BALANCING RESEARCH AND SERVICE IN ACADEMIA:

Gender, Race, and Laboratory Tasks

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Our study highlights specific ways in which race and gender create inequality in the workplace. Using in-depth interviews with 67 biology PhD students, we show how engagement with research and service varies by both gender and race. By considering the intersection between gender and race, we find not only that women biology graduate students do more service than men, but also that racial and ethnic minority men do more service than white men. White men benefit from a combination of racial and gender privilege, which places them in the most advantaged position with respect to protected research time and opportunities to build collaborations and networks beyond their labs. Racial/ethnic minority women emerge as uniquely disadvantaged in terms of their experiences relative to other groups. These findings illuminate how gendered organizations are also racialized, producing distinct experiences for women and men from different racial groups, and thus contribute to theorizing the intersectional nature of inequality in the workplace.

Keywords: *race; gender; STEM; intersectionality; inequality; organization theory*

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Universities are gendered organizations in which work, prestige, and rewards are conferred unequally on women and men (Bird 2011; Bird, Litt, and Wang 2004; Britton 2017). In the past 10 years, women earned more than 50 percent of all doctoral degrees but held fewer associate and full professor positions and earned lower salaries than men at each rank (Johnson 2017). While many factors contribute to those disparities, one dimension that has drawn researchers' attention recently is the distribution of tasks, particularly the tradeoff between research and service. Extant studies indicate that women faculty spend more time on service than men (e.g., Babcock et al. 2017; Bird 2011; Bird, Litt, and Wang 2004; Britton 2017; O'Meara, Kuvaeva, and Nyunt 2017)—pursuits that hold less value in promotion cases, particularly at research-intensive universities (Misra et al. 2011).

Research on the division of labor among faculty has tended to focus mostly on gender disparities, dedicating limited attention to the potential ways gender intersects with other identities such as race. This oversight is shared by much prior research on work differentiation and compensation across a range of different organizational contexts; this work has similarly treated gendered and racialized processes as distinct. However, scholars have increasingly highlighted the importance of intersectional analyses in the workplace (Acker 2006; Browne and Misra 2003; Wingfield 2013), and research in academic settings has drawn attention to the intersection of race and gender when examining experiences of African-American faculty (Griffin and Reddick 2011; Harley 2008).

We draw on theories of gendered organizations (Acker 1990, 2006) and intersectionality (Collins 1998) to illuminate how the division of labor in biological sciences, exemplified in both service work and access to collaborations, is uniquely experienced by different racial/gender groups. Theory of gendered organizations offers insights into the embeddedness of gender divisions that reproduce gender inequality in workplaces but leaves open the question of how these processes may also be racialized. We build on the recent work on intersectionality in organizations (Alfrey and Twine 2017; Bhatt 2013; Bonnes 2017; Garcia-López 2008; Griffin and Reddick 2011) to examine the specific ways in which gendered and racialized processes jointly create a unique racial/gender hierarchy.

Focusing on graduate students, we ask whether and how gendered and racial processes emerge much before newly minted PhDs take on faculty roles. From interviews with 67 PhD candidates enrolled in biology programs across 20 U.S. institutions, we analyze how laboratory tasks and opportunities for collaboration take on distinctly gendered/racialized

patterns. Whereas previous research suggests that men benefit from broader cultural beliefs that science is a masculine pursuit (Etzkowitz, Kemelgor, and Uzzi 2000), our findings imply that those benefits are restricted largely to white men. Racial/ethnic minority (REM) men are neither protected from service nor granted the same access to collaborations as white men. Moreover, all women do not have the same experiences: REM women are at a distinct disadvantage, reflecting the pattern of "double disadvantage" (Armstrong and Jovanovic 2015; Malcom, Hall, and Brown 1976). These findings contribute to theorizing of organizational inequalities by highlighting how specific gendered and racialized processes intersect to create distinct experiences in the workplace for women and men of different racial groups.

WHO DOES SERVICE AND RESEARCH?

Women's labor market participation has increased considerably in the last six decades. However, despite women's increased presence in contemporary workplaces, gender inequality persists in hiring, evaluation, and promotion (Kmec 2005; Leung and Koppman 2018; Reskin and McBrier 2000; Rivera and Tilcsik 2019). One way in which researchers have understood the persistence of gender inequality in employment experiences is through the application of gendered organizations theory. Organizations are key sites for the creation and maintenance of gender inequalities (Acker 1990, 2006; Kanter 1977). Acker (1990, 146) theorized that "advantage and disadvantage, exploitation and control, action and emotion, meaning and identity, are patterned through and in terms of a distinction between male and female, masculine and feminine." According to Acker, the gendering of organizations occurred in a number of interacting processes, including the construction of divisions along gender lines. Within work organizations, gender "divisions of labor, allowed behaviors, of locations in physical space, of power, including the institutionalized means of maintaining the divisions" disadvantage women (Acker 1990, 146).

A key site to understand how these divisions are constructed is in the distribution of work tasks—a source of inequality in organizations that has received notable attention in the literature (Acker 1991, 1994; Kelan 2009; Martin 1996, 2003, 2006). Even when women and men have the same job classification, women's tasks are more service-related and anchored in daily procedures than men's, whose tasks are more diversified

(Acker 1991, 1994). Women have fewer opportunities to take on developmental challenges in the workplace (Benschop and Doorewaard 1998), and even when promoted, women's task assignments remain stagnant (Acker 1991). Consequently, men acquire extended networks, skills, and experiences that prime them for managerial positions whereas women's opportunities for promotion are constrained.

Universities, like other organizations, are gendered, and the underlying logic of the distribution of work, prestige, and rewards assumes a gendered division of labor (Acker 2008; Bird 2011; Bird, Litt, and Wang 2004; Britton 2017). Bird, Litt, and Wang (2004, 199) point out that university work can be divided into highly rewarded core tasks, exemplified by grant writing, research, and publishing, and less valued support tasks, including committee work, advising, and other civic contributions. Although the vast majority of faculty rank research-related tasks as more important than service-related tasks, noting that service has limited individual benefits and plays a less significant role in promotion, women perform more service-related tasks than their male colleagues (Babcock et al. 2017; Mitchell and Hesli 2013; O'Meara et al. 2017; O'Meara, Kuvaeva, and Nyunt 2017; Porter 2007), and men spend more time on research (Misra, Lundquist, and Templer 2012; O'Meara et al. 2017; O'Meara, Kuvaeva, and Nyunt 2017).

In STEM (science, technology, engineering, and math) fields, women tend to have service workloads more similar to their male peers', partly because men in STEM fields report doing more service than men in non-STEM fields (O'Meara, Kuvaeva, and Nyunt 2017; see also Carrigan, Quinn, and Riskin 2011). Still, institutional policies that call for greater diversity on committees often overburden women who are underrepresented in their respective fields (Carrigan, Quinn, and Reskin 2011), leading women in STEM to do more university-level service than men (O'Meara, Kuvaeva, and Nyunt 2017). Other research suggests that even at the department level, STEM women faculty are overburdened by committee work and "housekeeping" (Britton 2017). Bird, Litt, and Wang (2004) reported that women in STEM departments were more likely to engage in support tasks and be educators and clinicians, whereas men were more likely to be on research-based faculty tracks that led to management positions.

Similarly, a separate body of research describes how REM faculty are overburdened with support work (Allen et al. 2000; Gulam 2004; Stanley 2006; Turner and Myers 2000; Villalpando and Bernal 2002; Wood, Hilton, and Nevarez 2015). A few recent studies also examine how race

and gender intersect to shape experiences of African-American female faculty. Harley (2008) described the roles of African-American women as "maids of academe," or—worse—the "work mules," suggesting that they were more often burdened by demands of advising, service, and committee work than other faculty. Other studies have noted that, among African-American faculty, women engaged in more intimate connections with students than their male counterparts (Griffin and Reddick 2011). These findings are not unique to faculty. Minority women face racialized gender discrimination in medicine (Bhatt 2013) and in the tech industry (Alfrey and Twine 2017). Moreover, women of color are particularly vulnerable to bureaucratic harassment, described as harassment enacted through policies and administrative processes (Bonnes 2017), and they contend with organizational practices that reinforce racism, sexism, and classism and limit their opportunities for professional advancement (Garcia-López 2008). African-American men also face challenges in the workplace relative to their white male peers. Studying professional men, Wingfield (2013) documents how the tokenized status of African-American males shapes their experiences and opportunities for promotion and networking. These findings are consistent with the principles of intersectionality that suggest that individuals' experiences are shaped by the conflation of multiple identities, including gender and race (Collins 1998).

We contribute to the burgeoning research on intersectionality within organizations in theoretically and empirically significant ways. Although the theory of gendered organizations has attended to the embeddedness of gender divisions in labor, it has painted a rather incomplete picture of the way inequality is experienced in diverse workplaces. We illuminate how multiple inequalities converge to shape workers' experiences. Specifically, we examine how gendered processes interact with racial processes to produce distinct patterns of workplace experiences for white and minority women as well as men.

Our work is uniquely positioned to illuminate the role of intersectionality in organizations by examining four groups: minority women, minority men, white women, and white men. Previous intersectional studies have tended to focus on men and women of one race (Bhatt 2013; Griffin and Reddick 2011) or on women of different racial and/or ethnic groups (Alfrey and Twine 2017; Bonnes 2017; Garcia-López 2008). Although this research shows that women are disadvantaged within racial/ethnic groups and that racial/ethnic minorities are disadvantaged among both women and men, the position of white women (advantaged by race but disadvantaged by gender) and minority men (advantaged by gender but

disadvantaged by race/ethnicity) is not clear. Those groups combine advantage along one dimension and disadvantage along the other, which provides a particularly fruitful basis for theorizing how race and gender intersect in organizations.

METHODS

This study focuses on experiences of biology PhD students. Although previous literature on gendered and racialized inequalities in universities has focused on faculty, the study of graduate students is crucial because graduate education provides the socialization context in which students "internalize the expectations, standards, and norms" of their disciplines (Austin and McDaniels 2006, 400; see also Gardner 2009; Weidman and Stein 2003). Thus, the gendered and racialized patterns observed among faculty may start much earlier—during graduate school. Moreover, as Merton (1968) observed, early success can lead to increased scholarly recognition and initiate a process of cumulative advantage (see also Conti and Visentin 2015). If women and minority graduate students experience constraints in their research endeavors, this could have notable consequences for their labor market prospects as well as long-term career trajectories.

The data for this study were drawn from a larger longitudinal survey of 336 PhD students in biology who entered their graduate programs in the fall of 2014. The original survey sample was not nationally representative, although institutional types and student demographics corresponded closely to the national distributions (please see Roksa, Feldon, and Maher 2018 for additional information). To select the interview subsample, we focused on the institutions that had at least one student who identified as belonging to a racial or ethnic minority group. Given research aims of the broader project, all REM students and first-generation students (regardless of race/ethnicity) were invited to participate in the interview. Next, we randomly selected students not belonging to these categories (i.e., students who are neither racial/ethnic minorities nor first-generation) to match the number of REM students at each institution. To sharpen our analyses, in year 3 we interviewed only domestic African-American, Latinx, and white students (excluding small numbers of international and Asian students from follow-up interviews).

This article is based on interviews with 67 PhD biology candidates during the summer following their third year in the program. Thirty-six percent (N = 24) of students self-identified as African American or Latinx.

In interview excerpts, we provide specific racial/ethnic categories. However, since Latinx and African-American respondents shared similar experiences, for analytical purposes, we refer to them collectively as REM. This is consistent with previous studies of faculty, which suggest that African-American and Latinx faculty are similarly overburdened by service work (Stanley 2006; Wood, Hilton, and Nevarez 2015). In addition, 70 percent (N = 47) of the sample is female. More specifically, our sample includes 16 REM women, 31 white women, 8 REM men, and 12 white men.

Among the 20 institutions attended by respondents, 94 percent (N = 63) attended an R1 institution (highest research activity, based on the Carnegie classification). On average, there were just over 3 students per institution, ranging from 1 to 11. Survey data find no consistent associations between institutional characteristics and students' experiences (see Roksa, Feldon, and Maher 2018). Consistent with other educational research, partitioning of variance for the survey data indicates that a relatively small proportion of variance is at the institutional level (authors' calculations). Students' experiences are shaped much more strongly by individual laboratories. Only four pairs of students shared the same principal investigator (PI; two each). Thus, we do not have adequate variation to examine whether experiences of different groups varied within labs, although that is an important area of future research.

Focusing on one discipline allows us to avoid conflating disciplinary differences in socialization practices with other sources of variation. A fundamental aspect of graduate education is socialization into a field or discipline, as students acquire the knowledge, skills, habits, and professional norms of their disciplines (Austin and McDaniels 2006; Gardner 2009; Weidman and Stein 2003). A study including multiple disciplines would face a challenge of disentangling disciplinary differences from those related to race and/or gender, especially since different demographic groups are not equally distributed across fields.

Labs involve extensive collaboration between different individuals (graduate students, post-docs, and PIs) and thus a constant balancing act between conducting research and performing other tasks needed to successfully run a lab. In biology, students spend the first year rotating through different labs. In the second year, they begin working in their permanent labs, and they set into the routines of working in the lab by the third year, which is why we focus on the third year in this study.

Among doctoral scientists and engineers, biological sciences are the most common disciplines, with almost a quarter of students earning PhDs in those fields (National Center for Science and Engineering Statistics

2017). Moreover, cellular and molecular biology and microbiology represent the most gender-equitable (44 percent female) and ethnically diverse STEM subfields by PhDs awarded (68 percent white, with highest proportion of African-American and Latinx degree recipients). At the same time, even though women have accounted for more than 50 percent of all PhD recipients in biology each year since 2008 (NSF 2015), only approximately a third of tenure-line assistant professorships in the discipline are held by women (Nelson and Rogers 2004).

The first author and another member of the research team conducted one- to two-hour interviews via the phone between June and September 2017. The relevant questions for this study included the types of tasks that students performed during the third year in the program, their sense of the lab's atmosphere, and their experiences working with their PIs and peers in the lab. All interviews were recorded, transcribed, and coded using the qualitative software program, Dedoose. Our analysis employed a grounded theory approach, wherein the first author developed an initial set of open codes by sorting all incidents where participants described tasks they commonly performed in the laboratory, examples of collaborations, and task conflicts (Corbin and Strauss 2008). Both authors reviewed the codes and revised the codebook until reaching a consensus (Saldaña 2013). The final coding scheme included multiple dimensions of service and research-related tasks. To protect the identities of the participants, we use pseudonyms throughout our analysis of the interviews and do not disclose respondents' institutions.

CORE AND SUPPORT WORK AMONG BIOLOGY PhD STUDENTS

Employing Bird, Litt, and Wang's (2004, 199) framework, which builds on Acker's (1990) theorization of gendered organizations, and specifically gendered division of labor, we examine biology doctoral students' engagement in highly rewarded core tasks and less valued support tasks. Support tasks typically involve maintaining laboratory inventory, organizing laboratory space, and attending to administrative matters, as well as training undergraduate and junior graduate students and facilitating their integration into the laboratory setting. Spending time on support tasks leaves less time for the core task: research. Moreover, doing research can span beyond one's own work to include collaborations both inside and outside of the lab, which can provide valuable opportunities for networking and skill development.

Navigating the Divide between Laboratory "Housekeeping" and Research

Our interviews revealed that women's experiences were more often shaped by support tasks than were those of their men peers. Like women faculty, women PhD candidates in biology more often engaged in "housekeeping," including ordering lab supplies, organizing lab space, and managing lab personnel. Women were often cognizant that these tasks were less valuable than other tasks and that they took time away from research and publication—highly valued tasks. For instance, Stella, a white woman, provided an account of lab housekeeping tasks that was typical of many women in our study, including administrative work and training new members of the lab. This took time away from research. She said:

> It's been hectic. I am training a bunch of undergrads to go in our lab. That's fallen on me. I haven't had time to actually sit down and write anything that is pertinent to my degree, which is really annoying. I am trying to get everyone trained, so that they can take over while I'm away, and hopefully, the train will drive itself at some point away from me, so I can get some work done. I feel like I haven't—my own stuff has been sidelined. Everything has been me—just handed a lab to run. I haven't actually done any writing this year.

Stella had little confidence that she had been given so much responsibility as a show of respect: "I don't feel like it has a lot to do with respect. It feels more like everyone is just too busy to bother helping me. It's not as validating as it sounds." Similarly, describing managing undergraduate and volunteer lab personnel, Naomi noted: "I do too much and then that sometimes compromises my ability to follow through on projects or coming up with ideas for projects—not doing all of them to the end."

Although most white women did extensive service that conflicted with their research, some were able to dedicate substantial time to research, largely because their advisors protected their time and ensured they were integrated into research projects. For example, Samantha, a white woman whose lab had recently moved to a European university, described having a very supportive relationship with her advisor, who she said had a general interest in "defending [her] use of [her] time" and prioritized the completion of her own research projects. Similarly, Erica's advisor encouraged her research development by including her in the work with a post-doc in the lab: "I think my boss has worked to make sure that I am included in it so that—I mean, in part, he wants to make the work go faster, but I think he's also aware that whatever the publication is to come out next for this

project, I should be contributing to that so I can have a publication under my belt. I think he's good at making sure that that happens." With proactive PIs, some white women were able to get research done, even though, overall, they had substantial service responsibilities that curtailed their research time.

Latinx and African-American women in our sample provided ample examples of service responsibilities and no examples of advisors protecting their research time or productively integrating them into ongoing research projects. Cassandra, a Latinx woman, who was a lab manager noted, "Well, I'm good at it [being lab manager], so it's hard to—but it does cut into my experiment time, so I feel like it does put a damper on—in terms of being efficient in lab." When Antonia, a Latinx woman, worked on a project in her lab, it was without an explicit discussion of publication and primarily as a service to the PI. She observed, "My PI tends to just come up with random experiments that he wants me to do that are not necessarily related to what I'm doing, so that tends to take up a lot of time. Then, I don't advance on my thesis project very much."

Moreover, REM women discussed the extensive nature of service tasks that spanned beyond the time in the lab and beyond the academic year. Cheyenne, an African-American woman who carried out the duties of a lab manager, explained how monitoring the lab's adherence to safety guidelines becomes time consuming and takes up time even outside of the lab. She said:

> I'm consistently having to change things that the EHS [Environmental Health & Safety] office told me was okay and acceptable, but now the person who's with me is saying it's not. That can be kind of time-consuming . . . . EHS, they do random inspections, so anytime there's a violation that they find, they emailed me. Even if I'm not there, I'm the one.

She started in this role because her advisor asked her and she did not mind it initially, but she also did not expect to get stuck in the position over the long term. She continued, "My advisor asked me. I didn't have a problem with it when I first started. . . . Usually it's a rotating position, but I don't know. I don't think it's going to be rotated, because my advisor asked me to stay on."

Cheyenne was not compensated for being a lab manager and did not have much confidence that it will help her as she transitioned into her professional career: "No, I don't think [it will benefit me], but I could be wrong. I don't think it will."

For many REM women, service work did not stop in the summer. Antonia, a Latinx woman, for example, mentored students. She said,

> For the summer my PI came up to me one day and said, "You're going to mentor a high school student for the summer," and I was like, "Okay." Then the next day they came. It's like it's an obstacle in the sense that I have to put my own studies aside, but I developed new skills. Like, now, I get to learn about mentoring someone in science.

It is not that these tasks—like managing a lab or mentoring undergraduates—had no potential value. Indeed, they are part of life in the academic workplaces in the sciences. However, they are disproportionately carried out by women and take time away from the highly valued research tasks.

Although women were more likely to be overburdened by laboratory "housekeeping" than men, REM men performed some support tasks and did so more often than white men. Francisco, a Latinx man, described the arrangement in his lab. He said:

> I'm the safety officer. I'm in charge of keeping everything up to compliance. When it comes to ordering, we actually hired an undergrad that is in charge of ordering. We asked her if she wanted to, because she would get paid to do it, and she was like, "Yeah." That's how that happened. That's the order of things basically.

Marcus, an African-American man, said that he volunteered to order supplies for the lab since he had undergraduate experience as a lab manager. He was not too concerned about these additional duties because he believed a lab technician would soon be hired to take over. The service that REM men tended to take on was narrower in scope and more temporary.

White men in our sample rarely reported performing such tasks. In fact, all but one identified another lab member who performed service tasks, and none expressed a sense that service work was distributed inequitably in the lab. Indeed, service work was not a significant aspect of white men's experiences in biology labs. The exception is Colt, who was the only member of his lab. He explained:

> I don't know, it just fell onto my shoulders. Stuff just wasn't getting done. It just became my job to order stuff and clean and straighten—I don't know. It's fine. It definitely takes time away from other work. I kind of wish that there was somebody who was kind of handling that stuff for me, because I would love to just have stuff ordered and statements organized for me. I

> mean, we don't live in a perfect world, so it's fine. I kind of find it cathartic to manage, kind of. I don't know, whenever research is getting me down, I just find it nice to do something very straightforward and simple as just organizing a file cabinet, or something like that. Yeah, so half of the time it feels like a burden. The other half of the time, it almost feels like a release.

Colt's level of engagement with service tasks was rare among white men in our sample, and his performance of these tasks differed from that of other groups, as he came to take on these tasks as sole member of the lab. Moreover, he conveyed a sense that he only devoted time to management and administrative tasks once his research work was done, and unlike the women in our sample, he did not have to manage other lab personnel.

Extending Research to Developing Collaborations

Our interviews suggest that among biology PhD candidates, white men held racial and gender privilege that not only shielded them from "housekeeping" commitments but also facilitated opportunities for research, collaborations, and network development, especially outside of their home labs. For example, Patrick described participating in multiple collaborations with more senior members of other labs. He said:

> I worked with a post-doc in another lab. She has expertise that my lab has no experience in. I collaborate with her pretty frequently. I actually made another connection through that lab to a lab at [another institution] on my project. I collaborate with them, I would say, maybe once a month. We established that collaboration because we were both doing—so they were also microbiology people, and we could give them some stuff that they couldn't do.

Similarly, William worked with a member of another lab who had expertise relevant to his research: "I'm working right now with a guy that's in another lab. I'm working with him to identify projects. Of course, we're going to be coauthors on the same paper." White men in our sample portrayed an abundance of opportunities to form research collaborations with members of other labs. Brayden, a white man, described a number of collaborations that his lab recently formed with a lab at another institution and added: "I haven't experienced an instance where I couldn't form a collaboration." Even Colt, who earlier described performing support tasks and is the only person working in his lab, boasted: "I've been able to land every collaboration that I've wanted."

White male biology PhD candidates expressed that research was their central focus, and they were rewarded with collaboration and network

opportunities. Their experiences reflected opportunities to engage with the discipline more broadly—to increase their visibility in the field. REM men, too, described significant engagement with core research tasks; however, these tasks tended to be concentrated in their home labs. Marcus, who earlier noted that he was the interim lab supply manager, explained that he routinely split his day between two labs in his department. He said:

> My primary lab [is where I'm] doing all the stuff I have to do. Then, going to my committee members' [lab]. Getting them to teach me things when they have time or whatever—just being part of their lab a certain part of the day. Splitting my day so I could learn all these techniques. Also, not just me learning techniques from them, but I help them out by doing some of their experiments as well if they didn't have a graduate student or they were busy themselves.

Despite much time spent refining techniques and performing experiments, Marcus's opportunities for collaboration were constrained. He described an incident when his PI forbade him to collaborate with another PI in his department. He explained:

> It was actually for a paper. One of the authors on the paper was another professor in the department [who] was teaching me in a class. It was time for the class to end. He was like, "Well, I think this would be a great experience for you to take a part of. I can teach you how to do it. You can run these experiments and do these studies. You'll have time. It's a great learning experience and it'll also teach you [about] authorship on a paper." He said, "All you have to do is just ask your PI about it. Ask your boss about it so we can get you started." I asked him about it. He was completely against it, which was confusing to me because it was a paper for our lab. I didn't have a project to do at the moment. He was very against it.

Compared with white men, white women had fewer opportunities for research collaboration and network development. When white women described collaborations, those collaborations tended to be with members of their home labs. For example, Erica explained that, upon joining her lab, she was asked to collaborate with a post-doctoral student on his research project in order to facilitate her research development and build a publication record. Although collaboration with members of the same lab was common, some white women, like Camila, noted that advisors would not be open to collaborations with outside labs. She said, "I'd love to. I'm open to it. I do know that, as a general rule, my PI does not like collaborating." Like REM men, white women's research activities were

more often based in their home labs, and they had fewer opportunities for collaboration and networking than their white male peers.

REM women had few opportunities for collaboration and often described explicit instances of being passed over for collaborations even in their own labs. Savannah, an African-American woman, described two research collaborations with other lab members in which she was not included. She said:

> It was just like, I just wasn't put on them. I can't say that I made the effort in asking or anything, but I don't think any of us in the lab has asked to be put on a project. It just happens. Like, the mentor will just tell you, "Hey, you're going to do this." You know?

She went on to say that she felt that much of the discussions about collaborations went on "behind closed doors." Antonia, a Latinx woman, noted that she had been passed over for collaborations that ended up going to a male peer. She said, "Other times there's a person who's a little more skilled in our lab at [data analysis], so they tend to give him those projects rather than taking a chance on someone who's still learning."

REM women also reported instances where their advisors explicitly objected to collaborations that were similar to those reported by white women and REM men. For example, Cassandra, a Latinx woman, described meeting resistance from her PI when trying to establish a collaboration with a member of another department at her institution. She explained,

> I talked to the instrumentalist in the chemistry department. I started to talk about collaboration with her to help with these samples. My boss didn't go for it. I have been turned down [by my PI] in terms of trying to collaborate.

Still for other REM women, like Aaliyah, a Latinx woman, involvement in cross-lab collaborations did not involve direct participation in experimentation or analysis. Rather, it involved administrative and management tasks. Aaliyah explained her role in a collaboration between hers and another lab, saying, "We have a new collaborator, and I've been the go-to person—like not, I hate to say, like the middleman but like the primary person that responds to the emails and the questions and things like that." In contrast to the other groups in our study, REM women were all but excluded from the types of core research activities that would allow them to develop their own research agendas or facilitate meaningful collaborative networks. Instead, they were largely constrained to the supportive role and activities that did not build their research skills or profiles.

CONCLUSION

Gendered and racialized processes operate along multiple dimensions of work, creating both opportunities and constraints that differ across racial and gender categories, and thus produce unique experiences for women and men of different racial groups. Overall, women's research opportunities in biology laboratories were constrained both by spending more time on support tasks and by having more limited access to networks. At the same time, women from REM groups were uniquely disadvantaged with respect to both dimensions. On the other end of the spectrum, white men were both shielded from service tasks and had unrestricted access to collaborative opportunities, with professional networks extending beyond their home labs, departments, and institutions. REM men did not enjoy the same advantages: They were more likely to perform support tasks than white men, and they did not have the same level of autonomy in framing research activities and establishing collaborations, remaining largely constrained to their institutions.

Previous research on gendered organizations describes how women's and men's workplace experiences and career outcomes are shaped by different tasks and access to networks (Acker 1991, 1994; Kelan 2009; Martin 1996, 2003, 2006). Our findings contribute to theorizing about gendered organizations by showing both how gendered processes are racialized and how advantages (or disadvantages) are simultaneously experienced along multiple dimensions of work. Whereas white men's lack of engagement with support tasks and their relative ease in facilitating collaborative opportunities reflected their privileged status in the workplace, gender privilege was not enough to shield REM men from support work or to provide the same level of research autonomy. On the other hand, gender disadvantage was not the same for white and REM women. REM women were in a distinct position wherein both extensive service tasks and virtually nonexistent access to collaborations placed them furthest away from the core tasks of building strong research profiles. These findings show how specific dimensions of workers' lives related to division of labor reproduce white male privilege in the workplace by steering women and racial/ethnic minorities into less valued work and limiting their opportunities for collaboration.

To understand the intersection between race and gender in the workplace, and particularly the disadvantages experienced by REM men, theorizing about gendered organizations would benefit from integrating insights from the literature on reproductive labor. Women's historic and

contemporary overrepresentation in unpaid and paid reproductive labor (Laslett and Brenner 1989) has led to stereotypes that portray women as caretakers, nurturers, and housekeepers (Bird, Litt, and Wang 2004). However, race is also implicated in reproductive labor, with REM men being disproportionately concentrated in work associated with reproductive labor, such as institutional cleaning and food preparation and service occupations (Duffy 2007). The gendered-racial patterns in reproductive labor (Nakano Glenn 1992) provide a mechanism for understanding the ways in which specific types of work (i.e., service/housekeeping) are not just gendered but also racialized. Women as well as REM men were thus more likely than their white male peers to be relegated to laboratory housekeeping tasks in our study.

Our findings also advance previous intersectional work by comparing four groups—REM women, REM men, white women, and white men—and describing how a unique racial/ethnic hierarchy emerges in the workplace. These comparisons reveal the complexity of workplace inequality and the importance of examining groups that combine both an advantaged and a disadvantaged identity. Although REM men may be more advantaged then REM women, they are disadvantaged relative to white men. White women are in a similar position in terms of being advantaged relative to REM women but disadvantaged relative to white men. Both REM men and white women had restricted access to networks, but white women did more housekeeping work. The relative experiences of REM men and white women may change in other contexts where other dimensions of work—apart from the distribution of tasks and access to collaborations—are more salient. Comparing those two groups across contexts can be particularly fruitful for illuminating the relative role of race and gender in shaping workers' experiences.

Our findings also contribute to understanding how managerial discretion is both gendered and racialized. Acker (1990) noted that managers' decisions often initiate gender divisions that are ultimately maintained by organizational practices. Our findings corroborate this argument, demonstrating how faculty use discretion to shape workplace division of labor. In addition, we show that discretion is not only gendered but also racialized, and that it encompasses multiple dimensions, from who performs what tasks to who has access to networks. Furthermore, our findings imply that prevalent organizational practices can be enacted by managers regardless of gender. White women's research time in our study was protected by both male and female PIs. Moreover, both male and female PIs discouraged, or at least did not facilitate, women's collaborations with

other labs and institutions. This is consistent with prior research, which has noted that women in STEM can see gender as a distraction (Rhoton 2011) and work to minimize the salience of gender in workplace experiences (Britton 2017). Entrenched organizational practices related to assignments of tasks and opportunities can thus contribute to inequalities regardless of the gender of the manager making the decisions.

The exceptions identified in this study in many ways further corroborate the gendered and racialized processes observed. When white men do service work, it is only in exceptional circumstances (e.g., Colt being the only member of the lab); and when women and racial/ethnic minorities have collaborations, they are often confined to their home labs or take on a supportive, rather than a central role (e.g., Aaliyah handling email correspondence between collaborating labs). Thus, it is not the case that white men never do service and that women and racial/ethnic minorities never get to collaborate, but the processes through which tasks and opportunities are distributed are uniquely gendered and racialized.

It is important to note the limitations of our study. First, without access to specific labs, we could not corroborate students' perceptions of tasks with observations of lab dynamics. Without observations, it is impossible to build a complete understanding of what participants actually do in the lab. However, interviews allow us to access a different kind of valuable information. Participants' perceptions of the work they do in the lab reveal much about how they make sense of their workplace, whether they see value in the work they do, and how they understand the role of their supervisors (Pugh 2013). Second, although examining four groups is a clear advantage of this study, a drawback is the small number of respondents in each category, which limits our ability to explore variations within categories. Larger samples would offer a richer examination of both similarities and differences within each group. Moreover, by demonstrating the gendered and racialized patterns of service and research (and in particular collaborations/networking), this study highlights the crucial role of examining laboratory dynamics. Both limitations call for ethnographic study of lab dynamics. Future research could provide valuable insights into gender and racial inequality by focusing on labs as units of analysis and by carefully examining students' day-to-day experiences through both ethnographic observations and interviews.

Although many institutions of higher education have launched diversity initiatives in recent years, aiming to diversify the professorate, especially in STEM fields, our findings reveal potential shortcomings of those approaches. First, focusing on faculty may be too late—understanding

graduate students' experience and preparation for the professorate is crucial. Second, it is important to pay attention to experiences, not just numbers. A recent National Science Foundation report (NSF 2018) drew national attention by showing the small numbers of PhDs awarded to students from REM groups, especially in STEM fields. Although the disparities in numbers are stark, our study shows that even if students persist through the PhD, they will have notably different experiences based on their race and gender, which may affect their success on the job market and subsequent careers. Finally, the discussions about diversity tend to focus on either race or gender, and our findings show the importance of understanding the intersection of those identities. The unique disadvantages experienced by REM women deserve particular attention. Diversifying the professorate will thus require concerted attention to inequalities in tasks and opportunities afforded to graduate students along both racial and gender divides.

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