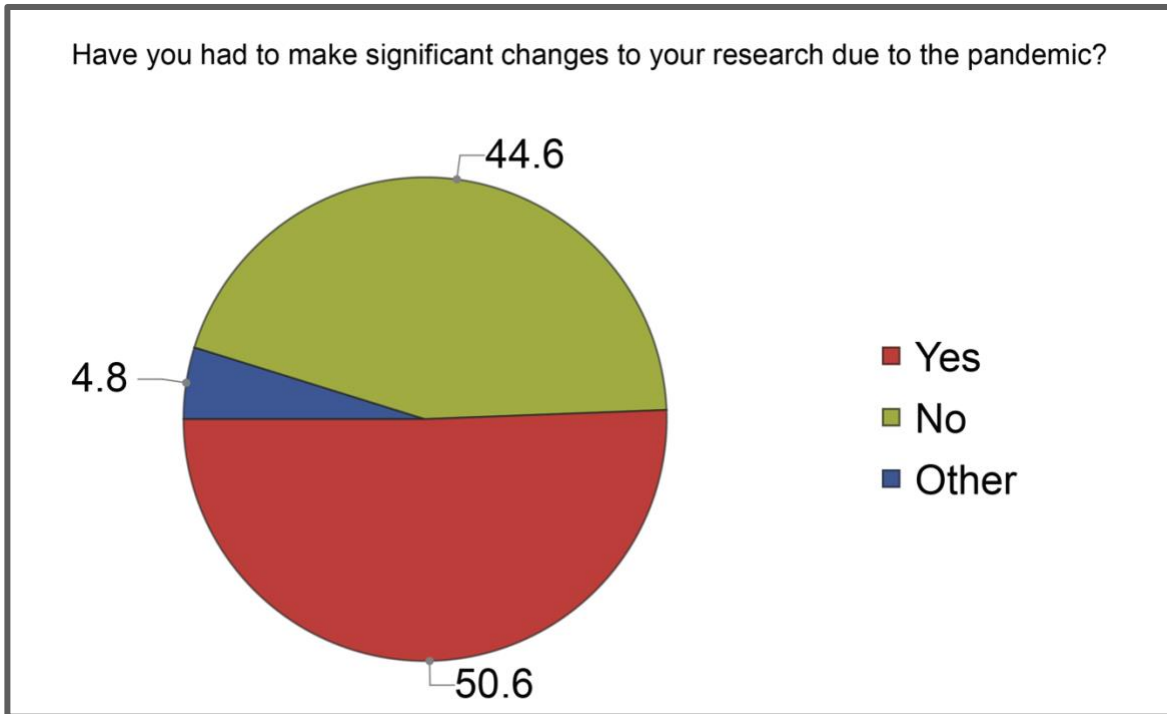


Figure 2. Percentages of respondents who did and did not report having to make significant changes to their research.

II.2. Breakdown by School

II.2.a. Respondent affiliations

Respondents were asked to give their department affiliation via a drop- down menu of options reflecting the Registrar’s [report](#). There was an option to write in a department/program not listed. (Students from IDM and SDM expressed frustration about perpetually being left off of lists of programs). We then used the same report to separate the respondents into Schools (**Table 2**). The majority of respondents in programs offered jointly between Schools were WHOI students.

Table 2. Numbers of respondents by self-reported School affiliation

School	# Respondents
SA+P (Architecture + Planning)	86
SHASS (Humanities, Arts and Social Sciences)	37
SoE (Engineering)	247
SoS (Science)	162
Sloan	12
Schwartzmann College	7
Joint programs	32
Undisclosed	6

Breakdowns of the responses by School will be given for SA+P, SHASS, SoE and SoS below. Though we saw some responses from Management and Operations Research PhD students, there were too few of those responses to make meaningful breakdowns for Sloan.

II.2.b. Results

The overall negative impact of COVID-19 on respondents' research held across schools (SA+P, SHASS, SoE, SoS); see **Fig. 3** below. However, the reported scope and severity of COVID-19's impacts on research vary across campus. Among represented schools, SHASS respondents recorded the largest proportion of "highly negatively impacted" (57%). The School of Science respondents also reported they were "highly negatively impacted" more often than Engineering (38% vs 30%). **Appendix V.1** will explore the disparate issues faced by Science students who worked in person on campus vs remotely.

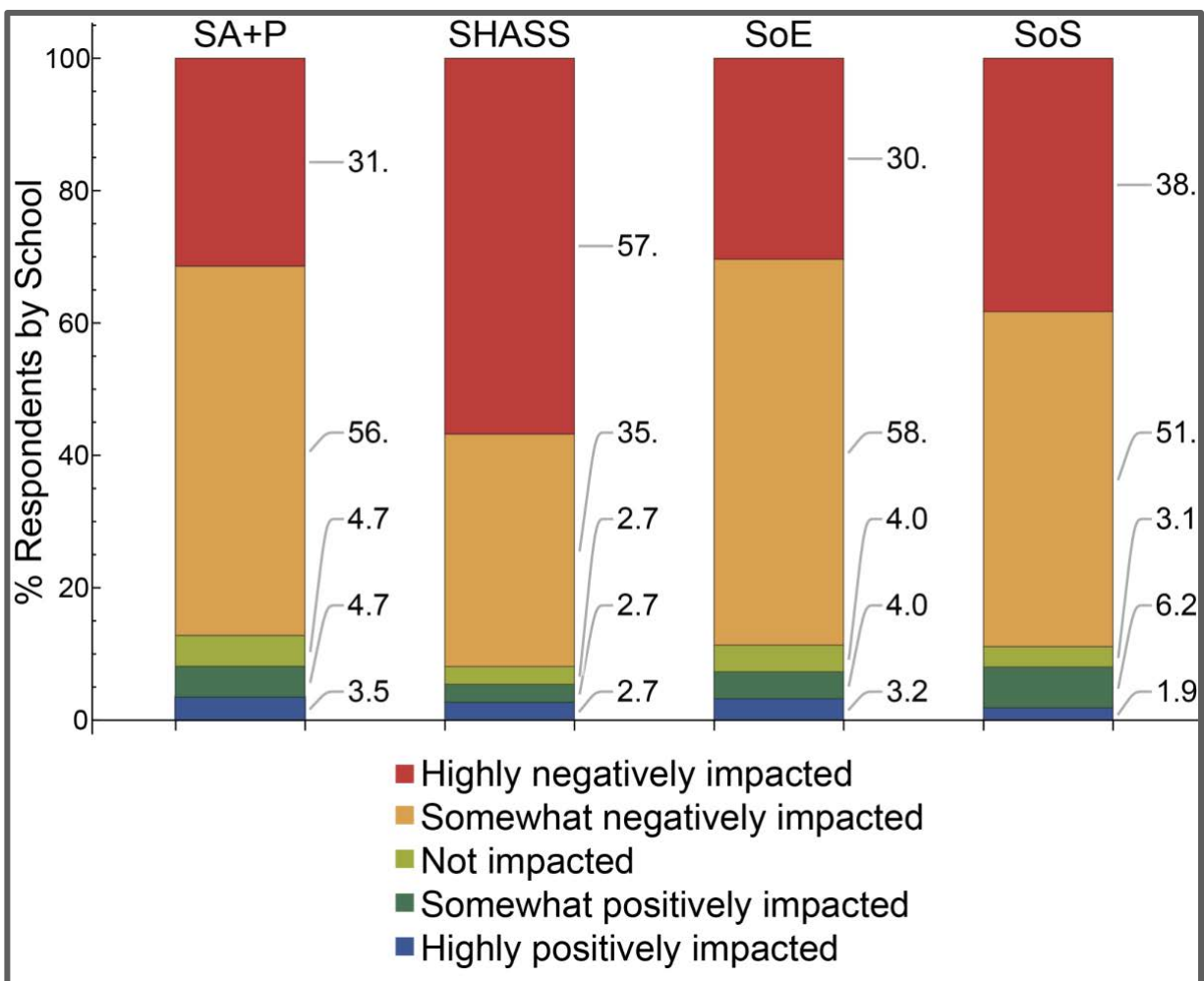


Figure 3. Breakdown of respondents' reported impact on their research by School

As a corollary of the overall impact of COVID-19 on their research, we asked respondents **whether they had to make significant changes to their research**. Respondents could answer "Yes" or "No," or write in another response. The School breakdown of respondents who gave a "Yes" or "No" is below (see **Fig. 4**). A substantially larger fraction of respondents from

SA+P and SHASS (72 and 77%) reported having to significantly change their research, compared to SoE and SoS (46 and 51%).

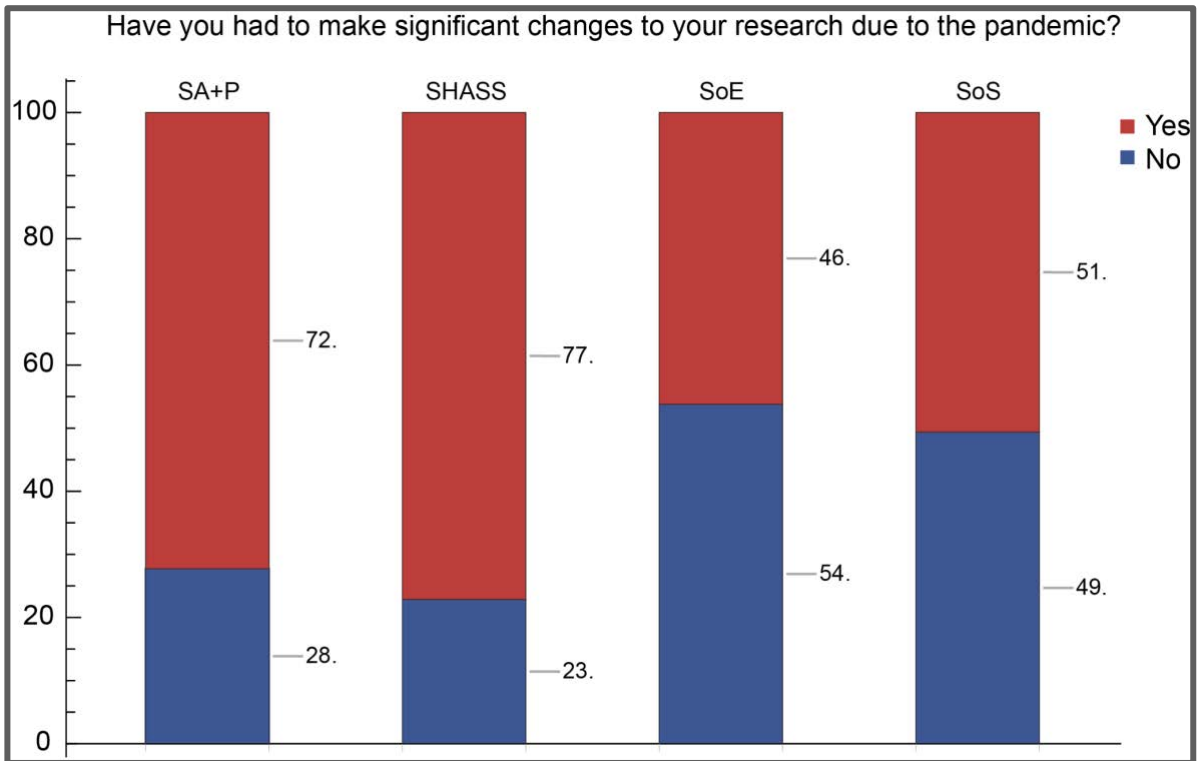


Figure 4. Changes to research, breakdown by school

The trends above fit cleanly with the plain realities of research in these disparate fields - with libraries closed, MIT-related travel largely disallowed, and human subjects research essentially shut down, it was difficult if not impossible for most humanities and social science researchers to move their research forward.

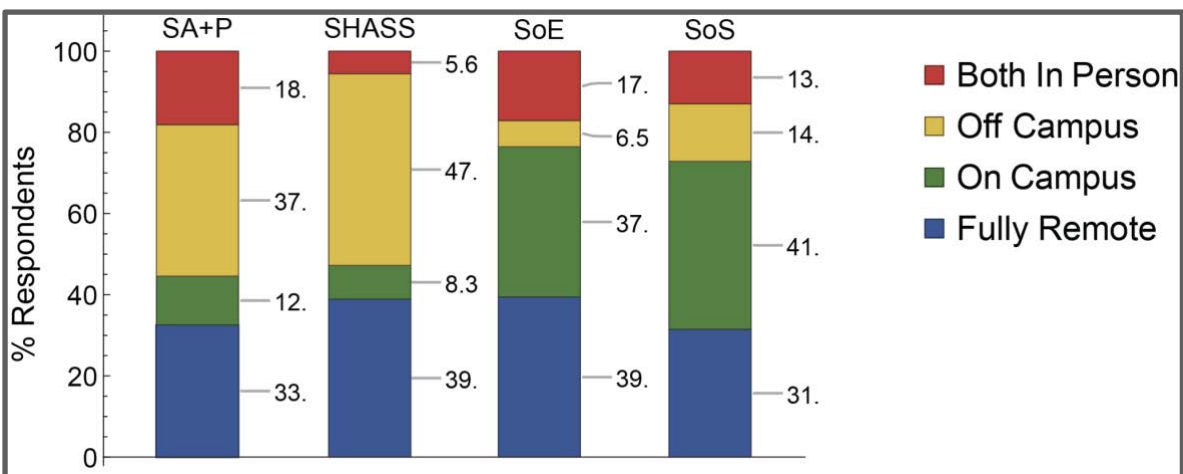


Figure 5. Category of work-site, breakdown by school

SA+P and SHASS also had a high percentage of respondents working off campus (**Fig. 5**), so difficulties with accessing off campus research sites may also have contributed to their high rate

of changes to research. SoS had the lowest percentage of researchers who responded working remotely, and many spoke of difficulty adapting their in-person work to COVID conditions.

II.3. International and US student researchers

International and domestic students were about equally likely to report a highly negative impact of COVID-19 on their research (36% vs 33%), with somewhat more domestic respondents reporting a negative impact overall (92% vs 83%). See **Fig. 6** below.

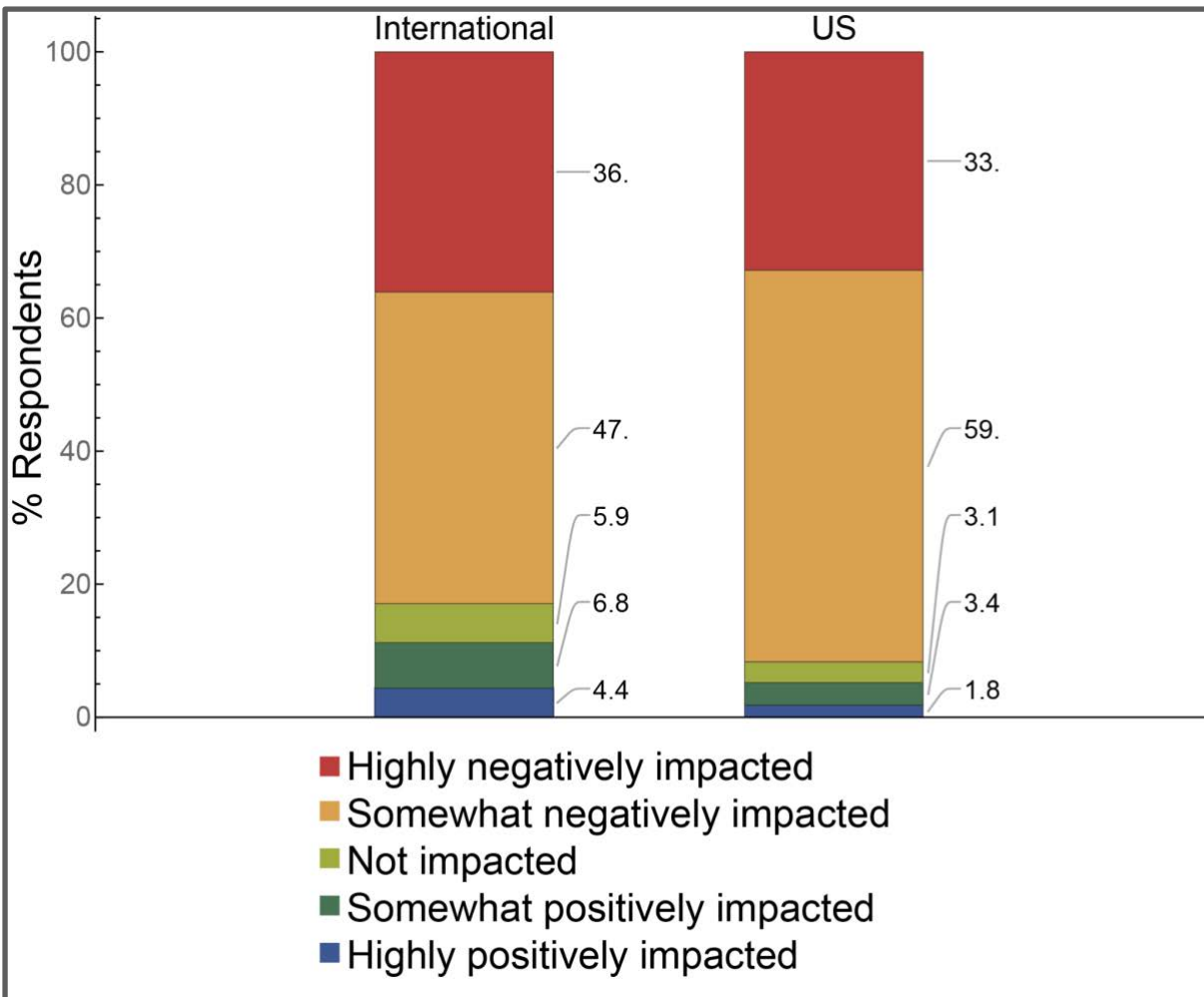


Figure 6. Breakdown of respondents' reported impact on their research, International vs US

Interestingly, international students were also more likely to say their research was positively impacted by COVID-19. We can only make educated guesses about the factor(s) driving this result. One potential explanation is that some international students whose work didn't have in-person elements to begin with (computer scientists, theorists, etc.), and who worked remotely from places outside the US, may have had more control over their work environments. That hypothesis is so far supported by some anecdotes we have heard from our peers.

Finally, we were somewhat surprised and heartened by the equal percentage of international and domestic respondents who reported having to make significant changes to their research.

That said, international students faced some specific (largely financial) obstacles more often than their domestic peers; see **Section III.3** for more details.

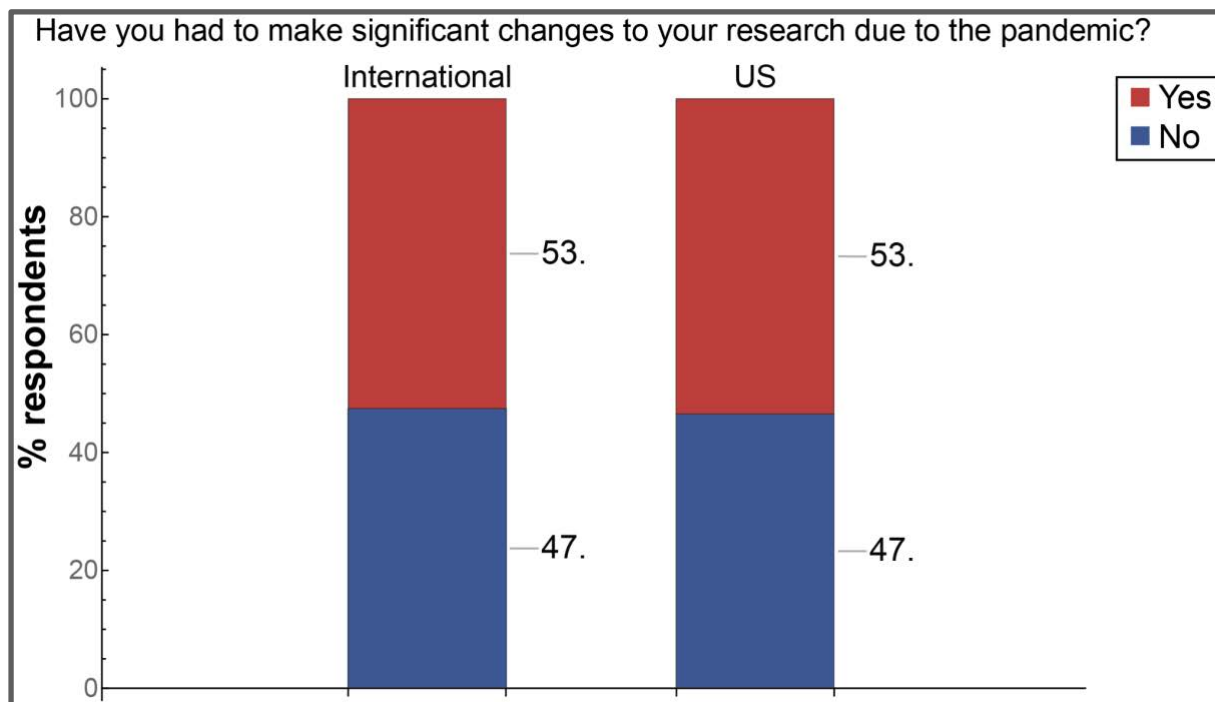


Figure 7. Significant research changes, International vs US

II.4. Breakdown by Work Site

II.4.a. Respondent categories

We asked respondents two simple Yes/No questions regarding where their research work took place:

- Does your research involve in-person work on MIT’s campus?
- Does your research involve in-person work off-campus?

Almost all respondents (582/590) answered both questions. From there, four categories of respondents arose (no/no, yes/no, no/yes, and yes/yes), which we term “Remote” = fully remote, “On Campus” = working in person on campus, “Off Campus” = working in person off campus, and “Both In Person” = working in person both on and off campus (Fig. 8).

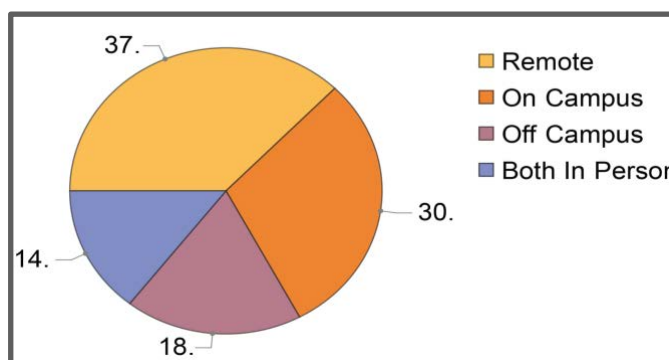


Figure 8. Percentage of survey respondents at each work site.

II.4.b. Results

The GSC leadership noticed a common assumption among some administration and faculty that researchers whose work was fully remote would not feel a negative impact from COVID-19. This assumption is not well supported by our data. For grad student researchers whose work involved coming to the MIT campus, 93% report a “highly negative” or “somewhat negative” impact (**Fig. 9**). For those whose work was fully remote, that figure was 84%. Thus, although the proportion of respondents who felt their work was negatively impacted was slightly lower for fully remote workers, **the vast majority of researchers in both remote and the in-person work sites reported a negative impact of COVID-19 on their work.**

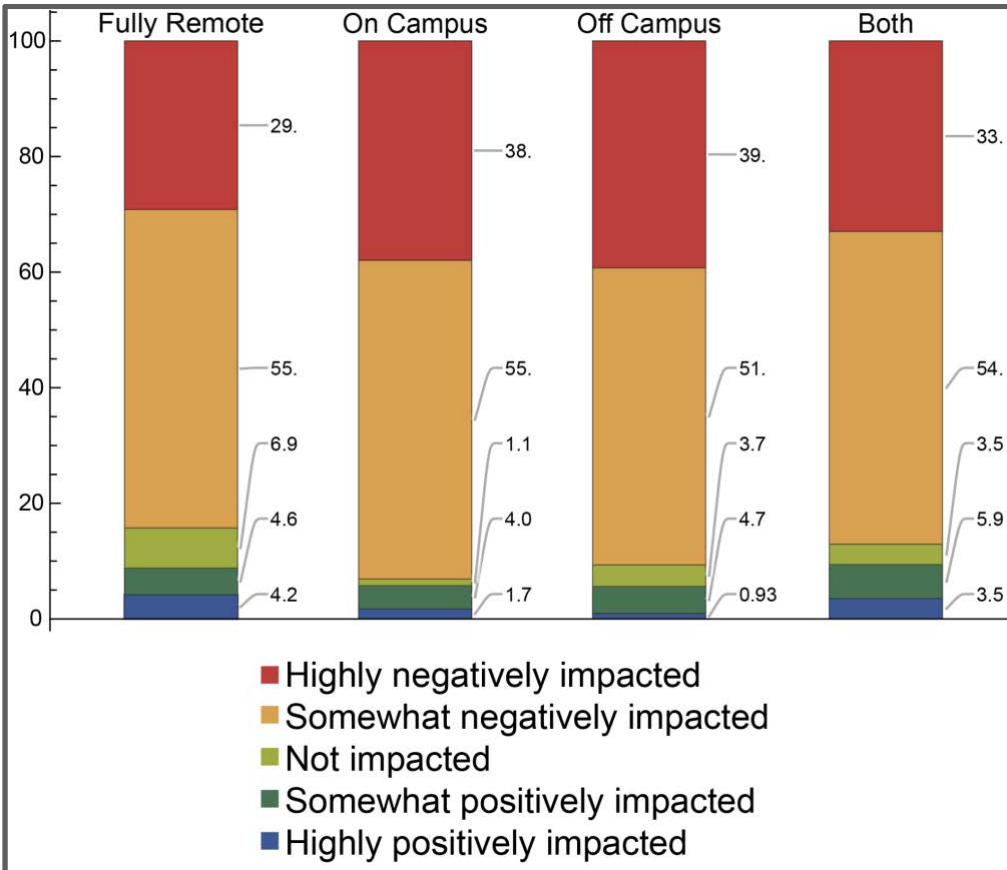


Figure 9. Breakdown by work site type

The ratios are similar for in-person, off-campus work: 90% of respondents whose research involves in-person, off-campus work reported high negative impacts. Interestingly, the figure was 87% for those who worked in-person *both* on-campus and off-campus, with a somewhat lower percentage of “highly negative” impact (33% vs 39%).

Thus, with some variation, the overall negative impact of COVID-19 pandemic on research progress holds across work styles (in person vs. not in-person research).

Finally, the grad student researchers who worked off-campus in person or both on- and off-campus in person were the most likely to report that they had to make significant changes to their research (72% and 69% respectively; **Fig. 10**). They were followed by the on-campus researchers (58%) and finally the remote researchers (33%). It’s worth noting that **even among**

the researchers who didn't have to physically access a lab or field site, a third of respondents had to substantially change their research. Based on that finding, it seems likely that PhD students across schools and fields may face obstacles or changes to their degree completion goals or requirements.

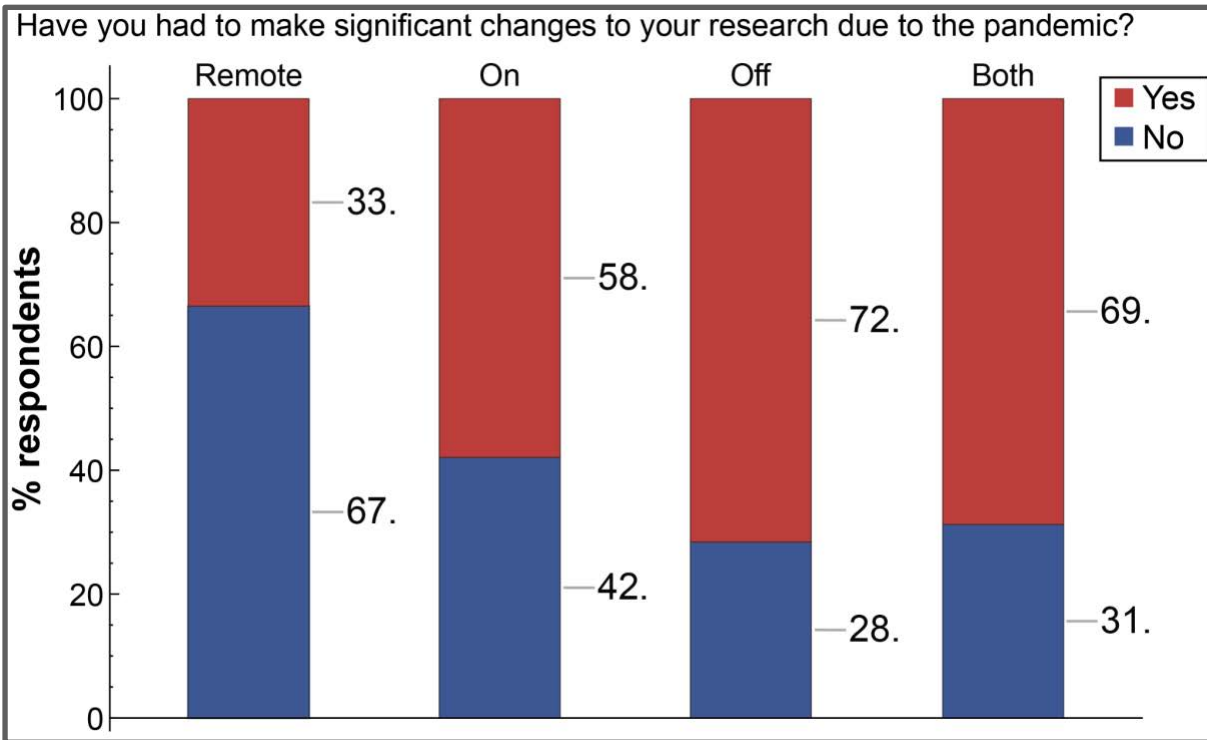


Figure 10. Significant research changes, by work-style

II.5. More Details on Significant Changes to Research

Students that made significant changes to their research do not break down evenly throughout the Institute. Uniformly high percentages of the graduate researchers in DUSP (69%), MAS (77%), and Architecture (67%), made significant changes to their research in light of COVID-19. These fields often require interview, observational, and ethnographic fieldwork. Similarly, designers often work in and with communities to complete research. To make matters more challenging, many scholars in these fields travel abroad for comparative or international work.

A representative answer to our open-ended section illustrates these challenges for social scientists:

“Lack of in-person research/travel is a HUGE barrier. Many social scientists have been encouraged to “pivot” to remote research, or change research plans entirely (i.e., switch fieldsites from a foreign country to the US). For many of us who have spent our entire grad careers (even undergrad research) preparing for our projects, these ‘pivots’ CANNOT be accomplished quickly, nor yield the same quality results. I live in fear of not collecting enough data to write a serviceable dissertation and get a job.”

Several individual departments stuck out as having a large portion of respondents reporting “Yes” to “Have you had to make significant changes to your research due to the pandemic?”: EAPS (27 of 38 respondents), and again the three SA+P departments - DUSP (20 of 29), Architecture (17 of 27) and MAS (23 of 30). Overall, 77% of the SHASS respondents said they had to make significant changes to their research; for several individual SHASS departments such as HASTS and Political Science, though the total number of responses was <20, we note that the vast majority of respondents report having to make such changes. These may represent academic fields where project continuity during the pandemic was particularly difficult.

Graduate students’ degree timelines represent another critical dimension of forced significant research changes. Students further along in their programs were more likely to have experienced research changes (**Fig. 11**). It’s worth noting that the grad students who entered in 2017 - many of whom are now entering their fifth year - reported significant changes to their research at almost exactly the same rate as those who entered in 2015 or earlier (for many social-science programs, students actively conduct fieldwork during year 4). Departments with fixed-term funding have, at the time of writing, made substantial progress in getting research funding extensions to the 2015-and-earlier group. But anecdotally, quite a few grad student researchers in the 2017 cohort report that they’re going into their fifth year already stressed about whether they’ll be able to complete their dissertation research before funding runs out.

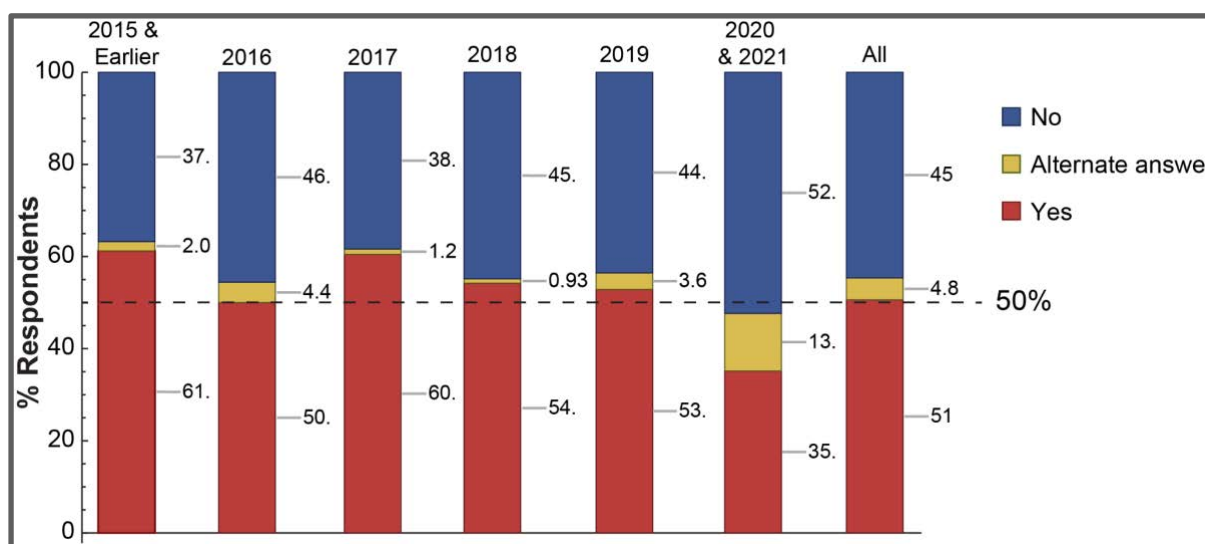


Figure 11. Significant changes by program start year

However, only students that have started very recently, such as 2020 or 2021, reported a rate of significant research changes below 50%. This group includes professional MA students as well as PhD students that have not yet taken their candidacy exams. Further, the students that entered in 2021 chose to attend already aware of the pandemic. (This does not mean, however, that these students, unable to meet with their colleagues in the normal fashion, have not overcome significant challenges in the past year.) Research progress is essential to degree completion; COVID-19 response must include policies which help researchers to overcome the specific challenges of changes to their projects.

II.6. Plans to Request a Funding Extension

In the face of these significant impacts to work and research, we asked respondents to self-report their likelihood of requesting a funding extension. (Although we prefaced the question

with “[For grad students in programs with fixed-term funding]”, we received 273 responses including many SoS/SoE students.) We found that 19% of respondents plan to request an extension, while almost 30% remain unsure. Further, 10.6% report already making an extension request, while 40% do not plan to apply for a funding extension (see **Fig. 12**).

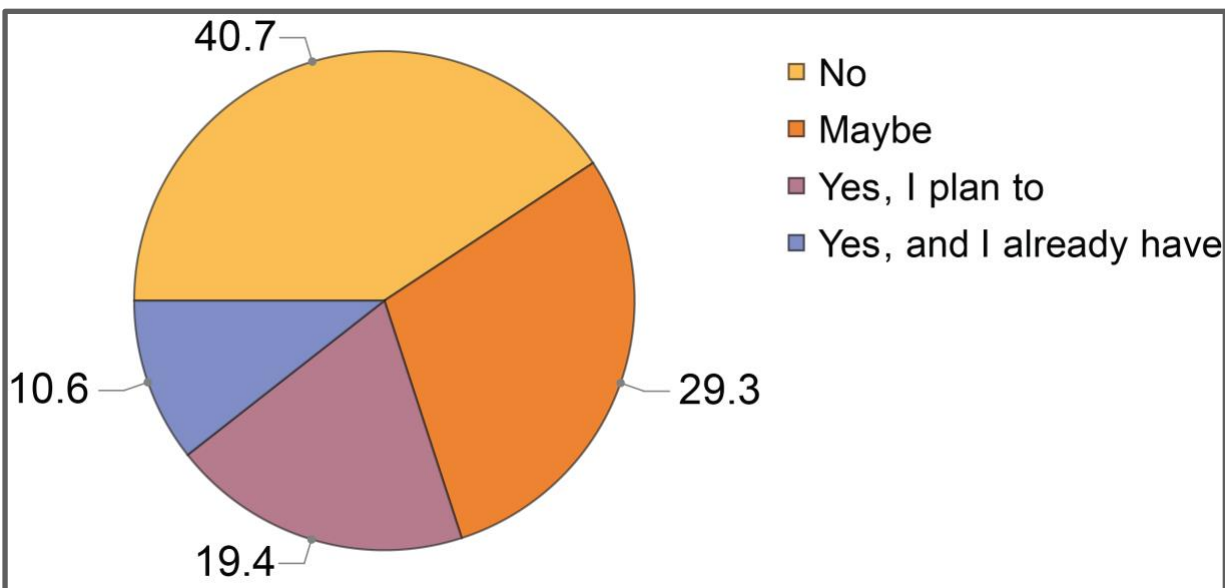


Figure 12. Plans to request a funding extension

The distribution of those requesting funding extensions is bimodal. Across the board, students that have been at MIT since 2013 or before have already requested or plan to request extensions; two-thirds have already received them. There is another cluster of students that started between 2016-2018 who have either already requested an extension or intend to do so.

In fixed-term programs with limited funding structures - the majority of which cluster in SHASS and SA+P, with Math the exception - students requesting extensions are already at or approaching the end of their funding package, and are doing so at noticeably high rates. For these students on a crunched degree timeline, COVID-19 represented a particularly critical and costly break. Travel disruption and public health dangers delayed much work. For others, the pandemic forced them to change their research questions or methods in order to accommodate pandemic-related constraints and continuing uncertainties. Such adjustments may require significant time repeating already completed research steps. Further, for those that did not make significant changes to research, research may have been delayed nonetheless, for example by health and family obligations or newfound workplace constraints.

We additionally note that a significant number of early-stage graduate students have already requested an extension or are considering doing so (see **Fig. 13** below). Early challenges in graduate school can induce cascading delays; students may put off milestones or be unable to begin their personal research on timetables that made sense before the pandemic. Though students entering this year have been able to better plan for pandemic graduate school, they still face many of the same constraints and delays as their more-senior peers.

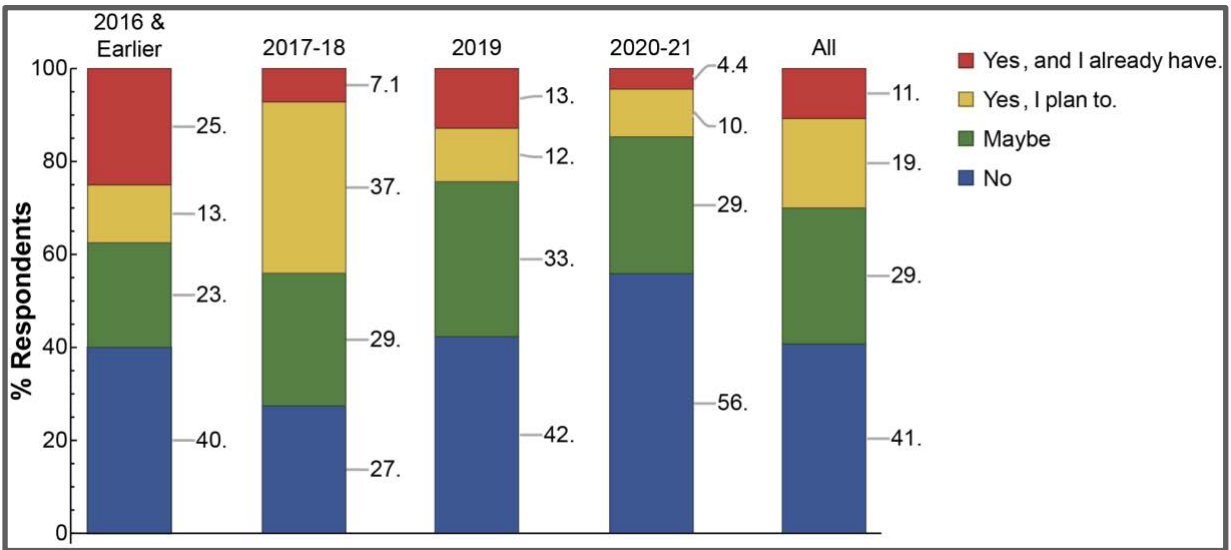


Figure 13. Plans to request a funding extension by year

Representative open-ended answers from early-stage students attest to these difficulties:

I really cannot stress enough how the first year has been damaged.

COVID-19 has substantially delayed/impacted my ability to conduct preliminary research, a major component that is foundational to dissertation work and successful PhD completion. Preliminary research is important to social science researchers who need to establish connections and trust with interlocutors, as well as to conduct archival research for history. Archives have been completely closed off or severely limited during the pandemic. Funding extensions for fixed-term funding would help to offset these disruptions.

It's hard to know how much those of us in the early stages of the program will be able to catch up in future years, and thus whether we'll need funding extensions, but I don't feel like I've accomplished anything in the past year and a half.

We therefore note that, even though MIT is returning to a normalized operating program for Fall 2021, the pandemic persists in diminishing research opportunities, for example through ongoing difficulties leaving the country; collaborating; accessing libraries, equipment, supplies, or lab space; or caring for children or family. We recommend careful long-term planning and fundraising for ongoing, chronic difficulties completing on pre-pandemic timelines.

III. Sources of Research Impacts

III.1. Aggregated results

We gave respondents an opportunity to say whether each of eighteen commonly-reported COVID-19 related research obstacles applied to them. For each potential obstacle, respondents

could mark “Major obstacle,” “Minor obstacle,” “Not an obstacle,” or “Did not experience or N/A.” From those eighteen, three were marked as obstacles the most often, with the trend holding across schools, international vs domestic, and work sites:

- Lack of appropriate work space
- Difficulty collaborating with other researchers
- Mental/physical health issues.

Table 3 represents the most commonly-selected obstacles to research under COVID-19 and their respective percentages of respondents. The middle column reflects the percent of all respondents who marked each of these obstacles as a “Major obstacle” while the right column represents the sum of those who marked the item as a “Major” or “Minor” obstacle.

Table 3. Most commonly-selected obstacles to research under COVID-19

Obstacle	Major %	Major + Minor %
Lack of appropriate work space	35%	77%
Difficulty collaborating with other researchers	45%	86%
Mental/physical health issues	48%	83%

III.2. Breakdown by School

In four Schools, enough graduate researchers responded to the survey for their responses to be broken down. We list them here with their abbreviations:

- School of Architecture and Planning (**SA+P**)
- School of Humanities, Arts and Social Sciences (**SHASS**)
- School of Engineering (**SoE**)
- School of Science (**SoS**)

The research barriers mentioned above were strongly felt in all four Schools, as will be shown below. There were also research obstacles felt particularly strongly in one or two of the Schools, so we calculated the percentage of respondents in each School who marked each of our 18 research obstacles as a “Major obstacle,” a “Minor obstacle,” etc. and constructed stacked percentile bar charts of responses along four major themes: obstacles related to work, those related to logistical hurdles, financial obstacles, and other duties as obstacles. Some insights emerged from this view of the data, which will be discussed below.

III.2.a. Obstacles directly related to work

Below, we break down by School responses regarding those obstacles which can be felt while actively doing research tasks. These cover obstacles in three main categories: spaces, equipment and communication. See **Fig. 14** below:

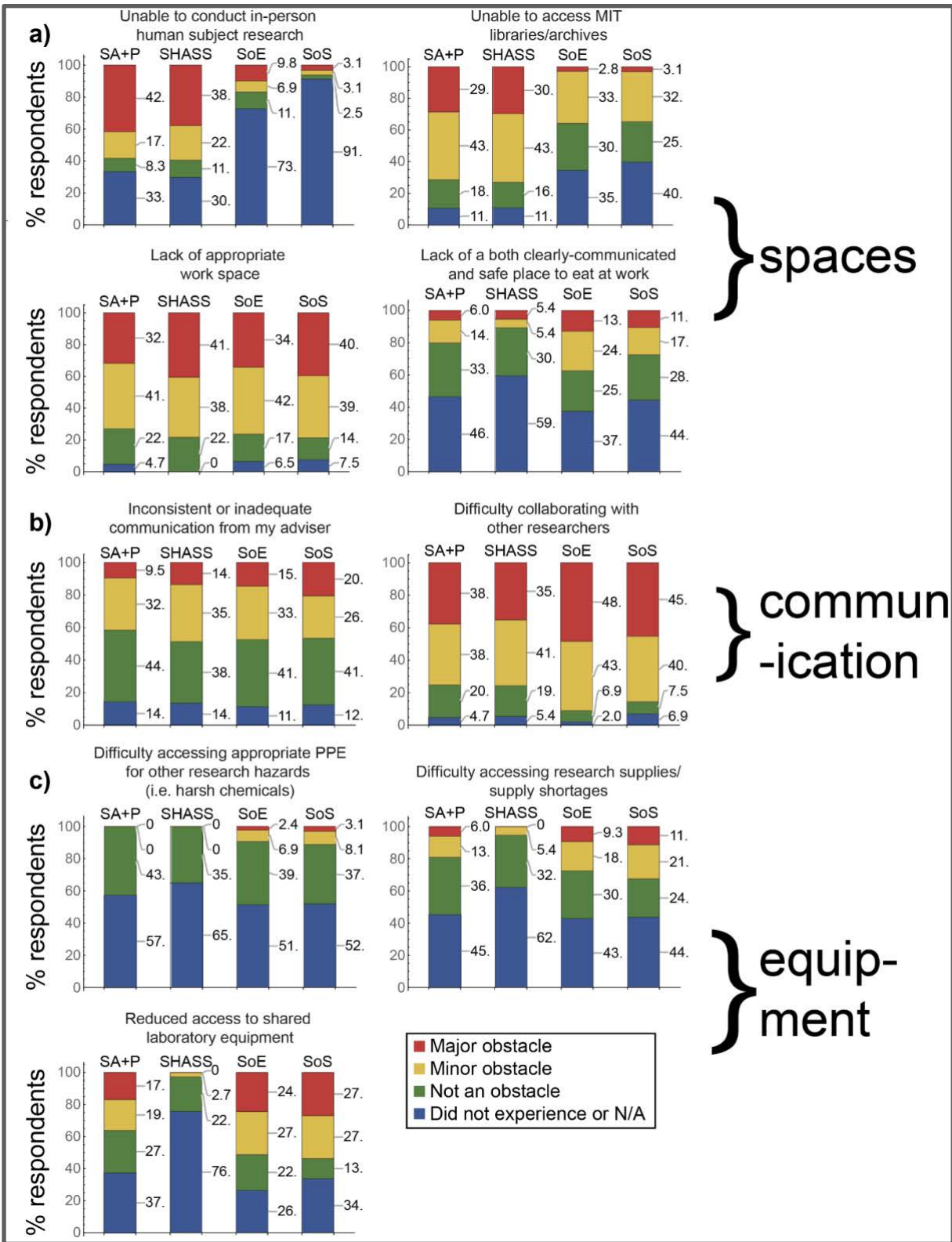


Figure 14. Obstacles directly related to work, breakdown by school

III.2.a.1. Space

Most respondents suffered from lack of appropriate work space, regardless of School:

Table 4: Work Space as an Obstacle

	Major obstacle %	Minor obstacle %	Not an obstacle %	Did not experience or N/A %
SA+P	32	41	22	4.7
SHASS	41	38	22	0
SoE	34	42	17	6.5
SoS	40	39	14	7.5

See also **Fig. 14a**. Experimentalists from the lab sciences commented on how their work suffered with a shift schedule, for example:

Even as research activities ramped back up, occupancy restrictions meant my lab had to work in shifts (as many labs did). Bizarre hours, reduced contact with labmates definitely impacted research.

Meanwhile those researchers who worked remotely noted that they couldn't necessarily afford to suddenly build a home office and pay higher utilities. This anonymous comment matched the experience of many researchers we heard from:

I felt that MIT forgot about students who work from home. I spent 6 months without a proper place to work (I was going crazy living and working in a single room). I ended up making a better work situation for myself by moving into a new apartment; however this cost me a lot of money [...] Students don't usually live in big houses with lots of space to live and work and professors, who often do, haven't shown much empathy with our situation. Even a small gesture like offering everyone who works from home an office chair, an extra monitor, etc, without having to explicitly ask around for it, would have gone a long way to make me feel taken care of/not forgotten.

The majority of SA+P and SHASS respondents reported **inability to conduct in-person human subject research** (59% and 60% respectively) and **inability to access MIT libraries and archives** (72% and 73%) as obstacles (**Fig. 14a**). This may have influenced the high rates of research changes in those programs, as discussed more fully in **Section II.2.b**.

III.2.a.2. Communication

In terms of communication obstacles to research, responses largely held across the four Schools. **Difficulty collaborating with other researchers** was considered a "Major" or "Minor" obstacle by the majority of respondents from every school: 76% of respondents from SA+P; 76% of respondents from SHASS; 91% of respondents from SoE; and 85% of respondents from SoS (**Fig. 14b**). One of the stories behind these numbers is demonstrated by the comment below:

The biggest negative impact COVID-19 has had on my research is the complete disintegration of any sense of community, both in my lab and in the department. I am

conducting research in an isolated bubble and am thus probably wasting time on stuff no one cares about.

About half of respondents from each school also reported **inconsistent or inadequate communication from their advisor** as a major or a minor obstacle to their research during the pandemic: 41.5% of respondents from SA+P; 49% of respondents from SHASS; 48% of respondents from SoE; 46% of respondents from SoS. **Section IV.2** contains recommendations for possible ways to alleviate these difficulties.

III.2.a.3. Equipment

Reduced access to shared laboratory equipment was considered a major or a minor obstacle by about a half of respondents from SoE (51%) and SoS (54%) and a third of respondents from SA+P (35%). See **Fig. 14c**. Together, those represent a large fraction of survey respondents.

As a constructive idea, MIT could invest in equipment to be shared between smaller groups, which could reduce the impact of equipment failures on experiment output in the present (see **Section IV.2.g**). This will also relieve the workload of graduate and postdoctoral researchers, who often have to go to great lengths to make outdated, inappropriate or inaccessible equipment work. With more robust research infrastructure, we have the capacity to reduce the research impact of the next crisis.

III.2.b. Logistical/life obstacles

COVID-19's impacts on graduate research extend beyond the research work itself. Many respondents reported logistical and quality-of-life obstacles to their research.

As is illustrated by **Fig. 15** below, more than half of respondents from each school report **mental/physical health issues** as a major or a minor obstacle: 85% respondents from SA+P (49% -- major obstacle, 36% -- minor obstacle), 89% respondents from SHASS (62% -- major obstacle, 27% -- minor obstacle), 82% respondents from SoE (45% -- major obstacle, 37% -- minor obstacle) and 85% respondents from SoS (53% -- major obstacle, 32% -- minor obstacle). These data show that mental/physical health issues due to the COVID-19 pandemic create a serious obstacle for students from all four Schools and, unsurprisingly, have a negative effect on the research progress across disciplines in similar measure.

More than half of the respondents from SA+P and SHASS reported **inability to travel or difficulty travelling** as a minor or major obstacle to their research. As is illustrated by **Fig. 15**, inability or difficulty travelling was considered an obstacle to their research by 81% of respondents from SHASS and 76% of respondents from SA+P. A significant proportion of respondents from SoE and SoS also cited inability or difficulty traveling as a major or a minor obstacle: 48% of respondents from SoE and 44% of respondents from SoS. This commenter demonstrates why not being able to travel negatively impacts degree timelines:

Lack of in-person research/travel is a HUGE barrier. Many social scientists have been encouraged to "pivot" to remote research, or change research plans entirely (i.e., switch field sites from a foreign country to the US). For many of us who have spent our entire grad careers (even undergrad research) preparing for our projects, these "pivots" CANNOT be

accomplished quickly, nor yield the same quality results. I live in fear of not collecting enough data to write a serviceable dissertation and get a job.

Additionally, this commenter spoke to the indirect but powerful impact of not being able to visit family:

As an international student, I found it extremely difficult during the pandemic to travel home and see my family, due to travel bans and visa closures. (If I leave the U.S., I may not be able to re-enter the U.S. in the near future.) Some of my family members need help, but I cannot visit them. This dilemma is very stressful and hindered my productivity.

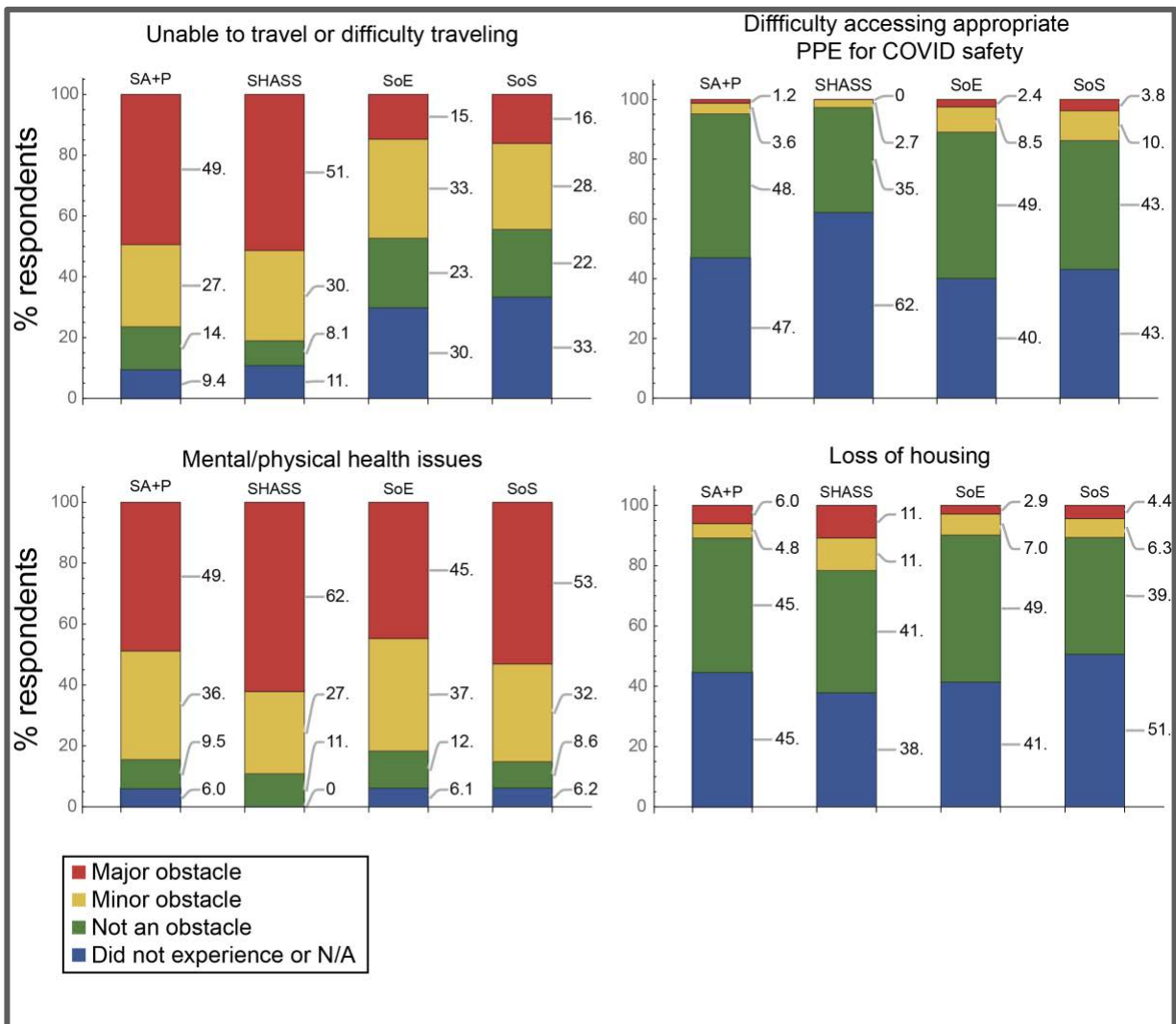


Figure 15. Logistical/life obstacles, breakdown by school

SoS respondents were somewhat more likely to report “Mental/physical health issues” as an obstacle than SoE, possibly contributing to SoS’s slightly higher percentage of researchers reporting a negative impact of COVID-19 (Sec. II.2). This Engineering respondent demonstrated how the pandemic’s mental health effects manifested:

COVID has been severely affecting my mental health, it took me a year to finally get back to a more productive state. I had this fear that I'd be a failure if I didn't succeed, but no one in my lab acknowledged the state of the pandemic and how that negatively impacts research productivity. No one at MIT says it is ok to not be productive when your life has been upended, especially for international students.

III.2.c. Financial obstacles

COVID-19 created serious financial obstacles for students from all the four Schools, with perhaps the highest burden felt in the social sciences. The most commonly reported obstacle is **uncertainty about funding for future years of the PhD**. In fact, 41% respondents from SA+P, 76% respondents from SHASS, 35% of respondents from SoE and 32% respondents from SoS consider this as a major or a minor obstacle, as is illustrated by **Fig. 16** below.

Another commonly reported financial obstacle can be described as **funding challenges for research groups**. It is considered to be a major or a minor obstacle by 42% respondents from SA+P, 33% respondents from SHASS, 27% respondents from SoE and 18% respondents from SoS, see **Fig. 16** below.

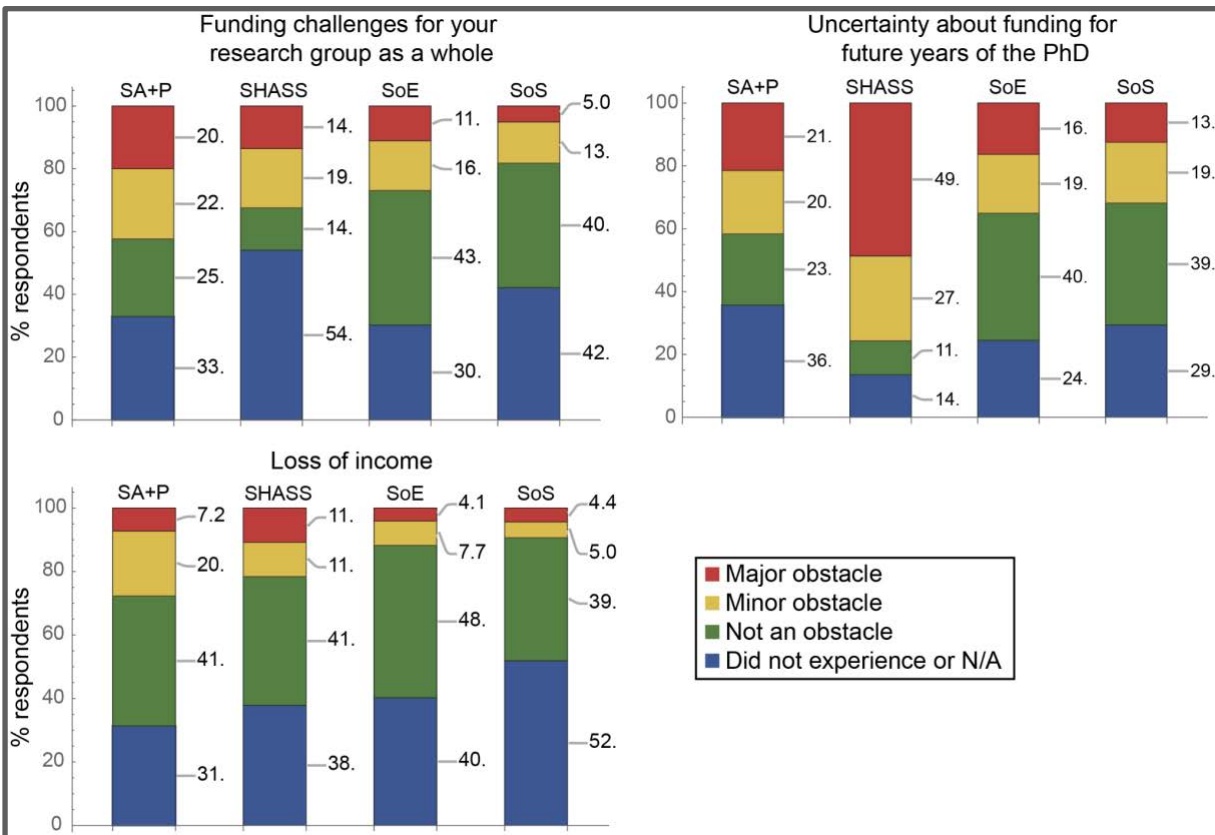
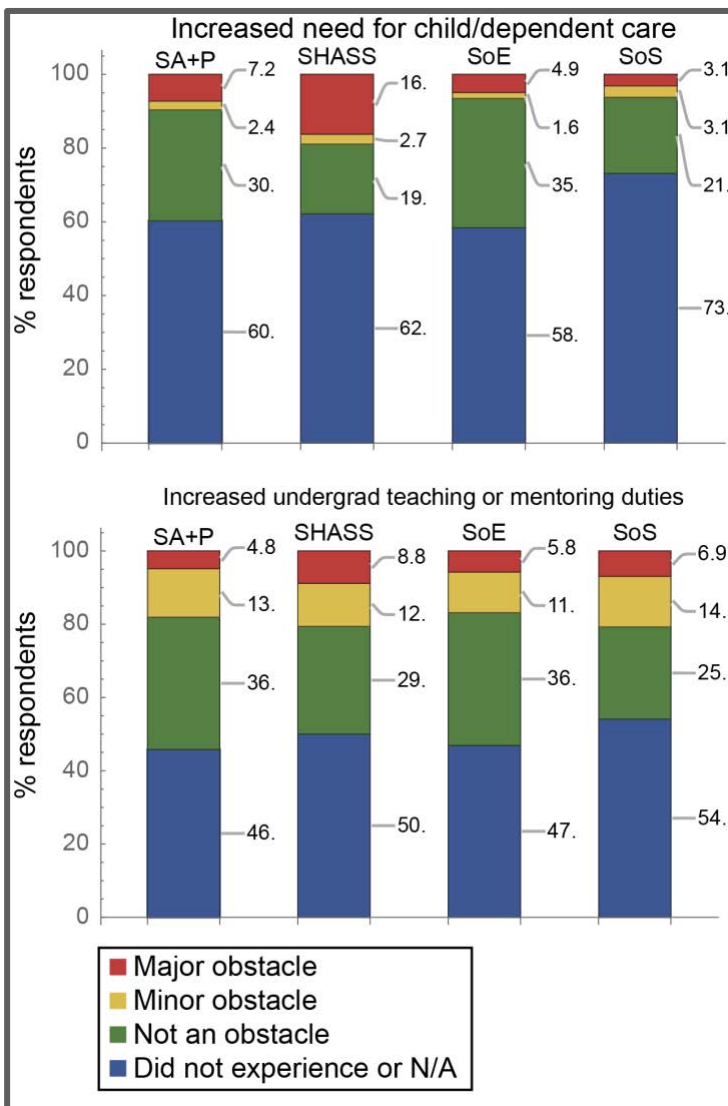


Figure 16. Financial obstacles, breakdown by school

III.2.d. Other duties as obstacles

Respondents with families in particular reported that their non-research everyday duties were also negatively impacted by the pandemic, which in turn, had an effect on their research. See, for example, the following comment:

We have been heavily impacted by the pandemic, our ability to do research got severely reduced due to the lack of childcare and even now that many options are back open, we see the impact of the pandemic in our kids which impacts our overall mental health and therefore research output. The mental toll of the pandemic is really hard to manage and as the pandemic keeps going, our mental health keeps deteriorating given the extreme challenge of working and caring for young kids in the pandemic.



The fraction of respondent researchers marking this obstacle was small (**Fig. 17**), likely due to the relatively small fraction of MIT grad students who have children (~7% based on the [2019 grad Enrolled Student Survey](#)). Nonetheless, policy-making in response to the pandemic must take graduate parents into account; see **Section IV.2** for related recommendations.

Finally, 15-25% of respondents in each School marked “Increased undergrad teaching or mentoring duties” as an obstacle to research, as shown in **Fig. 17**. SHASS respondents were particularly likely to mark both these outside duties as a “Major obstacle” to research.

Figure 17. Obstacles related to alternate duties, broken down by School

III.3. International and US student researchers

As mentioned previously, 34.5% of respondents marked themselves as “International” and 65.5% as “US.” This is not too distant from the approximately [41% international enrollment](#) in MIT’s graduate programs overall.

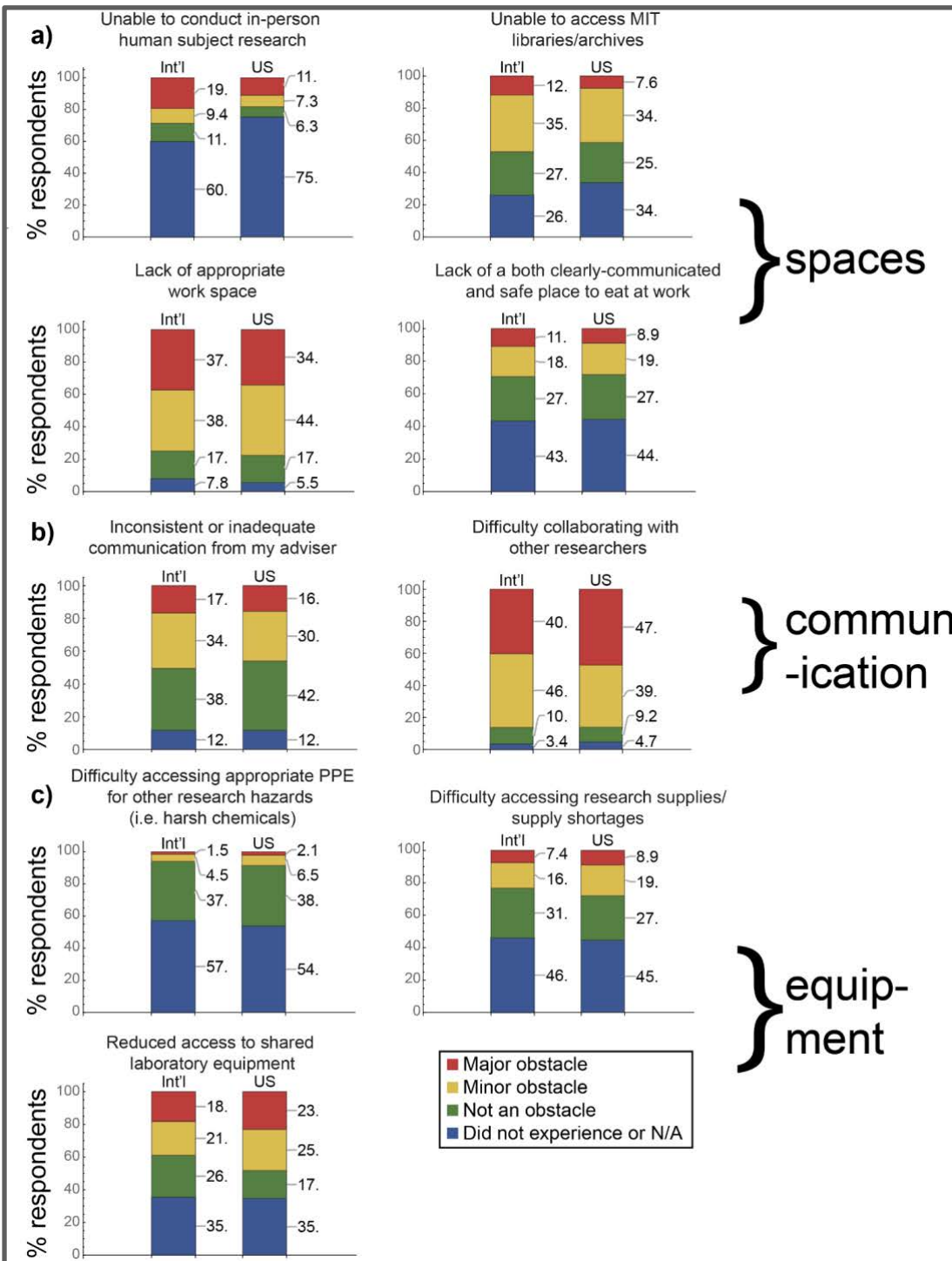


Figure 18: Obstacles directly related to work, International vs US

While international and US student researchers who responded to the survey experienced similar rates of overall positive and negative impacts on their research, and equivalent rates of having to make significant changes to their research (see **Section II.3**), there were some differences between international and US respondents when it came to specific obstacles to their research. Below, we break down international vs US respondents' responses to the research obstacle questions and point out the differences. Aside from the obvious increase in travel difficulties, international researchers experienced financial obstacles at higher rates than their US peers.

III.3.a. Obstacles directly related to work

International respondents were more likely to report a couple of directly work-related obstacles to their research:

- Unable to conduct in-person human subject research (28.4% vs 18.3%)
- Unable to access MIT libraries/archives (47% vs 41.6%)

On the other hand, US researchers were marginally more likely to report obstacles regarding access to equipment and supplies (**Fig. 18** above).

These differences may reflect the disparate percentages of international workers in different programs and Schools. The MIT Institutional Research office's [Graduate Education Statistics](#) pages show that 35% of School of Science (SoS) grad students are international, compared to 46% in the School of Humanities, Arts and Social Sciences (SHASS), for example.

Correspondingly, SHASS students were more likely to mark the human subjects research and library access obstacles, while SoS students were more likely to mark the lab equipment and supplies obstacles (See **Section III.2.a**).

III.3.b. Logistical/life obstacles

International respondents were more likely than US respondents to report "Unable to travel or difficulty traveling" as a "Major obstacle" to their research (32% vs 18%); see **Fig. 19** below. In the open responses, international respondents commented on the negative impacts of getting stuck outside the US, being unable to visit family, and the process of getting remote appointments approved. Some researchers working remotely reported feeling cut off from their support systems in the US, while others wanted to stay near their support systems in their home countries; both effects could contribute to travel difficulties as a research obstacle. Finally, researchers in some parts of the world also struggled to get access to healthcare and vaccines, adding substantially to their pandemic health burden and stress levels.

An observation that seems connected was that international respondents were more likely to report "Loss of housing" as either a "Major obstacle" or "Minor obstacle" to their research (15% vs 9.5%, **Fig. 19**). Anecdotally, the GSC heard a number of complaints from student workers who had been working remotely from Europe about enormous lease termination fees when they were suddenly asked to return to the US on short notice for Spring 2021.

Finally, for both US and international researchers, mental/physical health issues were a commonly and evenly reported obstacle to research (**Fig. 19**). Accordingly, we should ensure resources aimed at recovery of mental and physical health should be designed to be easily accessible to researchers of all nationalities, and those few who are still working remotely.

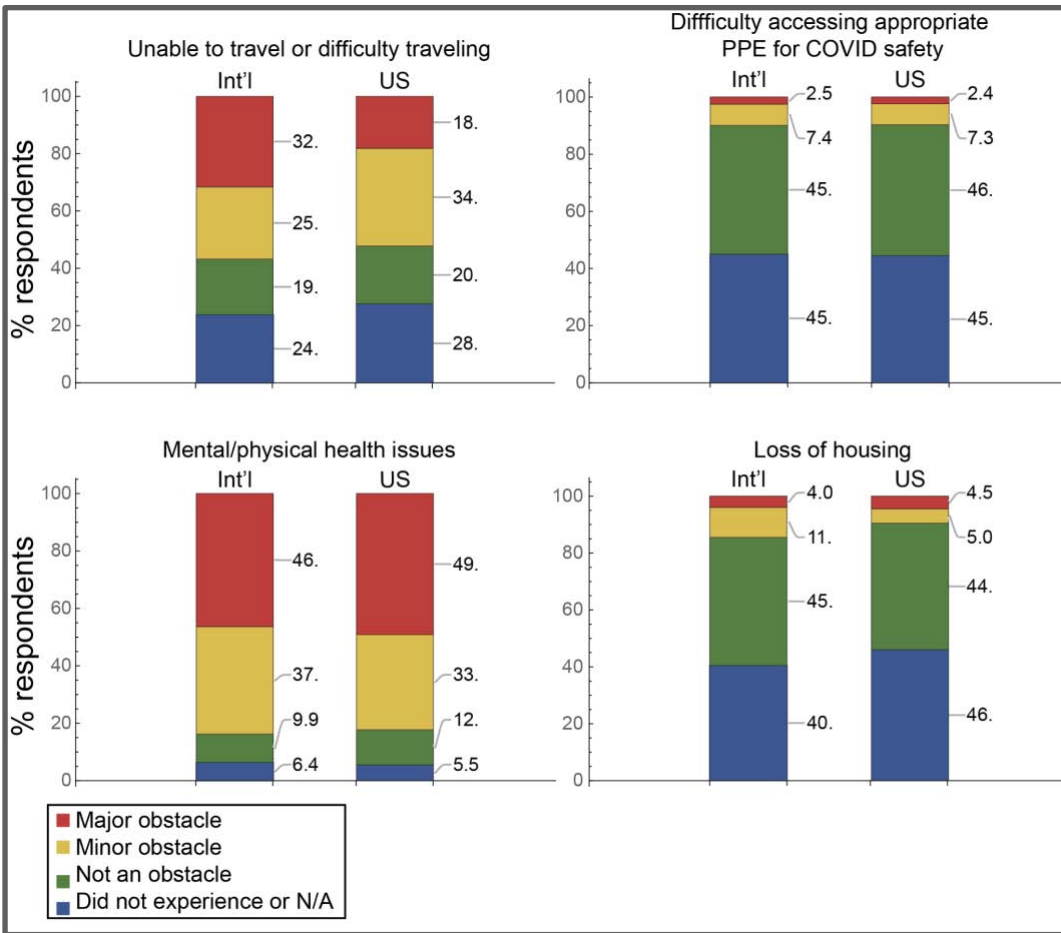


Figure 19: Logistical/life obstacles, International vs US.

III.3.c. Financial obstacles

The survey asked about three potential research obstacles related to finance and funding. For each of them, international respondents were more likely to mark it as an obstacle to their research (Fig. 20). International respondents were more than twice as likely to report “Funding challenges for your research group as a whole” as a “Major

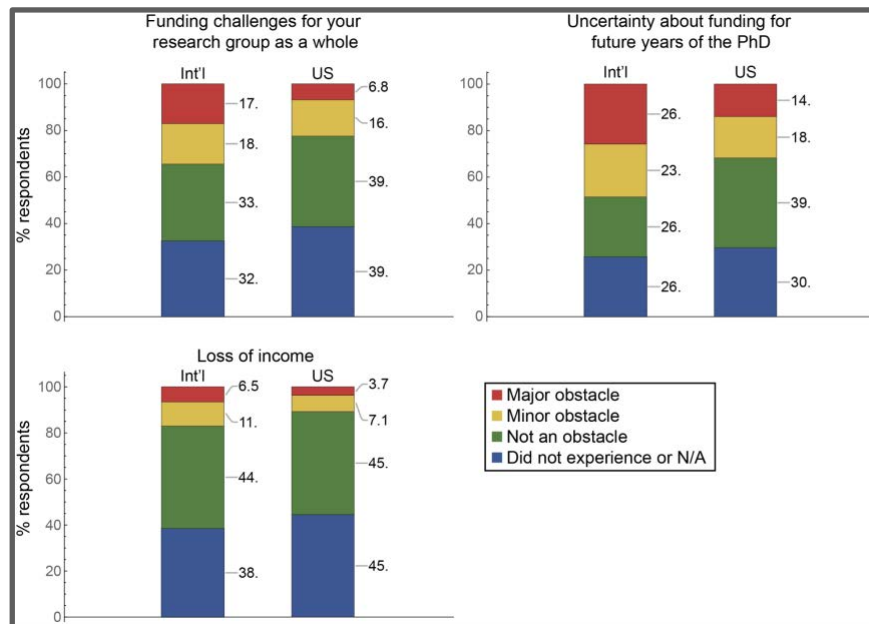


Figure 20: Financial obstacles, International vs US

obstacle” to their research compared to their US peers (17% vs 6.8%). Possible reasons for this include restricted funding sources such as grants from government agencies that can only be used for US students, or international students could simply be concentrated in programs that happened to be hit with more funding cuts.

International students were also more likely to report uncertainty about future funding as a major or minor obstacle (49% for international researchers vs 32% for US citizens). One possible explanation for this is that in programs with limited funding, students at the end of their funding packages typically rely on external fellowships to complete their degrees; many such fellowships include citizenship requirements or are otherwise unavailable to international researchers.

International students are also limited in their employment options outside the Institute. See **Section IV.2** for relevant recommendations on financial hurdles.

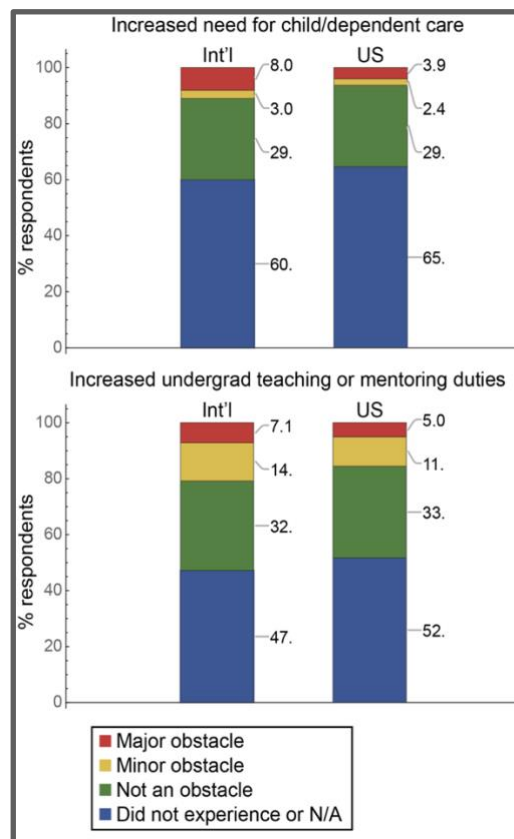


Figure 21: Other duties as obstacles, International vs US

III.3.d. Other duties as obstacles

International students also faced obstacles from other duties or obligations (see **Fig. 21**). For example, international respondents were more likely to mark “Increased need for child/dependent care” as a “Major obstacle” to their research (8.0% vs 3.9%). It’s possible that more international grad students happen to have children, or that they have a harder time finding child care options. We can’t distinguish those two possibilities with the data from this survey. However, this international grad student makes a case for why we need to better support for parents regardless:

Being a parent is financially draining due to the limited support by MIT. Especially as internationals with less family support and partners having difficulty to find work, I really don't know how to pay for everything. Radically increasing (5-10k / 1-2k monthly to match what MIT charges for childcare) the amount awarded by the Grant for Graduate Students with Children would be extremely helpful here.

International parents may be especially vulnerable as they already face higher expenses from traveling, visa processing, etc., and can’t always benefit from financial aid for parents offered by the state or federal government. Also, those spouses of grad students who enter the US on F2 visas are not authorized to work, forcing the family to subsist on one grad student’s income - which was difficult if not impossible even before the pandemic. These parents are a valuable part of the MIT community, and should be given the funding they need to support their families so they can continue making their unique contributions to research at MIT.

III.4. Breakdown by work site

Respondents were split into four non-overlapping categories as Remote, On Campus, Off Campus or Both In Person, based on their answers to questions about where they were physically located while they did their research. See **Section II.4.a** for more details. Here, for the same categories, we report how respondents in each category reported each research obstacle we surveyed for.

III.4.a. Obstacles directly related to work

Below, we show which proportion of each group of respondents reported experiencing various obstacles **directly related to their work**. As above, these can be categorized into obstacles related to work spaces, communication, and equipment access. See **Fig. 22**.

There are a few results for **respondents who worked on campus** to highlight:

- 51% of On Campus respondents marked “Lack of a clearly-communicated and safe place to eat at work” as a “Major” or “Minor” obstacle, with 22% marking “Major obstacle” (**Fig. 22a**).
- 52% of On Campus respondents marked “Difficulty accessing research supplies/supply shortages” as a “Major” or “Minor” obstacle (**Fig. 22c**).
- 76% of On Campus and 70% of Both In Person respondents marked “Reduced access to shared laboratory equipment” as a “Major” or “Minor” obstacle (**Fig. 22c**).

These suggest possible intervention points where planning and infrastructure can help prepare us for the next crisis, as outlined in **Section IV.2.g**.

We previously mentioned three research obstacles which were commonly marked as “Major” or “Minor” by the majority of respondents across many demographic groups. Those “usual suspects” were noted as obstacles by researchers across all four work site categories, including the “fully remote” researchers. **Table 5** below shows the percentage of respondents from each site who marked these as a “Major obstacle.”

Table 5: Percent of respondents from each work site category selecting the most commonly-marked obstacles as a “Major obstacle” to their research

Obstacle	Remote	On Campus	Off Campus	Both in Person
Lack of appropriate work space (Fig. 22a)	38	40	25	35
Difficulty collaborating with other researchers (Fig. 22b)	45	47	38	46
Mental/physical health issues (Fig. 23)	44	50	53	46

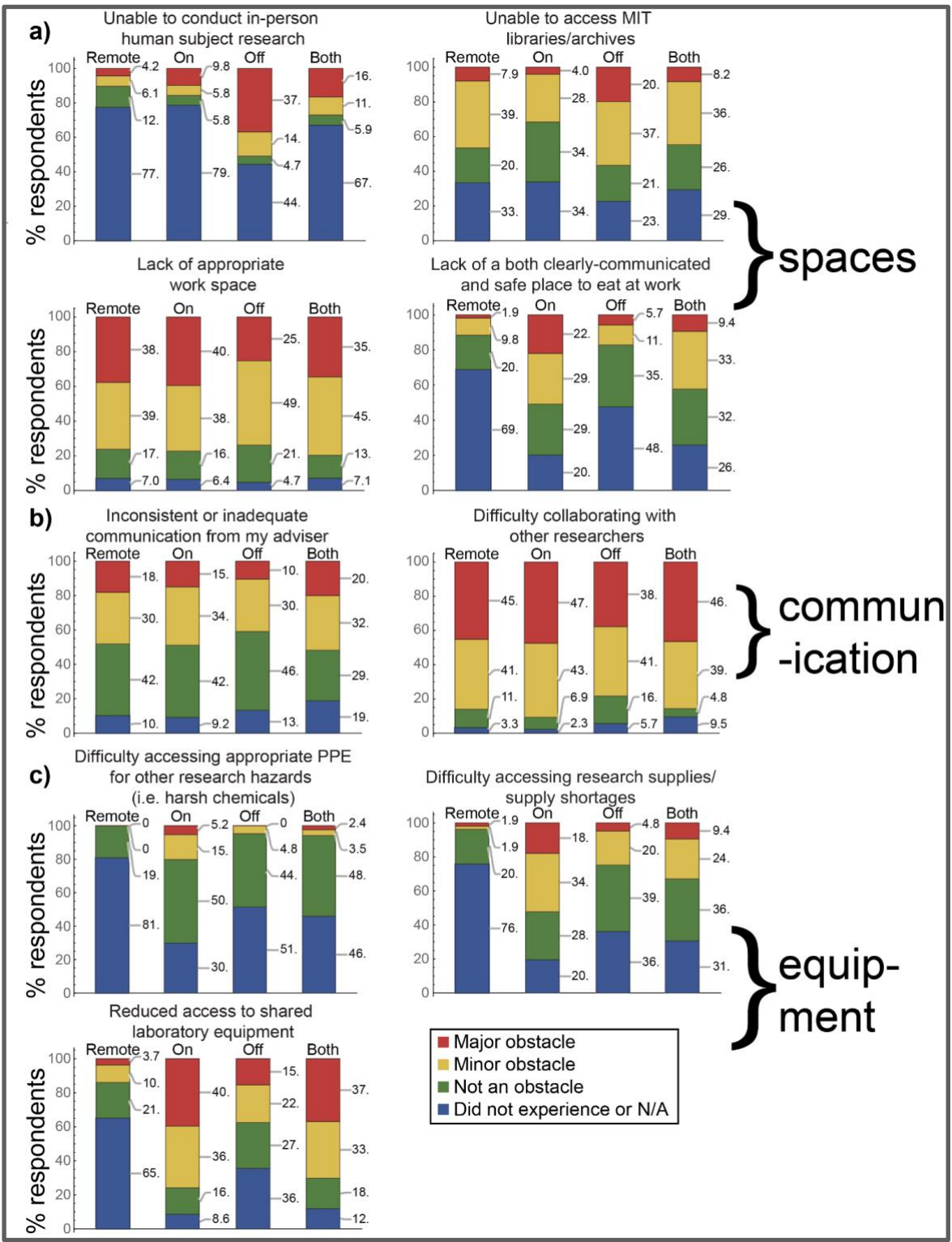


Figure 22. Obstacles directly related to work, breakdown by work site

III.4.b. Logistical/life obstacles

As previously noted, graduate researchers across all work sites reported “Mental/physical health issues” as a “Major” or “Minor” obstacle to their research (Fig. 23), which reinforces health as a major COVID recovery challenge across MIT. Naturally, off-campus researchers were more likely to mark “Unable to travel or difficulty traveling” as an obstacle. Finally, on-campus researchers were most likely to mark “Difficulty accessing appropriate PPE for COVID safety” as a “Major obstacle” (5.2%) or a “Minor obstacle” (17%).

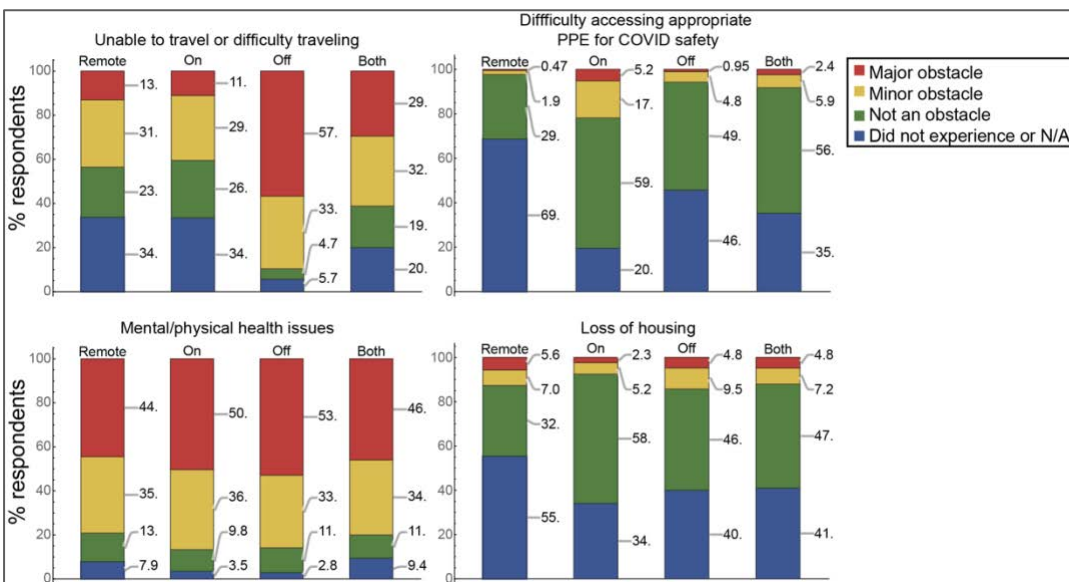


Figure 23: Logistical/life obstacles, breakdown by work site

III.4.c. Financial obstacles

Respondents who conducted some form of in-person research were more likely to mark “Funding challenges for your research group as a whole” as an obstacle to their research than those who worked remotely (Fig. 24). This trend was also reflected in a breakdown of School of Science respondents who worked remotely vs on-campus (see Appendix V.1). The simplest interpretation is that those who work in-person often also rely on

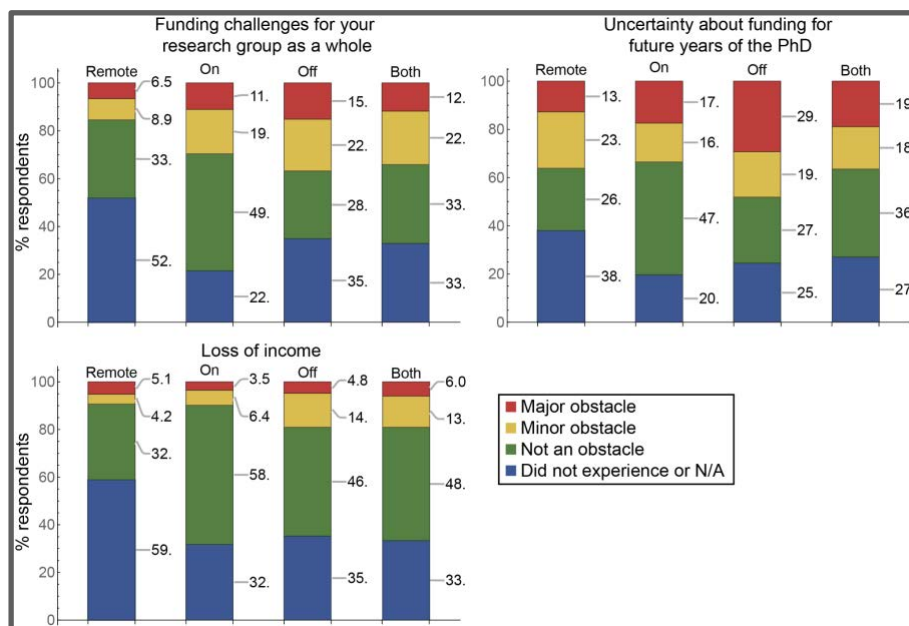


Figure 24: Financial obstacles, breakdown by work site

their research groups' budgets for necessary supplies and equipment, and funding challenges for the research group can often result in difficulty getting supplies we used to rely on.

Respondents who worked off-campus were more likely to report “Uncertainty about funding for future years of the PhD” as an obstacle (Fig. 24). This may reflect the fixed-term model of funding in the fields which happen to necessitate off-campus research like international fieldwork. Of the 107 Off Campus respondents, 31 were affiliated with programs in the School of Architecture and Planning (SA+P), and another 17 from the School of Humanities, Arts and Social Sciences (SHASS). In those two Schools, many departments/programs have fixed-term funding models. Plenty of respondents from those Schools believe their research was negatively impacted by COVID-19 (Section II.2.b), so naturally these respondents often voiced concerns about whether they'd be able to complete a reasonable dissertation before their funding packages run out.

III.4.d. Other duties as obstacles

Researchers who worked off-campus were more likely to report “Increased need for child/dependent care” as an obstacle to their research progress (13.8%, Fig. 25). This makes practical sense given these researchers may have been accessing a variety of research sites even outside Massachusetts, and the general struggle with childcare during COVID-19. Researchers from all work site categories were about equally likely to report “Increased undergrad teaching or mentoring duties” as an obstacle to their research, though interestingly, those working on campus were more likely to mark this as a “Major obstacle.”

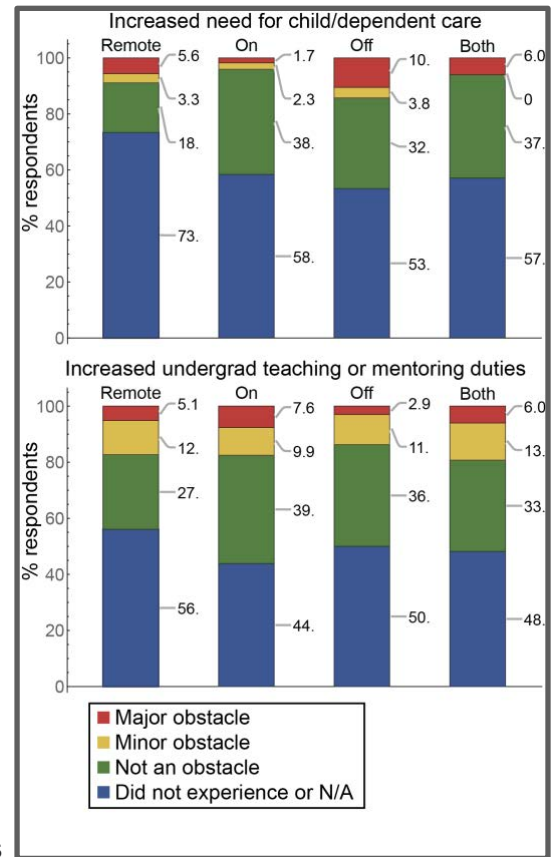


Figure 25: Other duties as obstacles, breakdown by work site

IV. Conclusions

IV.1. Future Research Directions

While this survey helped us understand the broad picture of impacts to research caused the COVID-19 pandemic and MIT's response to it, there were dimensions to research impacts which we did not record, and thus may be underrepresented in this survey.

We made the choice to exclude finer-grained demographic info to reduce the length of the survey, maintain anonymity, and increase response rate. However, this left us without a breakdown of the impact of COVID-19 on various marginalized groups, including women and non-binary people, people of color, and disabled/neurodivergent people.

The survey included a free-form text input for respondents to include information that was not otherwise asked about in the survey. Many responses indicated that there was an increase in difficulty of classes which was a significant source of impact on research, as demonstrated below. Future assessments might ask more thoroughly about pandemic workloads.

Research has been significantly impacted in an indirect route due to classes being more challenging/harder to do well in, harder to collaborate with students, and feeling like I have not really been part of a community since starting graduate school.

International students reported financial obstacles to their research at higher rates than domestic students (see **Sec. III.3.c**). Since universities strive to transcend the barriers of nationality and bring people together to solve humanity's common problems, it may be worth assessing in more detail where these disparate impacts came from, and what more MIT can do to shield international graduate researchers from funding discrimination or other financial disparities.

Finally, our survey only focused on graduate students at the Institute. To get a clearer picture of the broader impact of the pandemic on research, additional surveys which include research staff such as postdoctoral associates may be necessary.

IV.2. Recommendations

IV.2.a. Recommendation: Collectively acknowledge + navigate research impacts

In their qualitative responses, many students pinpointed a sense of loneliness in weathering the pandemic. As one respondent put it (emphasis added):

*COVID has been severely affecting my mental health, it took me a year to finally get back to a more productive state. I had this fear that I'd be a failure if I didn't succeed, but **no one in my lab acknowledged the state of the pandemic and how that negatively impacts research productivity. No one at MIT says it is OK to not be productive when your life has been upended, especially for international students.***

As MIT collectively recovers from the COVID-19 pandemic, we must openly acknowledge the range of research impacts and problem-solve together to get campus back to 100%.

We recommend a **series of town halls or workshops** for MIT students to give voice to these research impacts and to further understand the needs of the student body. Various student initiatives already work to normalize the failures and difficulties of research, for example the FAIL! Series; these demonstrate the value of collectively acknowledging difficult experiences and low points. The pandemic has been a time of enormous pain, stress, grief, and disruption for communities across campus. As vaccination rates increase and we anticipate a return to full in-person work in the fall, we cannot ignore or forget the reverberating impacts of a year of research under pandemic conditions. MIT must convene forums for graduate researchers and the broader MIT community to express and navigate these difficulties together.

IV.2.b Recommendation: Fundraising for Long-Term COVID-19 Recovery

Recovering from the disruption of the COVID-19 pandemic will require more than just verbal commitments to support students and departments; it will require clear financial commitments on the part of the administration.

MIT has the resources to properly fund COVID recovery. [MIT saw an 8.3% return on investments](#) for its endowment in the fiscal year ending June 2020, and since that time, the stock market has only continued to improve, with the S&P 500 seeing returns of almost 40% for the period from June 2020 to July 2021. MIT is on much safer footing than it was at the end of the 2008 recession, when its endowment dropped by more than a quarter.

In addition to funding COVID recovery through its endowment, we recommend that MIT tap on its broad donor network to **raise funds specifically to be used for COVID recovery programs**.

MIT COVID Relief has now shown with two surveys that PhD students in fixed-term-funding programs have *not* gotten the message that funding is available if they expend their funding packages before finishing their dissertations. This is still the case months after that funding was made available. The previous practice of relying upon department heads and deans to relay and act upon this information has not resulted in broad awareness that research extension funding exists. Many report inefficiently executing two research plans simultaneously in case their planned dissertation research can't be finished before they're forced to graduate or lose funding.

Given this, MIT should raise and distribute COVID recovery funds to departments and students through **universal, broadly-advertised, and centrally-administered grants**. Experience with MIT's current approach to pandemic relief funding (e.g. [COVID-related extensions for PhD funding](#)) has shown that it idolizes local administration and budgetary cleverness over actually providing relief to those who need it. As [MIT COVID Relief has made clear in the past](#), universal and centrally-funded grant programs are the only way to ensure that departments and students will be able to equitably and speedily receive the support that they need.

While we expect that the pandemic will continue to have long-term effects that will need to be addressed, we have several further recommendations for specific grant programs that MIT should institute.

IV.2.c. Recommendation: Universal funding extensions for graduate students

While many graduate students at MIT have been able to rely on consistent funding until graduation, this is not the case for all students. Students in departments with fixed-term funding, such as those in SHASS and SA&P, as well as Mathematics (SoS), have "funding cliffs" - that is, their funding runs out after a predetermined length of time.

These **funding cliffs have been an ongoing issue for students in these departments even before the pandemic**, as while most of these departments only guarantee five years of funding, doctoral [time-to-degree completion averages closer to 6 or 7 years](#) (in SHASS and SA+P), leaving students to search for funding at a pivotal time in their graduate career.

The COVID pandemic has only further exacerbated this problem. Students are now expected to complete their degree within the same timeframe even as they struggle with all the other issues

that the pandemic has created. Meanwhile, students in SoS and SoE programs also report delays to their degree progress or forced changes to their research.

In August of 2020, Provost Schmidt verbally committed to providing funding extensions to graduate students whose degree progress was affected by the pandemic. However, there was little commitment on the part of the administration to actually ensure that students received these extensions. In a preliminary survey of students in fixed-term funding programs conducted in February/March 2021, we found that the majority of respondents were unaware of the availability of funding extensions, and that even faculty and department administrators appeared to be unaware or misinformed of this promise.

As a result of a push by MIT COVID Relief, the administration published [clearer language around these extensions](#). However, to this day, many students in departments with fixed-term funding **still** lack confirmation around funding extensions, stymied by administrative backlog and negotiations.

Furthermore, MIT has only committed to extensions for late-stage graduate students. However, both early and late stage students suffered from delays to their research:

It's hard to know how much those of us in the early stages of the program will be able to catch up in future years, and thus whether we'll need funding extensions, but I don't feel like I've accomplished anything in the past year and a half.

Given the number of respondents (both early and late-stage) who pointed to uncertainty around funding as a significant obstacle to their research, we recommend that MIT take immediate action to resolve this standstill by guaranteeing **universal, centrally-funded extensions to graduate students in all years and fields**.

IV.2.d. Recommendation: Increased support for caregivers/parents

Grad students with families have been heavily impacted by the pandemic, our ability to do research got severely reduced due to the lack of childcare and even now that many options are back open, we see the impact of the pandemic in our kids which impact our overall mental health and therefore research output. The mental toll of the pandemic is really hard to manage and as the pandemic keeps going, our mental health keeps deteriorating given the extreme challenge of working and caring for young kids in the pandemic.

Graduate student parents and caregivers have long been underrepresented at MIT, and their issues have long been ignored by the central administration. Even before the pandemic, graduate families were forced to survive on near-poverty wages, especially international graduate families, who experience additional restrictions on their ability to work. Given the overall contraction of the US economy, especially in terms of jobs, during the pandemic, the number of graduate families who were forced to survive on near-poverty wages was even greater. We applaud MIT's recent moves towards dealing with these issues, including the recently instituted [MIT Grants for Graduate Students with Children](#), **but this support needs to be much more robust**.

Being a parent is financially draining due to the limited support by MIT. Especially as internationals with less family support and partners having difficulty to find work, I really don't know how to pay for everything. Radically increasing (5-10k / 1-2k monthly to match what MIT charges for childcare) the amount awarded by the Grant for Graduate Students with Children would be extremely helpful here.

The current grant only provides \$5-7k per academic year for graduate students with families, which is a drop in the bucket compared to the cost of childcare, which [averages \\$1750 a month](#) in Massachusetts for a single infant. Graduate students are additionally unable to take advantage of scholarships for daycare providers at MIT, which are only available to MIT faculty. Providing graduate students access to these scholarships would go a long way to alleviating the costs of childcare for graduate student parents and caregivers.

The COVID-19 pandemic also coincided with several drastic changes at the Institute which have far-reaching effects on the graduate population, especially parents and caregivers. In August 2020, MIT closed Eastgate, one of two family residences available at MIT at the time, and replaced it with new housing options which were significantly more expensive, sometimes above market-rate. This unnecessarily cruel move belies a lack of understanding of the limited income available to graduate parents and caregivers, and moves MIT away from its spirit as a research-oriented institution and towards a profit-driven one. MIT must stop their steady march towards profit-driven housing and **offer affordable housing choices for all graduate students, especially those with families.**

IV.2.e. Recommendation: Fair Institute reopening

As it becomes safer and more feasible for campus to reopen and more research to proceed, MIT must ensure that both short-term (i.e. as a result of the pandemic) and long-term inequities in access to Institute resources across different research groups are not reproduced or exacerbated by the reopening.

We recommend that MIT work with students and faculty to **create research group-level plans for reopening campus**. Furthermore, we recommend that MIT **commit to additional funding (i.e. separate from departmental/research group-level budgets)** to address inequities which are identified as a result of this process.

We further recommend **developing guidance for DLCs and advisors** to adjust workload or progress expectations, and, crucially, ensure that these adjusted expectations are taken into account during student progress meetings.

IV.2.f. Recommendation: Draw from examples/models of institutional support for graduate students

MIT's peer-level ranked institutions ([Harvard](#), [Stanford](#), [Yale](#), [Duke](#), [UC Berkeley](#)) have supported their graduate students on a university-wide level in multiple forms, including one-semester to one-year time-to-degree extensions, substantial tuition reduction (or remission once students reach ABD status), and dental insurance. MIT has not offered these lines of support to graduate students. We urge MIT to act in alignment with peer institutions on COVID-19 relief and recovery policies. This will ensure equity across graduate populations and maintain the Institute's peer competitiveness as we navigate unprecedented crisis.

IV.2.g. Recommendation: Create infrastructure to help manage the next crisis

Realistically, there is a decent chance we will experience another global crisis in the next century. That could be another pandemic, fueled by habitat destruction, or another world war.

We recommend that MIT establish **concrete plans for the future to alleviate the impact of future crises** -- for instance, establishing fair standards for use of space, resources and equipment.

We have had some ideas of enhancements to our research infrastructure that could both help research in the present and soften the impact of future crises. Those ideas include:

- Build a more efficient and accessible system for MIT's on-campus researchers to reserve conference rooms and classrooms. As a design principle, ensure that researchers can be easily assigned to access clusters, i.e. based on their departmental affiliation and lab location, and that the list of rooms each cluster of researchers can book can be easily updated. (This project may lend itself nicely to a smartphone app).
- Create a system to facilitate sharing of research supplies across campus, not just within an individual department. There is no reason a Biological Engineering lab that has extra pipette tips can't give some to a Chemistry lab that's struggling, and vice versa. This could help researchers deal with day-to-day issues in normal times as well.
- Use a common system across campus to manage access and scheduling of shared equipment, while allowing DLCs to tune parameters such as hours, time slots and access groups.
- Make a special investment in purchasing pieces of lab equipment in strategic locations to reduce the amount of equipment sharing between building clusters. In practice, this should help interdisciplinary labs and labs that are branching out into new disciplines, as quite often arranging access to needed equipment can be a rate limiting step.

COVID-19 has upended lives across the Institute. It has disrupted work and degree progress, as well as fueled significant degrees of stress, grief, and fear. In light of these challenges, MIT must implement COVID recovery policies and programs that acknowledge the shared impact of the pandemic. At the same time, COVID recovery must respond to specific instances of disparate impacts, for example to graduate researchers with families or on fixed-term funding. As the Institute cycles into the third academic year under COVID's shadow, we must also responsibly plan for an uncertain future. MIT has weathered acute emergency with tremendous energy and innovation - it can and should approach the chronic impacts and halting recovery with the same.

V. Appendices

V.1. Breakdown of responses from Remote and On-Campus SoS researchers

The School of Science (SoS) had the second-largest portion of respondents reporting their research was “highly negatively impacted” by COVID-19, second only to SHASS (**Fig. 3**). SoS also had the highest portion of respondents working on-campus, and the highest portion doing some kind of in-person work (**Fig. 5**). Therefore, we thought it could be informative to break down the responses of SoS students by work site, to inform and guide SoS’s recovery from COVID-19. Interpretation will be brief as the intention is to start discussions about next steps.

Since the vast majority of SoS respondents worked either fully remotely or on-campus, this analysis will focus on responses from those two categories of grad researchers. The breakdown of responses from SoS by work site is given below in **Table V.1**.

Table V.1.: School of Science (SoS) respondents by work site.

Work Site	Number of responses (SoS)	% of total responses (SoS)
Fully Remote	51	31%
On Campus	67	41%
Off Campus	23	14%
Both - In Person	21	13%

V.1.a. Overall impact of COVID-19 on SoS respondents

While both Remote and On Campus SoS respondents reported high rates of an overall negative impact of COVID-19 on their research, that rate was higher for those who worked on campus (**Fig. V.1**). A worrying 46% of SoS on campus respondents reported their research was “highly negatively impacted” by COVID-19.

As an unsurprising corollary of that, SoS researchers who worked on-campus were more likely to report that they had to make significant changes to their research than those who worked remotely (55% vs 29%), as shown in **Fig. V.2**. That said, the nearly 1/3 of fully remote SoS respondents who had to make such changes further show that remote workers were not completely shielded from COVID-19’s effects.

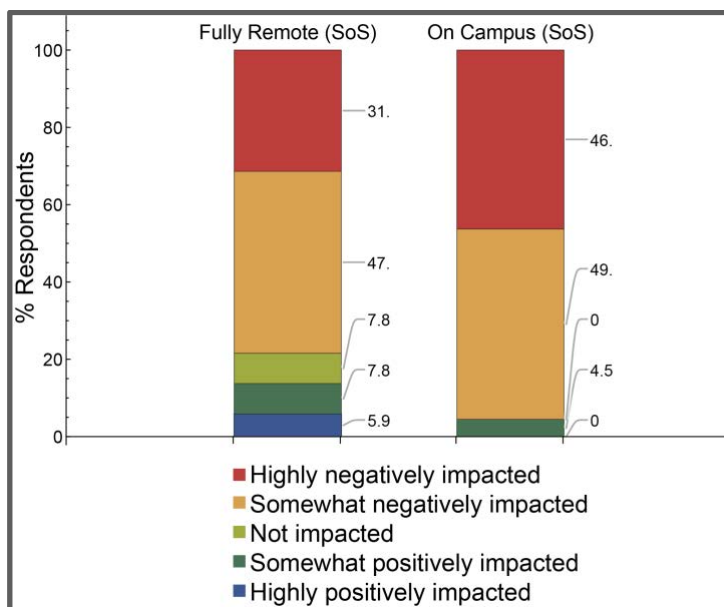


Figure V.1. Overall reported impact of COVID-19 on the research of School of Science (SoS) respondents by work site.

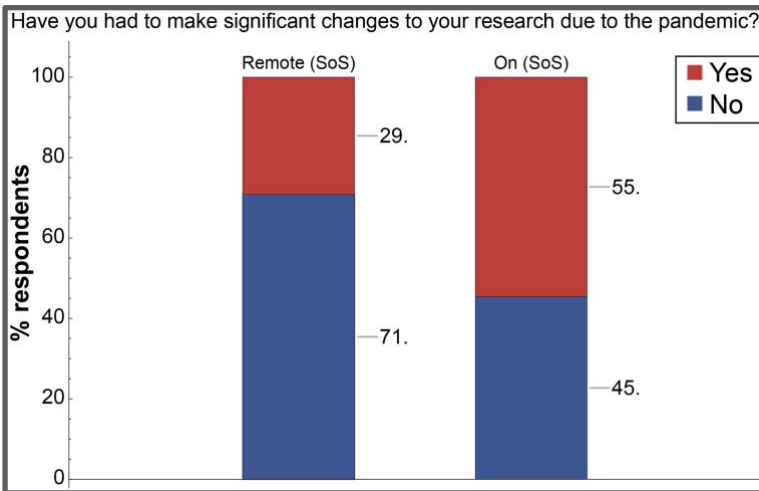


Figure V.2. Respondents from SoS reporting making significant changes to their research

To dissect what remote Science workers were struggling with, and why 55% of on-campus Science researchers who answered the survey had to significantly alter their research, we'll next examine the research obstacles by group.

V.1.b. Research obstacles faced by remote vs on-campus SoS respondents

First, in terms of access to spaces, both remote and on-campus SoS researchers were about equally likely to report “lack of an appropriate work space” as an obstacle to their research (**Fig. V.3.a**). This highlights the reality that grad students were not financially and logistically equipped to suddenly set up a functional home office. This may be a factor worth considering when the Institute draws plans to survive the next disaster or crisis.

A troubling 49% of on-campus SoS researchers who responded indicated “lack of a both clearly-communicated and safe place to eat at work” as an obstacle (**Fig. V.3.a**). Anecdotally, this issue was frequently reported to the GSC by both SoS and SoE student researchers. We heard of mechanical engineering students working late shifts, i.e. from 1-9 pm, with nothing to eat or drink, and chemistry students in giving up and eating in cramped shared offices because it was logistically impossible to schedule breaks around unpredictable experiments, or to all utilize the four single-occupancy conference rooms in Bldg. 18.

Both categories of SoS respondents struggled with communication barriers to research progress (**Fig. V.3.b**). Remote workers reported “insufficient or inadequate communication from my adviser” as a “Major obstacle” at a higher rate (27% vs 21%). Perhaps support for faculty in adopting virtual communication technologies such as Slack could also have a positive impact on grad students’ research.

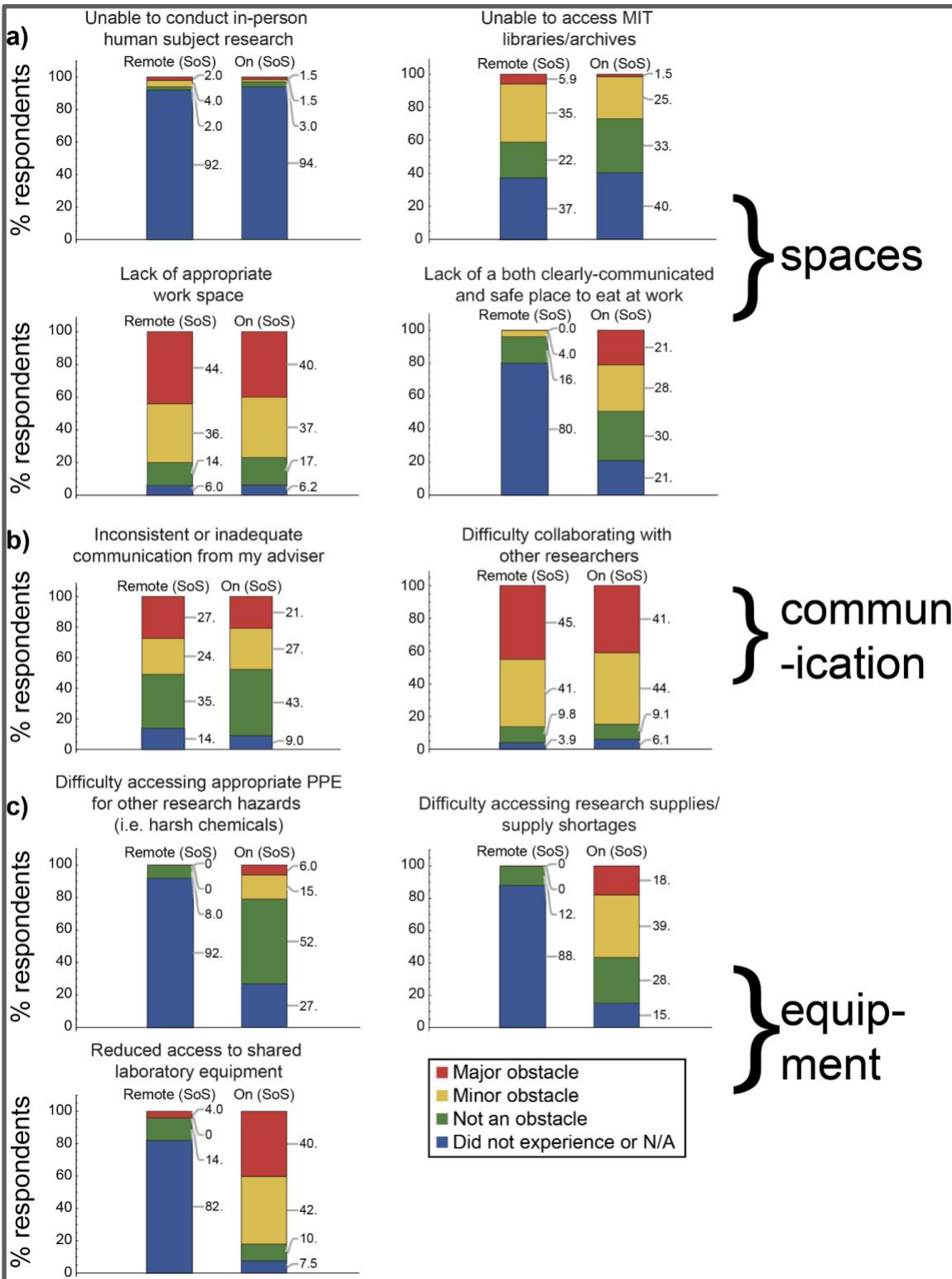


Figure V.3: Directly work-related research obstacles marked by SoS grad students working remotely vs on-campus.

The largest directly work-related obstacles for SoS on-campus researchers were those related to equipment (Fig. V.3.c). Eighty-two percent of respondents in this category report “reduced

access to shared laboratory equipment” as an obstacle to their research (42% - “Major”, 40% - “Minor”). Further, “Difficulty accessing research supplies/supply shortages” was a “Major obstacle” for 18% of these researchers, and “Minor” for 39%. Challenges in this category could have included the global shortages of gloves, pipette tips and tubes, local restrictions on the purchase of syringes, or (less directly) lab budget constraints making it harder to buy supplies.

In terms of life-related barriers to research, both categories of researchers were very likely to report “Mental/physical health issues” (Fig. V.4) - as indeed, this result held across all demographics tested. While both categories of Science researchers responding to the survey reported this as a “Major” obstacle at similar rates, it was marked as a “Minor” obstacle by more on-campus researchers, such that only 10.5% of on-campus SoS respondents *didn't* report such health issues as an impediment to research.

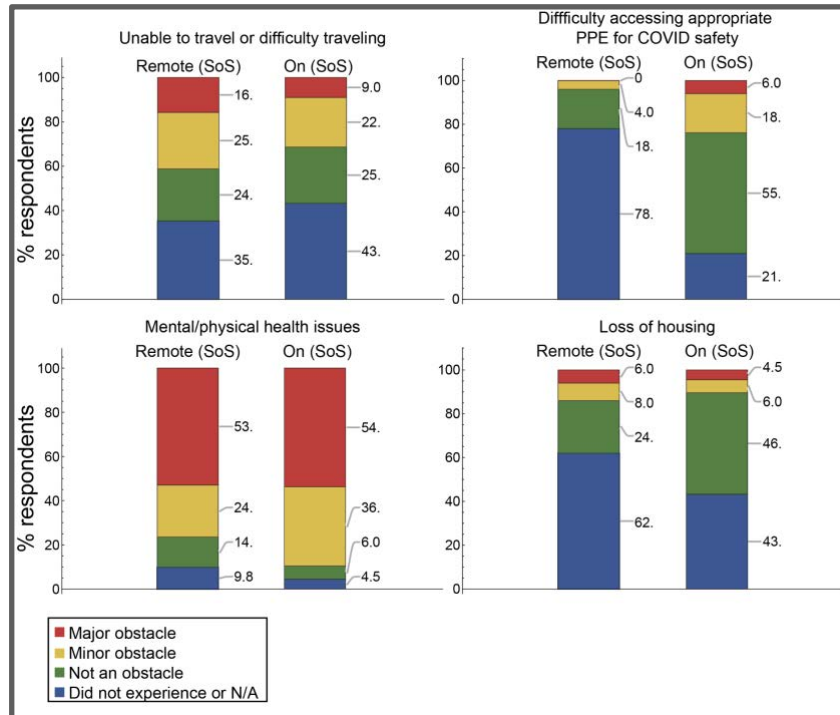


Figure V.4. Life-related obstacles to research as reported by School of Science (SoS) respondents who worked remotely vs On Campus.

Interestingly, SoS students whose work was remote were more likely to report travel difficulty as an obstacle to their research (Fig. V.4). One hypothesis that could explain this result is that SoS students who *could* do their work remotely could have been more likely to answer the campus’s call to evacuate the MIT-operated grad residences, thus exposing them to disruption caused by travel difficulties.

Financial obstacles to research looked rather different for remote vs on campus SoS respondents (Fig. V.5). On campus SoS researchers were more likely to report “Funding challenges for your research group as a whole” as an obstacle, perhaps contributing to the supply issues previously noted. Meanwhile, **SoS researchers who worked remotely were substantially more likely to report “Uncertainty about funding for future years of the PhD” as an obstacle (42% vs 26%)**, likely highlighting theorists’ greater vulnerability to fluctuations in funding availability. This category of respondents also included the small number of responses we received from the Math department, which to our understanding, only guarantees PhD students funding for five years.

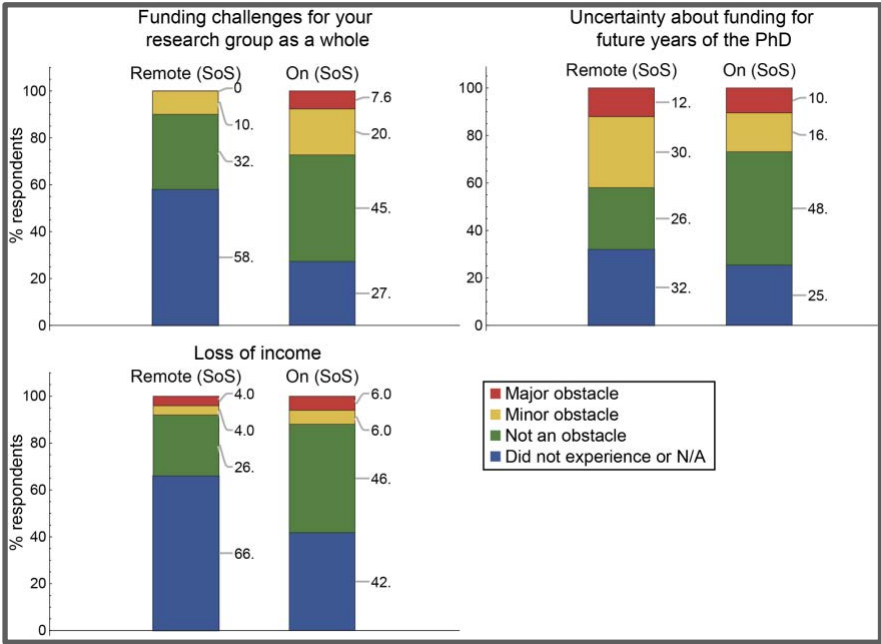


Figure V.5. Financial obstacles marked by School of Science (SoS) grad students who did research remotely vs on campus.

Finally, comparable fractions of remote and on-campus SoS researchers reported research obstacles related to their outside duties (Fig. V.6), while on campus researchers were more likely to mark “Increased undergrad teaching or mentoring duties” as a “Major obstacle” to their research (11% vs 4%). Anecdotally, many grad students reported that undergrad teaching took substantially more time during the pandemic. Further, once research ramped

back up and lab access hours were less restricted, many researchers worked strenuous hours to “make up” for lost time. A combination of the two duties could plausibly cause a great deal of stress for individual researchers.

V.1.c. Summary and conclusion

From the recognition that COVID-19 created immense obstacles for researchers in all categories and disciplines, empathy and solidarity are natural responses. Here we have shown that some obstacles, such as health difficulties and lack of appropriate work space, impacted similar numbers of people across all categories. Researchers who worked remotely were more often impacted by communication barriers, travel difficulties and funding uncertainty, while those who worked on campus were more impacted by infrastructural barriers like difficulty accessing supplies and conflicting teaching duties. **Hopefully, this more granular picture of the research struggles inside the School of Science can spark discussions about how we can support each other’s recovery from the pandemic.**

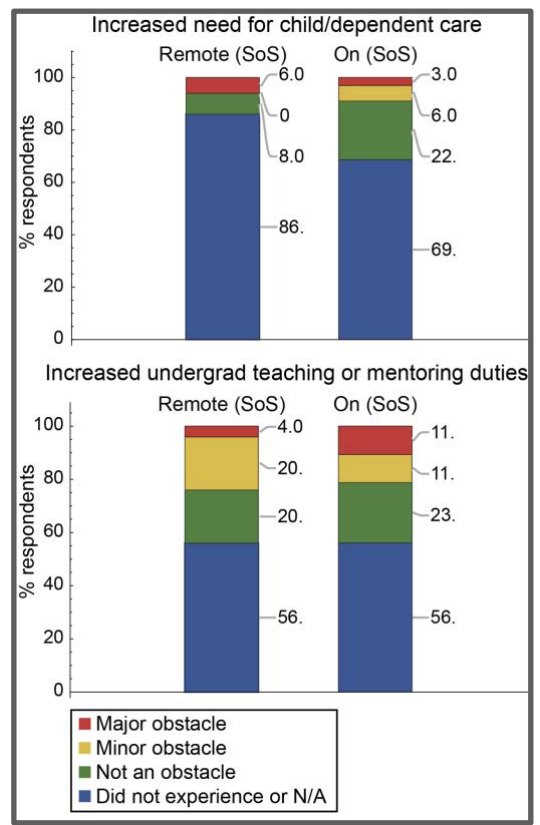


Figure V.6. Research obstacles related to outside responsibilities as marked by School of Science (SoS) students working remotely vs on-campus.