

LGBTQ@NASA and Beyond: Work Structure and Workplace Inequality among LGBTQ STEM Professionals

Work and Occupations

2022, Vol. 49(2) 187–228

© The Author(s) 2022

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/07308884221080938

journals.sagepub.com/home/wox

Erin A. Cech¹ 
and Tom Waidzunas²

Abstract

Scholars are just beginning to understand how organizational processes shape LGBTQ workplace inequality. Using multimethod data from STEM professionals, this article examines how one such factor—the way work tasks are structured within organizations—may impact LGBTQ workers' experiences of marginalization and devaluation. Through interviews with STEM professionals at two NASA space flight centers with different work structures, we find that LGBTQ professionals at the NASA center where work is organized in dynamic project-based teams experienced less inclusive and respectful interactions with colleagues, in part because they had to rapidly establish credibility and develop new status management strategies each time they were shuffled into new teams. The stability of the traditional unit-based structure at the other NASA center, by contrast, allowed

¹Department of Sociology, University of Michigan, Ann Arbor, MI, USA

²Department of Sociology, Temple University, Philadelphia, Pennsylvania, USA

Corresponding Author:

Erin A. Cech, Department of Sociology, University of Michigan, 500 S. State St. Ann Arbor, MI 48109, USA.

Email: ecech@umich.edu

LGBTQ professionals time to navigate status management and build trust. This stability also facilitated LGBTQ community building. Analysis of survey data of over 14,000 US STEM professionals (594 who identify as LGBTQ) corroborates this work structure pattern: LGBTQ professionals across STEM disciplines and employment sectors working in dynamic project-based teams were more likely to report interpersonal marginalization and devaluation than LGBTQ professionals who worked in traditional unit-based structures. These findings highlight work structure as an important mechanism of LGBTQ inequality that demands further investigation.

Keywords

Workplace inequality, LGBTQ workers, work structure, STEM

Following decades of research on gender and racial/ethnic labor force inequality, work and occupations scholars have begun to amass evidence of disadvantages faced by lesbian, gay, bisexual, transgender, and queer (LGBTQ) employees (Broyles and Fenner, 2010; Correll et al., 2014; Cortina et al., 2013; McFadden, 2015). This emergent research has revealed that workplace heteronormativity, cisnormativity, and heterosexism produce a host of disadvantages for LGBTQ workers (Albelda et al., 2009; Badgett et al., 2007; Collier & Daniel, 2017; Raeburn, 2004; Tilcsik, 2011; Yoshino, 2006).¹ These inequalities can take the form of exclusionary organizational policies, discriminatory hiring and promotion practices, and biased interpersonal workplace interactions (Patridge et al., 2014; Ragins & Cornwell, 2001; Tilcsik, 2011). While such research has made important headway, scholars still have limited understanding of the organizational mechanisms that amplify or undermine these inequalities.

One potentially important but unexplored dynamic of LGBTQ workplace inequality is the way that work tasks are structured within organizations. How an organization arranges its work tasks, and the way this arrangement subsequently structures colleagues' interactions with one another, likely has important implications for LGBTQ employees' experiences of inclusion and respect. We argue that, given complex processes of status management, selective disclosure, and anti-LGBTQ bias, how work is structured in organizations may be particularly important for shaping the quality of LGBTQ employees' interpersonal interactions with their colleagues and how heteronormativity, cisnormativity, and heterosexism play out therein.

To shed light on the possible relationships between work structure and LGBTQ workers' experiences of marginalization and devaluation by their

colleagues, we turn to two unique and complementary data sets of science, technology, engineering, and math (STEM) professionals. As discussed below, STEM contexts are particularly insightful locations for uncovering processes of interpersonal inequality by LGBTQ status because these contexts often foster heteronormative, hegemonically masculine interactional norms while at the same time striving for objective, merit-based processes (Cech & Pham, 2017; Cech & Rothwell, 2018; Rankin et al., 2010). The data we use are well suited to our task. We begin by exploring work structure differences through interviews with 27 LGBTQ professionals and allies employed at two NASA space flight centers with divergent work structures. Then, to understand whether the central differences by work structure identified in the interviews are reflected among STEM workers broadly, we turn to a US national-level survey of 14,434 professionals (594 of whom identify as LGBTQ) employed across a variety of STEM disciplines and work sectors.

The two NASA space flight centers that serve as our interview case sites provide an instructive comparison of work structures. At one center, which we call “NASA-South,” professionals typically work together in well-established, long-term work units. At the other center, “NASA-East,” technical work is structured into dynamic project-based teams—an increasingly popular work arrangement where teams are temporarily assembled for discrete projects and team members are then disbanded and reshuffled at the completion of their projects (Harrison et al., 2002; Kalev, 2009). These two centers share the same agency-wide human resource policies. Like all federal agencies, NASA has had comprehensive antidiscrimination policies inclusive of sexual identity for nearly two decades and added gender expression to those policies in 2012. And yet, as in other federal agencies, LGBTQ persons at NASA experience prejudicial treatment by colleagues (Cech & Pham, 2017; Cech & Rothwell, 2020). These two NASA sites, in short, allow us to focus attention on work structure differences while holding constant organizational-level variability in broad mission, HR policies, and funding structure.

While these NASA centers provide a useful comparison of LGBTQ employees’ experiences across work structures, they are idiosyncratic sites in many ways: they sit at the forefront of science and engineering innovation but are not at the whim of capitalist market forces like for-profit STEM organizations (Vaughan, 1996, 1999). To examine the relationship between work structure and LGBTQ workers’ experiences among a broader population of STEM workers, we use data from a large quantitative survey conducted after the interviews. These data are part of the STEM Inclusion Study (Pis: Cech and Waidzunas), which encompasses representative surveys of the US-based members of 21 STEM-related professional societies, including 13 national flagship disciplinary societies. These survey data allow us to test

whether the differential patterns of marginalization and devaluation by work structure suggested by the NASA interviews are echoed among LGBTQ STEM professionals across employment sectors and STEM disciplines.

As we explain below, existing literature on work structure sets up contradictory expectations about whether dynamic, project-based structures like those at NASA-East might promote or undermine LGBTQ inclusion, compared with more traditional unit-based structures like those at NASA-South. Suggesting the latter, our interviews indicate that LGBTQ employees at NASA-East had more negative workplace experiences than LGBTQ employees at NASA-South, and work structure differences were a central factor in this variation. The dynamic project-based team structure at NASA-East created particular challenges for LGBTQ employees: it demanded that team members rapidly establish trust and credibility with one another, and it privileged assimilation into heteronormative, hegemonically masculine team interactional norms. Further, because LGBTQ identities are frequently invisible, workers who wished to identify themselves as LGBTQ had to (re)establish their status and gain credibility within a new configuration of co-workers each time they rotated projects. In the unit-based structure of NASA-South, by contrast, coworker cohesion developed gradually as new members joined established units. This allowed LGBTQ employees time to decipher the cultural landscape of their units, decide if and how to reveal their LGBTQ status to colleagues, and figure out how best to manage their status within that interactional climate. If they found their work group unwelcoming, or encountered harassment from particular colleagues, they could apply for positions in other groups with more inclusive reputations without leaving the center. The stability of workers within the unit structure also facilitated LGBTQ organizing and community-building.

Our analysis of STEM Inclusion Study survey data showed that dynamic project teams are particularly challenging for LGBTQ STEM professionals well beyond the NASA case. LGBTQ-identifying survey respondents who worked in dynamic project-based teams were more likely than their peers in other work structures to report professional devaluation and marginalization by their colleagues, net of demographic, sector, discipline, and employment controls. LGBTQ workers in dynamic project-based teams were also less likely to feel comfortable being open to their co-workers about their LGBTQ status than those embedded in other work structures.

As we note in the conclusion, these findings raise broader questions about the consequences of work structure for LGBTQ inequality. They suggest that dynamic, project-based work structures may promote the marginalization and devaluation of LGBTQ workers more than other ways of structuring work activities within organizations. These results point to the need to more carefully consider how the arrangement of work tasks—and the subsequent arrangement of workers such structures produce—may aggravate LGBTQ

marginalization and complicate LGBTQ persons' status management calculus when deciding whether and with whom to be open about their LGBTQ status. Given the increasing popularity of dynamic project-based structures, especially in science and engineering industries, these findings are a timely caution about their potential negative consequences.

Theoretical Background

In this section, we contextualize our study within existing research on LGBTQ inequality in the labor force generally and in STEM in particular, and review literature on the relationships between work structures and socio-demographic inequality.

LGBTQ Workforce Inequality

Evidence is building that LGBTQ employees face persistent and multifaceted disadvantages in US workplaces. At the organizational level, LGBTQ persons are often still excluded from the benefits and protections extended to their non-LGBTQ colleagues (HRC, 2021; James et al., 2016). Many organizations lack basic domestic partner benefits or transgender-inclusive health-care benefits (HRC, 2021; Raeburn, 2004) and until only recently, half of US states did not prohibit workplace discrimination on the basis of sexual identity and transgender status. Hiring and promotion discrimination against gay and lesbian workers is also common: audit studies have found that job applicants that flag LGBTQ affiliations on their resumes are significantly less likely to be invited for an interview (Mishel, 2016a; Tilcsik, 2011; Weichselbaumer, 2003) and between ten and twenty percent of sexual minority survey participants believe they have been denied a promotion at some point in their career because of their status (Badgett et al., 2007; Mays & Cochran, 2001). Wage penalties have been documented for gay men, lesbian women, and bisexual workers (Mishel, 2016; Mize, 2016; Waite & Denier, 2015), and such discrimination is particularly common among transgender and gender non-binary workers (Clements et al., 1999; James et al., 2016; Schilt & Westbrook, 2009).

In addition to these more formal processes of discrimination, LGBTQ employees face interpersonal disadvantages that emerge in informal interactions with colleagues. LGBTQ employees often face marginalization from workplace social networks (Connell, 2015; Friskopp & Silverstein, 1995) and exclusion from social capital useful for career advancement (Ragins & Cornwell, 2001; Ueno et al., 2013). They also encounter more general negative status beliefs about LGBTQ persons as untrustworthy, aloof, deviant, or immoral (Dovidio & Fiske, 2012; Herek, 1998, 2007; Ragins, 2008). LGBTQ employees also experience devaluation of their professional competence by

colleagues and supervisors, particularly when stereotypes about LGBTQ persons contradict schemas of professional excellence within certain occupations (Cech & Waidzunas, 2011, 2021).

LGBTQ workers frequently engage in “status management” at work. Status management is the negotiation of whether and to whom one discloses socially devalued status(es), and how frequently one makes reference to those status(es) directly or indirectly in the presence of colleagues (Clair et al., 2005; Johnson et al., 1995; Jones & King, 2014). LGBTQ workers may feel pressure to conceal their LGBTQ identity at work or to “cover” or downplay their status among colleagues in order to reduce the likelihood of encountering bias (Giuffre et al., 2008). This status management can be cognitively and emotionally taxing and burdens LGBTQ employees with negotiation work not required of their peers (Cech & Waidzunas, 2011; Johnson et al., 1995; Jones & King, 2014; Schilt & Westbrook, 2009; Yoshino, 2006). LGBTQ persons’ extreme numerical underrepresentation in most organizations may also leave them vulnerable to processes of tokenism such as heightened visibility, exaggerated performance pressures, and greater difficulty establishing credibility (Kanter, 1993 [1977]). Status management means negotiating not only anti-LGBTQ status biases among colleagues, but also colleagues’ “boundary heightening” behaviors, whereby the presence of LGBTQ persons induces self-consciousness among non-LGBTQ colleagues who are used to less reflexive interactional styles. Such self-consciousness can, in turn, foster awkwardness or resentment toward LGBTQ workers by their coworkers (Kanter, 1993 [1977]).²

These LGBTQ status biases intersect with race and gender biases. The experiences of persons within the LGBTQ umbrella can differ by gender identity, race/ethnicity, and sexual identity. For example, experiences of gay men in the professional workforce differ from those of lesbian women and bisexual men and those experiences can vary, in turn, by race/ethnicity (e.g., Cech & Rothwell, 2020; Pedulla, 2014).³ Transgender and gender non-binary persons are often targets of different forms of bias and stereotypes than cisgender sexual minority workers (Bilimoria & Stewart, 2009; Cech & Rothwell, 2020; Mize 2016; Schilt, 2010). LGBTQ workers also vary in the degree that management of status visibility is an option for them (Collier and Daniel, 2017). Nonetheless, we consider LGBTQ status as a category of analysis here because heterosexism, heteronormativity, and cisnormativity contribute to an interwoven cultural system of bias that disadvantage sexual identity and gender minority persons in overlapping ways (Yoshino, 2006).

Recent work has identified a handful of organizational factors that shape experiences of LGBTQ workers. Organizations with a history of anti-LGBTQ

bias, such as military organizations, tend to foster less positive workplace experiences than others (Cech & Rothwell, 2020; Raeburn, 2004). Organizations with greater representation of sexual minority and transgender individuals tend to support more positive workplace experiences for LGBTQ workers (Ragins & Cornwell, 2001), although such workplaces can still harbor anti-LGBTQ stereotyping, harassment, and discrimination (Giuffre et al., 2008; Williams & Giuffre, 2011).

Beyond this, we know little about how organizational structures amplify or undermine the interpersonal marginalization and devaluation LGBTQ workers experience. Strategies of status management, and the strain of that status management on workers, may be particularly sensitive to the arrangements of work tasks within one's organization and the types of interactions of colleagues, supervisors, and/or clients those arrangements necessitate. We thus center work structure in our investigation to better understand whether the arrangement of work tasks might be its own source of disadvantage for LGBTQ persons.

LGBTQ Inequality in Science and Engineering Contexts. Science and engineering-related work contexts can be especially challenging for LGBTQ-identifying persons. For instance, Cech and Pham (2017) found that LGBTQ-identifying employees in STEM-related federal agencies (including NASA) experienced wide-ranging inequalities in perceived treatment as employees, workplace fairness, and work satisfaction, and were more likely to intend to leave their agency compared to their non-LGBTQ colleagues. These trends are echoed in emergent scholarship on sexual minority and transgender persons in academic STEM. Patterns of heterosexism, transphobia and heteronormativity, as well as harassment and pressures to pass as heterosexual and/or cisgender or cover one's LGBTQ status, are pernicious within STEM departments and negatively affect both faculty and students (Bilimoria & Stewart, 2009; Cech & Waidzunus, 2011; Patridge et al., 2014; Riley, 2008). Our recent research (Cech & Waidzunus, 2021) found that across industry and discipline, LGBTQ STEM professionals are more likely than their similarly qualified peers to experience marginalization, devaluation, and harassment at work. Yet the majority of this scholarship has attended to either LGBTQ status bias among coworkers or discriminatory policies within organizations, with little explicit attention to how organizational structures may contribute to LGBTQ inequality.

Work Structure and Inequality

Work structure—the arrangement of work tasks within an organization—is consequential for sociodemographic inequality within organizations. Work

structure shapes a number of features of work environments, including how frequently and for how long workers are in contact with one another, the way competence is displayed and rewarded, workers' options for advancement, and structural opportunities to resist and subvert bias in one's workplace (Hodson, 2001; Huemann et al., 2007). How work tasks—and thus social relations between workers—are arranged within organizations can facilitate or undermine worker power, autonomy, solidarity, and dignity (Cohen & Ledford, 1994; Hodson, 2001; Smith, 1997; Vallas, 2003). Work structures that are dynamic and ever-changing, for example, may give marginalized workers the opportunity to demonstrate their skills to a wider group of people, or they may be especially taxing, requiring re-establishment of trust with new sets of colleagues.

Previous scholarship has argued that the structural features of organizations can themselves be biased. The routine practices and arrangements of organizations—their contracts, logistical arrangements, physical spaces, etc.—often assume cisgender male bodies, masculine workers, and uninterrupted work hours (Acker, 1990).⁴ These organizational structures can embed “culturally available stereotyped images and narratives throughout organizational practice” (Ely & Padavic, 2007, p. 1133). Dominant groups, in turn, can use work structures to reinforce cultural boundaries in ways that help cement their organizational power (Cooper, 2000; Kanter, 1977). Not only may organizational structures privilege men over women and white persons over persons of color (as previous scholars have illustrated), they may also privilege non-LGBTQ workers over LGBTQ persons (Acker, 1990; Faulkner, 2007). As such, we suspect that the way work is structured within organizations, and how workers are subsequently arranged as a result of those work structures, has important implications for the extent to which heteronormativity, cisnormativity, and heterosexism are deployed in workplaces and the status management strategies LGBTQ persons must rely on to navigate those settings.

Project-Based Work Structures. Many workplaces in the US, especially STEM-focused organizations, have shifted away from hierarchical, top-down work structures, where line employees are grouped into stable units, toward more horizontally arrayed, self-managing work groups that are arranged according to the expertise demands of specific projects (Smith, 1997). These project-based structures became popular in the US in the 1980s and 1990s, and by the early 2000s, around 35% of medium to large workplaces in the US had already adopted some form of self-managed project-based teams (Kalev, 2009; Vallas, 2003).

Project-based teams are often “dynamic,” where team composition and work processes are arranged in the service of immediate, time-bounded

projects. Dynamic teams are typically formed and then disbanded by management to meet the demands of discrete project goals (Huemann et al., 2007). Workers in traditional unit-based structures may also work on discrete projects, but those workers remain in their designated units project after project, and team cohesion remains relatively stable. Dynamic project-based work structures are heralded as more efficient and more effective than traditional unit structures, in part because they provide more amiable conditions for collaborative problem-solving (Vallas, 2003), but also in part because they intensify self- and peer-monitoring and discipline which increases productive output (Cohen & Ledford, 1994; Smith, 1997; Sobering, 2019).

Some research on racial/ethnic and gender inequality has argued that project-based team structures may help mitigate typical processes of ascriptive disadvantage within workplaces. This scholarship argues that project-based teams reduce job segregation and facilitate greater inclusion of women and racial/ethnic minorities in leadership positions (Kalev, 2009). Because they require the interaction of professionals from various disciplines and allow workers to demonstrate skills and abilities outside the confines of their official job titles, project-based teams may “create new opportunities for peer-like collaborative relations between workers from more- and less-valued jobs” (Kalev, 2009, p. 1595) and offer greater opportunities for women and racial/ethnic minorities to demonstrate their abilities (Kvande & Rasmussen, 1994; Ollilainen & Rothchild, 2001; Smith-Doerr, 2004). The horizontal management structures typical of project-based teams may also facilitate egalitarian relationships across different job categories better than traditional unit-based structures, helping historically marginalized group members feel more integrated with their colleagues and make the quality of their work more visible to their peers and supervisors (Berdahl, 2017).

Smith-Doerr’s (2004) study of biotechnologists, for example, illustrated the potential positive effect of interdisciplinary team structures for women scientists. In these horizontal structures, the network-based nature of the teams allowed women to re-arrange their work relations in ways that best suited them. Women’s contributions in these structures were more likely to be respected compared to women’s contributions in more traditional structures like academic departments. Women who worked in project-based biotech companies were also more likely to be promoted than their peers, due in part to the more porous boundaries between employees of different statuses. The work structure in which these biotech workers were embedded allowed women the freedom to move through their networks and rotate roles as it suited them and their careers.⁵

In contrast, other studies suggest that team-based work structures exaggerate processes of ascriptive disadvantage for historically marginalized groups.

Vallas (2003) argued that team-based structures do not readily transcend racial and gender boundaries between workers and can, in some instances, heighten intergroup conflict. Ollilainen and Calasanti (2007), in turn, challenge the idea that project-based organizational structures contribute to more gender egalitarian workplaces. They find that women team members are frequently burdened with emotional labor and are less likely to be assigned high-value instrumental project tasks. Similarly, men and women often experience different outcomes for similar actions in project-based teams: how men and women are rewarded in their teams depends on whether the project roles they fulfill fit normative gender roles (Sieben et al., 2016).

Further, the operation of project-based teams tends to rely on informal social relationships more than formal bureaucratized procedures. Previous work has found that gender and racial/ethnic biases are more likely to enter into decision-making processes in informal interactions than in more formalized settings (McIlwee & Gregg Robinson, 1992; Reskin & McBrier, 2000). For example, in their classic study of engineers, McIlwee and Gregg Robinson (1992) found that STEM organizations where channels of authority were explicit and standardized were better for women than more informally structured horizontal organizations where masculinized rituals and displays of skill held more sway over decision-making and the perceptions of women's abilities. In contrast, the experiences of workers in project-based teams are highly sensitive to the interpersonal dynamics within the teams. Interpersonal conflict and eroded intra-team trust reduce team effectiveness and have serious consequences for team members' experiences of inclusion, respect, and dignity (Hodson, 2001; Langfred, 2007).

Additionally, team "dynamism" itself—the rotation of employees through teams that convene to address particular, time- and effort-bounded tasks—may be especially problematic for historically marginalized workers. Dynamic project-based organizational structures substantially reduce the length of time that workers have to get to know one another and establish inclusive interactional norms. Such time is important for fostering collaborative decision-making and trust between co-workers. It is also important for establishing professional value and credibility in the eyes of one's colleagues, particularly for minoritized group members (Harrison et al., 1998; Harrison et al., 2002; Huemann et al., 2007; Söderlund & Bredin, 2006; Turner et al., 2008).⁶ Analogous research among freelance professionals has illustrated the challenges freelancers face quickly establishing their credibility among new client groups; such credibility establishment is precarious and is heavily dependent on the interpersonal dynamics within teams (Barley & Kunda, 2004; Osnowitz, 2010).⁷

It is not clear from existing literature, then, how work structures may amplify or undermine LGBTQ workers' experiences of marginalization and devaluation. Even if there was consensus in the literature about the benefits or drawbacks of different work structures for women and/or racial/ethnic minority employees, the patterns found along other axes of disadvantage do not necessarily translate to LGBTQ workers' experiences with their colleagues. LGBTQ status is a different kind of difference which cannot as frequently be "read off the body" as other social categories like gender identity (Cech & Rothwell, 2020). Passing and covering demands also mean that processes of workplace bias are experienced and navigated differently vis-à-vis LGBTQ status compared to other marginalized statuses (Cech & Rothwell, 2020; Cech & Waidzunus, 2011). Modulating the visibility of one's LGBTQ status among colleagues can be a regular (even daily) point of negotiation and stress (Jones & King, 2014). As such, prior literature on workplace structures may be only partly applicable to the context of LGBTQ inequality. The combination of interview and survey data we use here is well equipped to begin to examine the role of work structures in interpersonal disadvantages for LGBTQ workers.

Data and Methods

We enlist two unique datasets for this investigation. Interviews with LGBTQ professionals and allies at two NASA space flight centers provide a useful comparison of employees' experiences in two different work structures across these centers and provide rich narratives that illuminate particular mechanisms of LGBTQ disadvantage within those structures. A large survey of STEM professionals, in turn, allows for broader examination of the relationships between work structure and LGBTQ professionals' experiences of marginalization and devaluation across the STEM workforce.

Interview Context: Two NASA Centers

The National Aeronautics and Space Administration (NASA) is spread over nearly a dozen field centers and numerous smaller outpost facilities across the United States. We focus on two NASA centers. The center we call NASA-South employs approximately 15,000 workers and is involved in elements of human space flight such as the international space station and the space shuttle program.⁸ NASA-South STEM professionals are arranged in traditional long-term units that are responsible for the development and maintenance of facets of NASA-South's mission. The center we call NASA-East has a large suburban main campus and three outpost facilities and employs

around 11,500 professionals. NASA-East is primarily focused on the design, testing, launching, and maintenance of satellites, and the use of satellites for scientific observation. STEM professionals at NASA-East are arranged in a dynamic project-based work structure. Under this arrangement, NASA-East STEM professionals are organized into professional pools according to discipline and specialty. Specialists from various pools are assembled by management to work on project teams that last for the duration of discrete projects, typically for four years or less, such as the eighteen-month development of a satellite that is completed upon launch.

Along with other federal agencies, NASA began addressing LGBTQ inclusion issues in the early 2000s. Implementation of agency-wide LGBTQ-inclusive non-discrimination policies was followed by the establishment of LGBTQ-related Employee Resource Groups (ERGs) at both centers.⁹ The ERGs at NASA-South and NASA-East both engage in public-facing LGBTQ events such as local pride parades, despite the fact that NASA-South is in a more traditionally conservative region of the country.

The research reviewed above suggests contradictory expectations for our comparison of the experiences of LGBTQ workers at the two centers. On the one hand, dynamic project-based work structures at NASA-East may provide better opportunities and more collaborative interactional environments than the traditional unit structures at NASA-South. On the other hand, the dynamic project-based work structures at NASA-East may be problematic for LGBTQ-identifying workers as they frequently re-negotiate status management and credibility establishment among new sets of colleagues.¹⁰

NASA Interviews. LGBTQ persons make up about 2.2% of NASA employees agency-wide (Cech & Pham, 2017). Because NASA does not keep records of LGBTQ status like they do for other demographic characteristics, there is no systematic way to assess the size of this population at each center (a common challenge in LGBTQ workplace inequality research—see McFadden 2015). To access possible interview participants, we distributed an exploratory intake survey through the listservs of the LGBTQ-related ERGs at both centers. These ERGs included LGBTQ-identifying individuals as well as allies (i.e. non-LGBTQ individuals who advocate for LGBTQ equality). In total, 94 professionals from NASA-South and NASA-East participated in the intake survey. Of these respondents, 43 identified as LGBTQ.¹¹ At the end of the survey, respondents were asked whether they would be willing to participate in an interview. Thirty respondents agreed to be contacted again about interviews; 27 ultimately participated in an interview (16 LGBTQ, 11 ally). The voices of allies were an important part of our assessment of interpersonal processes of heteronormativity and cisnormativity at

each center because allies are privy to statements or actions toward LGBTQ persons that can occur out of earshot of openly-LGBTQ persons. We attend here to the experiences of professionals in scientific, technical, or technical management positions at both NASA centers. The work of support staff and service providers is not structured in the same way as that of technical professionals, so our results do not directly speak to their experiences.

The interview guide addressed organizational, interactional, and professional dimensions of respondents' day-to-day work and their experiences with colleagues. All interviews were conducted face-to-face in respondents' offices or meeting rooms at the space centers or in coffee shops and restaurants just off-site. Interviews lasted between 60 and 120 min, and were audio recorded and professionally transcribed. We analyzed the data in *Atlas.ti*, first coding for themes within broad categories of interactional, professional, and organizational processes of disadvantage as well as navigation strategies. Sub-themes within these categories were initially informed by our literature review and new themes emerged as the data were closely analyzed.

ERG leaders and the upper management at both NASA centers supported our research effort and expressed enthusiasm for understanding the experiences of their LGBTQ employees. The authors completed standard NASA security procedures and obtained proper security credentials for accessing NASA center campuses. This research was approved by NASA's own human subjects board as well as the IRBs of authors' home institutions.

The intake survey used to identify possible interviewees also included several measures assessing respondents' experiences of marginalization, devaluation, and harassment. Appendix A in the online supplement summarizes results from the LGBTQ-identifying respondents of this intake survey ($N = 43$). This exploratory survey helped motivate the content of the interview questions, as it suggested clear differences in the experiences of LGBTQ STEM professionals across the two centers. We summarize the patterns in these exploratory survey data below and discuss them in greater detail in Appendix A.

STEM Inclusion Study Survey Data

To understand the extent to which the work structure patterns identified in the NASA case sites might be reflected in the STEM workforce broadly, we analyzed a survey of members of 21 STEM-related professional societies fielded as part of a broader project called the STEM Inclusion Study (SIS). These 21 professional societies represent STEM workers from across the physical and natural sciences, mathematics, and engineering, and encompass 8 national flagship disciplinary societies in the natural and physical sciences and mathematics,

5 national flagship disciplinary societies in engineering, 2 interdisciplinary STEM societies, 3 teaching-focused STEM societies, and 2 demographic-focused professional societies. We do not specify the names of these societies to protect respondent confidentiality.

Between winter 2017 and spring 2019, we worked with the leadership of each professional society to field the survey to either the entire US-based membership of each society or, for the largest societies, a random sample of their employed US-based members. The overall SIS survey sample included 26,972 employed STEM professionals, with an overall response rate of 20.5% (which is typical for external online surveys; see Van Mol, 2017).¹² For this analysis, we excluded respondents who reported that they work independently, as their interactions with colleagues, and subsequent status management strategies, are distinct from the work structure processes we investigate here. We also excluded those with missing data on the LGBTQ status question. This yielded a final sample of 14,434 (594 LGBTQ; 13,840 non-LGBTQ). Respondents were asked a series of questions about their workplace experiences and the context of their jobs and organizations. The survey was conducted after the NASA interviews and included measures of work structure and marginalization and devaluation by colleagues found to be salient in our initial analysis of the NASA interview data.

LGBTQ Status. LGBTQ status was measured in the SIS survey through a set of questions that asked separately about respondents' sexual identity and gender expression. First, respondents were asked, "Please mark your sexual identity from the categories below" and could choose between the following options: "Heterosexual or straight," "Gay or Lesbian," "Bisexual," "Queer," "I don't know how to answer" or "Something else (please specify)." Those who marked "something else" were invited to note their identity in a text box. Anyone who marked "Gay or Lesbian," "Bisexual," or "Queer" on this question were included in the LGBTQ category.

Gender expression was measured with a set of three questions. The first question asked "what sex were you assigned at birth?" "Male" or "Female." The second question asked "How do you currently describe yourself?" "Male," "Female," "Transgender Male" or "Transgender Female," "Something else," or "I don't know." Respondents whose answer on the second question differed from their answer on the first question were asked the following confirmation question: "Just to confirm, you were assigned a different sex at birth than how you currently describe yourself. Is that correct?" "yes" or "no." This confirmation question limited the number of false positives for transgender or gender non-binary status—an important step for appropriately identifying proportionally small populations like non-cisgender individuals.

Respondents who marked “something else” or “I don’t know” on either the current gender identity question and/or the sexual identity question were asked a follow-up question: “do you identify as part of the LGBTQ community?” (1 = yes, 0 = no). This question helped ensure that we did not code people as LGBTQ who did not themselves identify as such.

Respondents who indicated that their current gender identity is female (whether they are cisgender or transgender) were included in the category “women;” respondents who indicated their current gender identity as male (whether they are cis- or transgender) were included in the category “men.” Respondents who answered “something else” or “I don’t know how to answer” were coded as gender non-binary. Due to the very small proportion of respondents who identified as gender non-binary, and the need to protect their confidentiality, we do not provide data for gender non-binary respondents as a separate category in the models. Instead, the indicator for “women” in the models is contrasted against both the categories for men and gender non-binary respondents.

Project-Based Teams Measure. Respondents were first asked, “Do you typically work in teams in your job?” Those that answered “no, I typically work alone” (37% of the total sample; e.g., computer technicians, medical equipment sales engineers) were excluded from the analysis. Those who responded that they work in teams were asked to indicate the type of team they work in. Those who responded that they work in “short-term project-based teams that are assembled by your supervisor” were coded as working in dynamic project-based teams (1 = yes) versus those in other types of collaborations (e.g., long-term permanent teams or teams they assemble themselves) (0 = no).¹³

Measures of Interpersonal Marginalization and Devaluation. The SIS data included several devaluation and marginalization measures. First, respondents were asked whether they agree that, in their workplace, “my colleagues treat me as an equally skilled professional,” and whether “in my workplace, my work is respected” (1 = strongly disagree to 5 = strongly agree). As an indication of their feelings of inclusion in their workplace, they were asked whether “Overall, I feel I ‘fit in’ with other people in my workplace” (1 = strongly disagree to 5 = strongly agree). To assess more embodied negative workplace experiences, we measured the frequency with which respondents reported having “felt nervous or stressed” in the past year (1 = never to 5 = very often).

To determine differences in comfort being open to colleagues about their LGBTQ status, we asked sexual minorities, “which of the following best describes how open you are about your sexual identity at your workplace?”

(1 = not open to anyone I work with to 5 = open to everyone I work with). For non-cisgender identifying persons, we asked similarly, “which of the following best describes how open you are about your gender identity at work” (1 = not open to anyone I work with to 5 = open to everyone I work with). For respondents who identified as both non-cisgender and non-heterosexual, we averaged the values on these two questions

Controls. The SIS models control for several other demographic characteristics: respondent gender (noted above), their racial/ethnic category (respondents could choose more than one: Latinx, Black, Asian, Native American/Asian Pacific Islander [NAAPI], white, and other racial/ethnic category; 1 = yes, 0 = no), their age in years, and their highest degree (1 = less than high school degree to 8 = Ph.D.). We also control for their STEM discipline (computer and mathematical sciences, biology and other life sciences, physical and other related sciences, social and behavioral sciences, engineering, and other science and engineering-related occupations), their employment sector (private for-profit company, non-profit organization, public utility, federal government, state or local government, military, four year college, two year college, or K-12), and whether they had supervisory responsibilities (1 = yes, 0 = no). To ensure that differences in experiences by team structure is not driven by the specific work activity respondents are engaged in, we control for respondents’ reported primary work responsibility (applied research, basic research, computer applications, design, management, production and maintenance, accounting and finance, sales, quality management, teaching, or other). Finally, we include indicators for the professional societies from which respondents were recruited.

Analytic Strategy. The SIS data analysis presented below uses ordinary least squares (OLS) regression models to predict each of the outcome measures. Table 1 below provides the means and standard errors for each measure for all respondents and separately by LGBTQ status. Table 2 presents OLS regression models predicting the marginalization and devaluation measures with LGBTQ status, the dynamic project-based team indicator, and an interaction term between LGBTQ status \times dynamic project-based team indicator (plus controls). We used multiple imputation to handle missing data; specifically, we used the MI chained technique in Stata 14 with 20 imputations (Allison, 2002).

NASA Interview Findings

We interviewed 27 respondents across the two NASA centers: 8 men and 19 women, 16 LGBTQ and 11 straight ally, and 24 white and 3 racial/ethnic

minority respondents.¹⁴ All respondents were members of the LGBTQ ERGs at their centers, and were employed as engineers, scientists, technical managers, or technical support personnel. Reflecting membership in the ERGs, most were employed as NASA civil servants, while a few were on-site contractors.

As responses below suggest, the experiences of LGBTQ persons at NASA-South, although not unproblematic, were generally more positive than the workplace experiences of LGBTQ professionals at NASA-East. Even though NASA-South is in a politically conservative region of the country with a history of hostility toward LGBTQ rights, and several employees at NASA-South reported tumultuous coming out experiences in their units, interviews revealed that LGBTQ persons there generally described more inclusive and respectful treatment by their colleagues than at NASA-East. At NASA-East, LGBTQ respondents lived and worked in a more progressive region yet more often experienced social marginalization and disrespect from colleagues. NASA-East respondents were also less comfortable being open to co-workers about their LGBTQ status.

These center differences in LGBTQ professionals' experiences are echoed in the exploratory survey results from LGBTQ employee resource group members at the two NASA centers described in Appendix A (see the online supplement). Although small, this exploratory NASA survey sample revealed that LGBTQ respondents at NASA-East were more likely to report experiences of harassment and devaluation, and less likely to perceive an LGBTQ-inclusive interactional environment, than LGBTQ respondents at NASA-South (net of gender, racial/ethnic minority status, and contractor status).

The interviews described below point to work structure variation across the two centers as an important catalyst of these differences. The way work is organized, and the interactions among colleagues that those work structures entail, made status management and credibility establishment more challenging for LGBTQ persons at NASA-East than those at NASA-South. The team dynamism at NASA-East also undercut the effectiveness of LGBTQ-related community-building, compared to the firmer foothold LGBTQ organizing was able to achieve in the stable unit structure of NASA-South.

NASA-South: Trust-Building Time and Familiarity with Unit Culture

NASA-South is organized into large, stable work units and STEM professionals work in long-standing teams within those units. Because employees at NASA-South generally stay in their units through multi-year or multi-decade career stages, most described a sense of familiarity and camaraderie with their immediate colleagues:

You're working long hours with [colleagues] and you will get to know them, and you spend a lot of time...more than you do your family a lot of times... I'd say, the group I worked with was pretty open [about their personal lives] and I've got history with all of them too, right, so I've known them a long time... some would be more forthcoming [than others] ...but I feel like, I could have a private conversation [with any of them]. (Sara, straight ally, NASA-South)

Patricia, a lesbian engineer, described her sense of pride from working in a group that had collaborated for years to contribute parts to broader unit initiatives: "I might have had my piece of software...[but] my little piece is part of this big piece [of the group], and this big piece went into this other bigger piece" which contributed to the unit's mission. This long-term collaboration facilitated interpersonal integration as well. Erica, a straight ally involved with the LGBT ERG noted, "we sit close to each other...We hear each other's phone conversations. You know, it's like pretty dang hard to not get to know people and just be close."

The interactional culture at NASA-South that accompanied the unit structure was often referred to by respondents as the "NASA family." Dave, a gay man and engineering administrator claimed, "it's a great environment, you know, to be in. Everybody is very appreciative of everybody else. It's a big family." The phrase "NASA family" signaled a unit and center-wide sense of common purpose at NASA-South. This cohesiveness was especially palpable during center-wide events like space shuttle launches. Contract employees worked alongside civil servants in unit teams often for years and were widely considered part of the unit community as well.

Respondents acknowledged that not all areas of NASA-South felt like a "family" to LGBTQ professionals. Jack, a gay engineer, explained, "There are definitely pockets" where LGBTQ employees have to be "very careful about who they are and who they socialize with and what they put on Facebook." One well known "pocket" is the astronaut corps. William, a gay man who worked with astronauts explained that LGBTQ-identifying astronauts were less comfortable revealing their status than other LGBTQ professionals at NASA-South because they perceived that being out may "hurt their chances of getting a [space shuttle] flight." Outside the astronaut corps, LGBTQ professionals at NASA-South who felt marginalized within their particular teams or units had the option of transferring to more inclusive teams or units without leaving the NASA center. Jack described an example where a gay man experienced extreme interpersonal hostility in his original work group. "But now he's in a job in a different area [at the center] with a very welcoming group, he is who he is and it's no issue at all and he is

thriving.” The stability of this long-term work group structure offered opportunities for LGBTQ workers to investigate other units in search of more respectful and inclusive colleagues.

While NASA-South professionals shifted posts within their units on occasion as their careers advanced, they tended to remain in those units for years or even decades. In this setting, LGBTQ employees got to know their colleagues and managers over several years. They developed their status management strategies over time, taking into account the fact that they would be working with colleagues for the long run. Most of the LGBTQ respondents at NASA-South who were open to colleagues about their status explained that their initial coming out process caused them stress and they strategized for weeks or even years about the best way to disclose their status to colleagues. For example, Jack was hired at NASA-South in the mid-1990s. At that time, employees could lose their security clearance and potentially their jobs for being LGBTQ, so he remained closeted. Jack moved units within NASA-South shortly after an executive order took effect that changed that policy. During his initial “about me” presentation to his new unit colleagues, he decided to come out to his new colleagues. He displayed a picture of his husband and adopted children in order to say, “This is who I am, this is my family.” He said, “I tried to strike the right balance between in-your-face and just telling it like it is. And, that strategy worked out pretty well for the team that I have here. For the working level troops, it wasn’t really an issue. A lot of people asked me about [my family] just casually after that.”¹⁵

Although Jack’s decision to reveal his status was tainted by his earlier experiences with formal and informal marginalization at NASA-South, he was glad to have done so. Jack still works with many of those same people and describes his working relationships with colleagues in his unit as respectful and positive. Denise, a lesbian engineer who was also anxious about revealing her status to her unit colleagues, similarly noted that “since I’ve come out, I haven’t had any kind of problems.” This context afforded the ability to negotiate boundaries between their personal and professional lives on their own time. Because Jack and Denise have worked with these colleagues for years, they could rely on tried-and-true status management strategies. Jack, for example, openly talks to his colleagues about his weekend family outings but refrains from what he calls more “in-your-face” advocacy conversations.

For transgender persons transitioning at work, outness could be an especially lengthy and vulnerable negotiation process. Bonnie, a transgender woman engineer, transitioned gradually over the course of five years, beginning with wearing nail polish and then getting breast implants.

Okay, so...I came out [verbally to colleagues] in 2010...I [was] still dressing as a guy with polos and jeans and stuff...It was only last summer when I decided to start wearing like cowl neck tops and you know frilly things and stuff like that and then all of a sudden you wouldn't believe the fire storm it created.... and nothing had changed except the type of clothes I was wearing. (Bonnie, engineer, NASA-South).

The first few months after she began to change her appearance were tumultuous for Bonnie. She received harassing emails, was criticized by colleagues in the women's bathroom, and constantly heard comments about her clothing and her body. Yet, she explained that the initial resistance and hostility she encountered from coworkers in her unit slowly subsided. By the time of the interview, a little over five years after she came out to her colleagues, she estimated that "90 percent" of the people in her unit accepted her and no longer enacted hostility.

LGBTQ organizing efforts at NASA-South were also aided by the stability of the unit-based work structure. LGBTQ community-building began at NASA-South at the grassroots level as LGBTQ employees began meeting informally to share experiences and provide support. Jack explained that they had "monthly lunches and things like that just to kind of support each other." When senior management was developing LGBTQ diversity and inclusion initiatives in the early 2000s, they built upon these grassroots connections and cultivated ERG representatives from each unit to bring the concerns of unit members to the ERG leadership. Jack described the momentum the center's LGBTQ ERG was able to achieve: "We have the Center Director's support. We have HR's support. We have legal office support. I mean, we participate in the Gay Pride Parade every year. We vocalize what we're doing in the email blasts. We have our ERG meetings at least monthly with our special events." Stable group structures allowed ERG leaders to cultivate representatives and allies across units and promote change efforts therein. For example, Wendy, a straight ally, described training sessions where unit managers "meet every other Friday and they talk about a different topic, like [LGBTQ bias]" and strategize ways to "let people know that you can talk to [center leadership] about this kind of stuff." This work context also allowed some LGBTQ employees and allies, especially those in leadership positions, to feel comfortable leveraging their status in their units to push for LGBTQ-inclusive policies and practices at the center.

In summary, although LGBTQ respondents at NASA-South encountered heteronormative and cisnormative treatment by colleagues, features of the long-term, unit-based work structure at NASA-South helped them navigate this bias and establish their credibility. Workers had time to decipher the

informal interactional climate of their unit and come out, if they so choose, at their own pace—over months or even years. Those unhappy in their units could scout out the climate in other units that might be more inclusive. The stable unit structure also fostered sustained LGBTQ organizing which integrated top-down initiatives with grassroots intra- and inter-unit community-building. It is not, then, that NASA-South nurtured an organizational culture that was immediately and enduringly accepting of LGBTQ employees. Rather, NASA-South respondents described a work setting whereby colleagues eventually came to accept them and their work alongside—or at least in spite of—their LGBTQ status, and where a robust LGBTQ community was nurtured over time by unit advocates and allies.

NASA-East: Project-Based Work Structures That Favor Homogeneity and Challenge status Management

At NASA-East, a dynamic project-based work structure shuffled technical workers into new team formations every few months or years to design, manufacture, test, and launch satellites. In an arrangement NASA-East called “matrix management,” managers drew on pools of engineers, scientists, and technicians—some of whom were civil servants and others who were contractors working on site—to assemble project teams. Across the NASA-East main campus and outputs, there could be upwards of 200 missions in operation at any given time.

While the dynamic nature of this work structure was widely seen as efficient for the completion of the satellite missions, the community fragmentation of the NASA-East workforce it produced was a well-known problem among NASA-East employees. Valerie, a lesbian senior scientist, noted, “we are supposed to be this big badge-less team” but “I have heard from management, and I see on a daily basis, that our culture is very fractal, based on what projects people are working on and whether they’re a scientists or an engineer, contractor or civil servant.” Valerie claimed that the project orientation of NASA East’s work structure neglects concern for team members’ well-being: “folks are so mission oriented that we neglect the team, and the team is not healthy as a result, and that you need to consciously be spending time and maintaining the health of the team.”

When they are assigned to a new project, the members of the new team must simultaneously decide how to tackle their assigned project while situating themselves among a new configuration of colleagues. Ted, a senior manager and engineer at NASA-East used a “globetrotter” basketball metaphor to describe this process, referencing NASA’s expectation that the

team succeeds at “impossible” technical and scientific tasks even while navigating this new interactional dynamic:

So how do we do impossible things?...you’ve got to be excited to do the impossible thing. The other thing that you do is you put together these really cohesive teams...They get charged with doing the impossible thing, and you shove resources at them and essentially what happens is the really effective teams, they almost work like, I don’t know, the Globetrotters or something, where it just looks like this teamwork is just happening and it’s just magic, and they catch each other’s faults before the fault is even made, and all this other stuff.

This teamwork is far from immediate or automatic. Ted explained how the success of the team rests not only on their technical prowess but on the team’s rapid development of interpersonal cohesion. It is this push for cohesion, he argues, that is especially difficult for LGBTQ team members: “Well, [success] depends on not just your technical work, but your ability to blend into that team....That’s where a big difference in someone’s [LGBTQ] status gets noticed, right?” Ted explained how this demand for close cooperation, paired with a strong pressure to “blend in” with team norms, means that LGBTQ identity can seem to “intrude” on this delicate cohesion:

So someone is like, yeah, let’s have a cookout because we’ve worked our butts off to get to...this big milestone ... yeah [a man on the team can] bring your wife, but your boyfriend, uh, all of a sudden that thing becomes obvious, it intrudes because of the closeness that we try to bring to these teams because we ask so much of them.

The ability for individuals to blend in with their teammates professionally and socially was seen as key to successful participation in these project-based teams. However, this team coherence required rapid assimilation to a shared set of cultural practices that were often heteronormative and prioritized homogeneity. For example, Brent, a gay male contractor, who decided not to disclose his LGBTQ status to his team members, reported that during work trips out of state, the men in his team would frequent strip clubs together to “bond.” This made status management difficult, as many LGBTQ respondents feared that coming out would disrupt the cohesion demanded of their teams.

LGBTQ professionals at NASA-East who wished to be open about their status among their colleagues had to develop new status management strategies each time they rotated into a new configuration of teammates. For example, Janice, an engineer and lesbian, explained:

[E]very four years I'm on a new project with new people...so it just kind of depends how much personal life comes up, and it's different with every team. I was in the lab for my last [mechanical integrity] test, and the quality assurance guy [on the team] was looking at [her computer background and saw] two pictures of my kids and one of me and my wife. So he just said, "so where's your husband?".... I feel like I'm coming out all of the time, which is awkward, because I talk and people ask about my kids and assume I'm straight. So it's weird. I'm very comfortable talking about my kids [but] I always catch myself a little and stumble the first time I say "my wife" to somebody, and then hold my breath and wait to see [their reaction]...

Janice did note that a benefit of the dynamic project-based team structure was that it provided her opportunities to be "indispensable" in her project in a way that was important to her career. Yet Janice described the status management required of the team structure as arduous, requiring work and credibility-building in every new group to which she was assigned.

Other LGBTQ respondents at NASA-East reported experiences of having their credibility questioned by team members due to their LGBTQ status. Tina, a lesbian manager and LGBTQ Advisory Board member claimed, "I know there are people that don't talk to me because [of her LGBTQ identity]; there are people I think who have like pushed me harder than other people to like...make sure I knew I was talking about... It seems like there was a different standard for me." Valerie, who described herself as a "soft butch" lesbian, felt it necessary to "butch it up" among her teammates in order to maintain credibility in the masculine interactional context of her team.

Even if the other people on their teams were not strangers, the interpersonal dynamic of each new team required LGBTQ professionals to devise a new set of status management strategies for that configuration of colleagues. And, the constant churn of teams meant that LGBTQ professionals could not seek out other long-standing groups in other units to avoid problematic individuals. Ted, a technical manager, told a story about Cassandra, a transgender woman engineer who had recently quit her job at NASA-East due to unbearable harassment she experienced in her team. Ted claimed, "people made fun of her, and it was just not a good thing. People talked about her all the time." This was a costly loss for the center, as Cassandra's expertise was key to several projects that were subsequently delayed. Because of the churn of workers through teams, Cassandra was always at risk of being rotated onto teams with her harassers.

The NASA-East interviews also revealed how LGBTQ organizing and community-building efforts were hampered by the dynamic project-based

work structure of the center. As opposed to the grassroots efforts at NASA-South, the genesis of LGBTQ equality efforts at NASA-East was spearheaded by senior management in a mostly top-down fashion. While the NASA-East ERG was somewhat active with outside speakers and events during Pride month, Dennis, a straight ally and ERG member explained that “the rest of the year, there might not be as much going on... it can be harder to keep some people’s interest long term when it’s not like the issue of the month.” In the absence of a robust and integrated LGBTQ and ally community, ERG social activities rarely succeeded. Tina explained that NASA-East employees typically “are not going to stay after work to go to happy hour or do an event” in ways that would foster community and help build connections across LGBTQ employees and allies. As a result, the LGBTQ ERG at NASA-East primarily served to advise management about problems raised by members, and to advocate for individual LGBTQ employees. Suzanne, a transwoman scientist, for example, explained that her involvement with the ERG was primarily a matter of helping to ensure that NASA-East’s initiatives “won’t damage trans-centric people.”

Further, Tina explained how the work structure at NASA-East made it particularly challenging to help employees who experience discrimination “to feel like they are safe enough to be able to raise their hand and say this happened to me” because they feared they might not be assigned by management to desirable projects in the future. Valerie explained that her colleagues “see [diversity] as like a public good...in a way that is utterly unconnected from the mission.” Anna argued that this superficial view of the relationship between diversity and STEM work was able to thrive within the fragmented work structure because “for some people just generally diversity and inclusion is intrusive” to the work of project teams.

In summary, LGBTQ employees in the dynamic project-based work structure of NASA-East faced a number of challenges: shuffling to new teams required them to rapidly establish trust and credibility with new configurations of colleagues, which in turn often entailed assimilation to a heteronormatively masculine “globetrotter” interactional style. LGBTQ workers often described feeling pressure to remain closeted or downplay their status so as not to upset the delicate cohesion of their teams. Those that did wish to be open to team members had to renegotiate their status management tactics anew every time they rotated teams. The fractured nature of collegial relationships at NASA-East, furthermore, made LGBTQ organizing and community-building difficult.

These NASA centers are unique research sites. The project-based teams at NASA-East may be unusual in that the intensity of the “impossible” tasks they are assigned privileges homogeneity and heteronormativity more than project-based teams in other organizational setting might. And, respondents’

relative feelings of inclusion at NASA-South may have been partly the result of the more unified mission of the agency. Yet, despite these idiosyncrasies, some of the underlying features of these divergent work structures may not be isolated to these NASA centers. Dynamic project-based teams in the STEM workforce broadly may similarly privilege homogeneity and require frequent renegotiation of status management strategies with new configurations of colleagues, amplifying marginalization of LGBTQ professionals and making credibility establishment more challenging. Employment in organizations with stable units may similarly provide time to understand the unit culture, come out to colleagues gradually, and build credibility over years. We now turn to the SIS survey data to see whether LGBTQ professionals' experiences of marginalization and devaluation similarly vary by work structure in the STEM workforce generally.

STEM Inclusion Study Survey Results

We begin by comparing LGBTQ STEM professionals in the SIS data to their non-LGBTQ peers. Table 1 presents univariate and bivariate statistics on demographics and the devaluation and marginalization measures for the entire SIS survey sample and for LGBTQ and non-LGBTQ respondents separately. Appendix B Table B.1 in the online supplement provides means on the controls for STEM discipline, employment sector, and primary work activity. Consistent with research on LGBTQ inequality in the workforce generally, LGBTQ STEM professionals reported significantly worse outcomes on the four workplace experience measures compared to non-LGBTQ respondents. The OLS regression models in Appendix B Table B.2 test whether these bivariate differences by LGBTQ status remain when holding constant variation by demographics, STEM subfield, job activities, and sector. Net of these controls, LGBTQ respondents are indeed significantly less likely than their non-LGBTQ peers to report that their colleagues treat them as an equally skilled professional and are marginally less likely to say their work is respected. LGBTQ professionals are also less likely to say that they "fit in" with their colleagues and report experiencing nervousness and stress more frequently than their non-LGBTQ peers.

The focal question for this analysis is whether LGBTQ STEM professionals' more frequent experiences of marginalization and devaluation are amplified within dynamic, project-based team work structures (compared to other work structures). Table 2 presents OLS regression models predicting each of the focal workplace experience measures with an interaction term between LGBTQ status and an indicator for whether respondents work in dynamic project-based teams. Looking to the first model in Table 2, the interaction

Table 1. Univariate and Bivariate Statistics for All Respondents and for LGBTQ and Non-LGBTQ Respondents Separately (STEM Inclusion Study Survey Data)

	ALL (N = 14,434)		LGBTQ (N = 594)		Non-LGBTQ (N = 13,840)		p
	Mean	Std. Err.	Mean	StdErr	Mean	StdErr	
Women (<i>1 = yes, 0 = no</i>)	.277	.004	.348	.020	.274	.004	***
Black (<i>1 = yes, 0 = no</i>)	.020	.001	.028	.007	.020	.001	
Latinx (<i>1 = yes, 0 = no</i>)	.067	.002	.099	.013	.066	.002	**
Asian (<i>1 = yes, 0 = no</i>)	.104	.003	.106	.013	.103	.003	
NAAPI (<i>1 = yes, 0 = no</i>)	.009	.001	.016	.005	.009	.001	*
White (<i>1 = yes, 0 = no</i>)	.794	.003	.794	.012	.794	.003	
Disability status (<i>1 = yes, 0 = no</i>)	.150	.003	.276	.019	.145	.003	***
Advanced Degree (<i>1 = yes, 0 = no</i>)	.794	.003	.775	.018	.795	.003	
Age (Years)	49.105	.112	42.650	.522	49.369	.114	***
Employer Size (<i>1 to 5</i>)	5.768	.016	5.871	.076	5.764	.016	
Works for military (<i>1 = yes, 0 = no</i>)	.109	.003	.094	.012	.110	.003	
Supervisory Responsibilities (<i>1 = yes, 0 = no</i>)	.629	.004	.534	.021	.633	.004	**
Works in dynamic, project-based teams (<i>1 = yes, 0 = no</i>)	.242	.004	.290	.019	.240	.004	**
LGBTQ (<i>1 = yes, 0 = no</i>)	.041	.002					
Devaluation and Marginalization Measures							
In Workplace, my Work is Respected (<i>1 = strongly disagree to 5 = strongly agree</i>)	4.313	.007	4.180	.039	4.319	.007	***
Treated as Equally Skilled Professional (<i>1 = strongly disagree to 5 = strongly agree</i>)	4.362	.007	4.174	.040	4.371	.007	***
I fit in with others in my workplace (<i>1 = strongly</i>	4.034	.008	3.710	.046	4.048	.008	***

(continued)

Table 1. Continued.

	ALL (N = 14,434)		LGBTQ (N = 594)		Non-LGBTQ (N = 13,840)		p
	Mean	Std. Err.	Mean	StdErr	Mean	StdErr	
<i>disagree to 5 = strongly agree)</i>							
Felt nervous or stressed (1 = never, 5 = very often)	2.728	.009	3.120	.042	2.712	.009	***

Note: + $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$; Means for employment sector, STEM discipline, and primary activity are included in Appendix Table B.1.

term is significant and negative ($B = -.125, p < .001$), suggesting that, compared to LGBTQ respondents embedded in other work structures and non-LGBTQ respondents, LGBTQ STEM professionals in dynamic project-based teams are less likely to report that their colleagues treat them as equally skilled professionals and marginally less likely to report that their colleagues respect the work they do, net of controls (see second model in Table 2).

Similarly, in the third and fourth models in Table 2, LGBTQ persons in dynamic project-based teams are significantly less likely to respond that they fit in with their colleagues, and they report experiencing nervousness and stress at work more frequently, compared to LGBTQ persons in other work structures and their non-LGBTQ peers. Together, these results indicate that the workplace disadvantages that LGBTQ STEM professionals experience across the STEM workforce (and documented in Appendix B Table B.2) are amplified for professionals who work within dynamic project-based team work structures.¹⁶

A key theme from the interviews, and one of the mechanisms that appeared to lead to less positive experiences for LGBTQ professionals employed at NASA-East, was that LGBTQ persons in dynamic project-based teams were less comfortable being open with their colleagues about their LGBTQ status than they wished to be. In Table 3, we analyze the subsample of LGBTQ respondents to assess whether work structure impacts the likelihood that LGBTQ respondents feel comfortable being open with their colleagues about their status. Mirroring the interview responses, we find that LGBTQ persons working in dynamic project-based teams are significantly less likely to report being open about their LGBTQ status at work than those in other types of work structures.

The survey data also allowed us to examine how these work structure effects might play out intersectionally by gender and race/ethnicity. Previous studies of LGBTQ STEM professionals have found that women, racial/ethnic minority, and non-cisgender LGBTQ persons are more likely to experience marginalization and devaluation than their white, male, cisgender peers (Cech & Waidzunus, 2021; Cech & Rothwell, 2020). Accordingly, we tested whether the negative effects of being in dynamic project-based teams differed intersectionally for LGBTQ women, non-binary persons, and persons of color. Specifically, among the subsample of LGBTQ respondents only, we tested interaction terms between gender and the dynamic project-based teams indicator, and separately, interactions between racial/ethnic categories (Black, Latinx, Asian, and/or NAAPI) and the project-based teams indicator. Women LGBTQ respondents in dynamic project-based teams were more likely than other LGBTQ respondents and LGBTQ women in other work structures to report that their colleagues treat them as equally skilled professionals ($B = .455, p < .05$).¹⁷ However, there were no significant differences on any other focal workplace experience outcome, and no differences on the negative effect of being in dynamic project-based teams for LGBTQ persons by race/ethnicity. This suggests that the amplification of disadvantages for LGBTQ persons within dynamic project-based teams is generally consistent across LGBTQ STEM professionals.

Discussion

The goal of this article was to shed light on the role that work structures may play in interpersonal inequality for LGBTQ-identifying professionals. We argued that how work tasks are arranged and the way workers are subsequently oriented to one another within that arrangement, may have important implications for LGBTQ persons' experiences of inclusion and respect and the status management tactics required of them. We focused here on LGBTQ professionals in STEM, as STEM has historically been slow to move beyond heteronormative, hegemonically masculine norms of interaction.

We used a unique combination of interview and survey data in this study. Data from NASA professionals suggested that the day-to-day experiences of LGBTQ persons at NASA-East were generally more negative than the experiences of those at NASA-South—patterns that were reflected in exploratory survey data of LGBTQ professionals at the two NASA centers reported in Appendix A. Even though several employees at NASA-South reported tumultuous coming out experiences in their traditional unit-based structure, and despite NASA-South's location in a politically conservative geographic region with a history of hostility toward LGBTQ rights, respondents at

Table 2. OLS Models Predicting Workplace Experiences, with Interaction Term between LGBTQ Status and Indicator for Dynamic Project-Based Team Work Structure (STEM Inclusion Study Survey Data, N = 14,434)

	Treated as Equally Skilled Professional			Work is Respected by Colleagues			Fit In with Others at Work			How often Felt Nervous or Stressed		
	B	SE		B	SE		B	SE		B	SE	
Woman	-.174	.016	***	-.104	.016	***	-.170	.018	***	.322	.018	***
Black	-.171	.047	***	-.063	.048		-.315	.056	***	-.167	.056	**
Latinx	-.072	.027	**	.005	.027		-.063	.031	*	-.121	.031	***
Asian	-.116	.022	***	-.043	.023		-.034	.026		-.248	.026	***
NAAPI	-.164	.069	*	-.148	.070	*	-.210	.081	**	.055	.081	
Disability status	-.136	.019	***	-.137	.019	***	-.170	.022	***	.350	.022	***
Biological and related science	-.028	.029		-.092	.030	**	.026	.034		.126	.034	***
Physical and related science	-.026	.026		-.067	.026	*	.007	.031		.100	.031	**
Social and related science	-.089	.065		-.183	.066	**	-.178	.076	*	-.036	.076	
Engineering	-.003	.025		-.041	.025		.020	.029		-.037	.029	
Other STEM-related field	-.044	.036		-.071	.036		.045	.042		-.002	.042	
Advanced degree	.052	.020	**	.007	.020		-.043	.023		-.039	.023	
Age	.005	.001	***	.004	.001	***	.006	.001	***	-.024	.001	***
Employer Size	-.006	.004		-.022	.004	***	-.019	.005	***	.000	.005	
Works in Military	.013	.023		.014	.024		.012	.027		-.066	.027	*
Supervisory status	.037	.016	*	.035	.016	*	.031	.018		.077	.018	***
R works in dynamic project-based team	-.070	.017	***	-.059	.017	**	-.043	.020	*	.002	.020	
LGBTQ	-.050	.040		-.024	.040		-.180	.047	***	.118	.047	*

(continued)

Table 2. Continued.

	Treated as Equally Skilled Professional		Work is Respected by Colleagues		Fit In with Others at Work		How often Felt Nervous or Stressed		
	B	SE	B	SE	B	SE	B	SE	
LGBTQ × Dynamic project-based team	-.260	.074	***	-.132	.075	+	-.211	.087	*
Constant	4.321	.114	***	4.319	.114	***	3.989	.133	***
							3.685	.132	***

Note: + $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$; Comparison category for race/ethnicity is white; comparison category for STEM discipline is computer and mathematical sciences; each model also controls for respondents' employment sector, the professional society they are a member of, and their primary work activity.

NASA-South reported less frequent marginalization overall and more respect for their professional contributions among their colleagues. At NASA-East, where employees were structured in project-based teams that rotated every few months or years, LGBTQ respondents reported more experiences of social marginalization and professional devaluation and pressures to cover their LGBTQ status among colleagues.

Interviews revealed work structure as a central catalyst of this difference. NASA-South’s traditional unit-based structure meant that, although potentially rocky at first, LGBTQ professionals had time to assess the best way to come out if they wished and slowly (re)establish professional credibility among even the most critical colleagues in their units. Employees facing

Table 3. OLS Models Predicting Comfort being Open to Colleagues about LGBTQ Status, by Dynamic Project-Based Team Work Structure (STEM Inclusion Study Survey, LGBTQ respondents only; N = 594)

	How open are you with your colleagues about your LGBTQ status?		
	B	SE	
Woman	-.194	.138	
Black	-.290	.387	
Latinx	-.096	.230	
Asian	-.330	.217	
NAAPI	-.399	.541	
Disability status	-.068	.266	
Biological and related science	-.082	.235	
Physical and related science	.259	.416	
Social and related science	-.308	.231	
Engineering	-.394	.307	
Other STEM-related field	.322	.191	+
Advanced degree	.005	.006	
Age	.023	.041	
Employer Size	-.415	.251	+
Works in Military	.153	.150	
R works in dynamic project-based team	-.529	.157	**
Constant	3.031	.801	***

Note: + $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$; Comparison category for race/ethnicity is white; comparison category for STEM discipline is computer and mathematical sciences; each model also controls for respondents’ employment sector, the professional society they are a member of, and their primary work activity.

anti-LGBTQ hostility at NASA-South could also search out opportunities in other work units with more inclusive reputations without having to leave NASA-South. Furthermore, its stable unit structure appeared to facilitate LGBTQ community-building and organizing.

NASA-East employees, in contrast, were reshuffled into new groups of colleagues every few months or years. The fast-paced “globetrotter” demands of these dynamic project-based teams meant that team cohesion had to be established rapidly. This privileged social homogeneity among team members and required that workers assimilate quickly to dominant (typically heteronormative, cisnormative, and masculine) interactional styles. LGBTQ respondents at NASA-East often feared that revealing their LGBTQ status may be a liability not only to how their teammates saw them, but to the delicate cohesion of their newly-formed teams. LGBTQ respondents in project-based teams had to re-establish their status management strategies and come out to new colleagues with every new team configuration.

It is not, then, that NASA-South was an exemplar of LGBTQ inclusion. However, the stability of its unit structure allowed LGBTQ employees time to develop working knowledge of the interactional norms of their units and decide how to navigate them in ways most beneficial to their professional and personal needs. Such status management was predicated on understanding the interactional landscapes of their workplace. When those landscapes constantly fractured and recombined, as in NASA-East, status management was more challenging.

Consistent with the broad patterns in the NASA data, our analysis of SIS survey data illustrated that LGBTQ professionals across STEM disciplines and work sectors who worked in dynamic project-based teams reported greater marginalization and stress, less professional respect, and less comfort being open to colleagues about their LGBTQ status than their peers in other work structures.

Limitations

Our triangulation of these work structure patterns across the two data sources provides greater insights than analysis of the individual data sets could alone. Yet, this research has several limitations. For the interviews, our recruitment strategy yielded participants that, like the ERGs we recruited from, were predominantly white, lesbian and gay (rather than bisexual and/or queer), and included only a few non-cisgender participants. Additionally, interviews focused on the experiences of scientific and technical professionals and thus cannot speak to the experiences of employees in support staff or service provider roles. Although the survey data provided an opportunity to

explore possible intersectional processes that could not be examined in the interview data, future qualitative research should investigate these racial/ethnic and gender intersections more closely. Second, although the SIS survey sample is large and includes STEM professionals from professional societies that span the spectrum of natural, physical, and life sciences, engineering, and mathematics, it is not strictly representative of the US STEM workforce. It also does not include a measure of the size of the source pools for these teams. Third, our focus on STEM professionals skews our study to highly educated workers. LGBTQ workers in blue collar or service jobs who work in often-rotating teams likely have distinct experiences than professionals in dynamic teams documented here. Nonetheless, the survey and interview results underscore work structure as an important facet of LGBTQ workplace inequality.

Conclusion

While scholarship on LGBTQ workplace inequality is gaining momentum, much more research is needed to understand how work structure, along with other organizational processes, impact the experiences of LGBTQ employees inside and outside of STEM contexts. The goal of this article was to raise the possibility of work structure as an important factor in LGBTQ professionals' experiences of marginalization and devaluation, paying particular attention to the increasingly popular structure of dynamic project-based teams.

The features of traditional unit-based work structures highlighted here—particularly the time and stability they offer for LGBTQ persons to find their footing and navigate unit cultural landscapes—may be common among other organizations with similar work structures beyond the STEM context. Non-STEM LGBTQ employees who work in dynamic project-based team structures, in turn, may face similar challenges to those documented here: having to reestablish credibility and develop new status management strategies in each new team configuration, dealing with the privileging of homogeneity produced by the demand to rapidly establish team cohesion, and facing the devaluation of identity features that might “interrupt” such cohesion.

Beyond more often-examined processes of organizational policies and interactional bias, scholars, organizational leaders, and diversity and equity advocates should carefully attend to how work structure may be its own source of LGBTQ disadvantage. LGBTQ workers often understand their identity as a potential source of disadvantage and often calculate the risks and benefits of various status management strategies accordingly (Jones & King, 2014). Dynamic structures make it so that LGBTQ workers have less time to assess whether or not it is safe to make one's identity known

or salient (Ragins & Cornwell, 2001; Ward 2008; Yoshino, 2006). Even if such work structures appear more efficient for completion of organizational tasks, they may incorporate inefficiencies related to diminished work satisfaction and underutilization of available talent of all team members. Future policy-centered research might investigate the most effective means for addressing the problems with dynamic project-based teams documented here.

Finally, this article suggests that work structures themselves may serve as mechanisms through which other forms of inequality are perpetuated. Project-based team structures that require workers to re-establish credibility each time they encounter a new group dynamic may perpetuate devaluation and marginalization on the basis of gender and race status biases in each new team configuration. Like LGBTQ workers, employees whose devalued statuses are not reliably visible—e.g., mental health difficulties—may face similar issues of status management in frequently-rotating groups.

To more fully understand the operation of workforce inequality, researchers must take seriously the role that the arrangement of work—and the arrangement of colleague relations those arrangements necessitate—play in reproducing organizational inequalities. If certain workplace structures prove more harmful than others, scholars must also investigate ways that organizations can ameliorate these problems with effective interventions.

Acknowledgments

This research was funded in part by the Social Science Research Institute at Rice University and by the National Science Foundation (#HRD 1535385, 1535360). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. We are grateful to William Rothwell for his help conducting several of the NASA-South interviews and for exceptional assistance with the STEM Inclusion Study. We thank Michelle Pham, Ethan Levine, and DeAnna Smith for excellent research assistance. We are grateful to our contacts at both NASA centers for serving as institutional liaisons and for helping us navigate the NASA IRB and security clearance process.

Declaration of Conflicting Interests


The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the

National Science Foundation, Division of Human Resource Development (grant number 1539140).

ORCID iD

Erin A. Cech  <https://orcid.org/0000-0001-6913-7150>

Supplemental Material

Supplemental material for this article is available online.

Notes

1. Heteronormativity and cisnormativity are, respectively, assumptions about a strict male-female sex binary and beliefs that heterosexuality is the only natural relationship form; heterosexism involves prejudice and hostility toward LGBTQ persons (Albelda et al., 2009; Badgett et al., 2007; Collier & Daniel, 2017; Raeburn, 2004; Tilcsik, 2011; Yoshino, 2006).
2. LGBTQ persons may not all experience tokenism in the same way. Some LGBTQ workers may experience “partial tokenism,” whereby they are tokens by LGBTQ status but privileged along other axes (Wingfield, 2013). For example, white gay cisgender men may experience tokenism as sexual minorities but have privileges of dominant status by gender and race.
3. For example, Pedulla (2014) found that gay Black men did not experience the same hiring penalties as straight Black men. Cech and Rothwell (2020), furthermore, found that federal employees of color experienced more marginalization and less job satisfaction than their white LGBTQ colleagues.
4. The term “cisgender” and the prefix “cis” refer broadly to “non- transsexual/transgender” individuals who experience congruence between their sex/gender assigned at birth and their gender identity and embodiment (Schilt & Westbrook, 2009).
5. The project-based teams Smith-Doerr (2004) studied differ in two key ways from typical dynamic project-based work structures described above: the bioscientists tended to work in relatively stable teams and, because they were network-based, they had quite a lot of control over the teams they entered and the duration of their engagement. In contrast, project-based structures are typically short-term and operate within (rather than across) organizations; workers often have little say over the composition of the teams to which they are assigned. Thus, worker-assembled teams like those in Smith-Doerr’s study are not necessarily proxies for the short-term, manager-assembled teams common in dynamic, project-based work structures.
6. Additionally, these dynamic project-based teams may amplify boundary-heightening processes. Kanter (1993 [1977]) argued that in situations where coworkers are

brought together who do not know each other well, boundary heightening behaviors among dominant-group members may be especially pronounced.

7. Hodson (2001) noted that over time, colleagues working together can generate stable patterns of rights, obligations, and behavior that can be a foundation of social relations that safeguard and promote worker dignity. Team-based forms of production, he argues, can intensify peer pressure and self-supervision that may constitute a challenge to worker dignity.
8. While NASA employs thousands of civil servants, thousands more work at NASA facilities as contractors from different STEM-related corporations (e.g., Boeing, Lockheed-Martin).
9. These ERGs resulted from a confluence of employee activism, human resources efforts, and top-down directives from senior management. This path of LGBTQ advocacy and organization is common in corporate firms as well (Raeburn 2004; Williams & Giuffre 2011).
10. The climate for LGBTQ workers may also depend on the cultural norms dominant in the geographic region in which the NASA centers are situated. If the experiences of NASA-East employees were generally more positive than the experiences of NASA-South employees, it would be difficult to disentangle whether this effect was the result of organizational structures or regional differences. On the other hand, if NASA-South professionals fared better than those at NASA-East, this would suggest that the findings hold despite NASA-South's embeddedness within a more conservative geographic region.
11. According to ERG leaders, the survey samples at each center included between one-third and one-half of ERG members. The ERG listserv membership is hidden to the ERG leaders, so they do not know the precise number of ERG members at any given time. This protects the confidentiality of LGBTQ persons at NASA who are not open to colleagues about their status but wish to be notified of LGBTQ-related events and resources.
12. Compared to National Science Foundation (NSF) statistics on the US STEM workforce, the SIS sample over-represents women (29% in the US vs. 31% of our sample), those who are white (78% vs. 66%), those who work in engineering and physical sciences, and those who work in government and other sectors (See Cech & Waidzun, 2021). As such, we control for detailed demographic, experience, and employment measures in all analyses. Additionally, in supplemental models, we weighted our sample to match the distribution of STEM professionals in the NSF data by gender, race/ethnicity, age, sector, and STEM field. The results patterns when using the weighted sample did not vary from those we present in the multivariate analysis in Tables 2 and 3. There are no national-level statistics on the representation of LGBTQ-identifying persons in STEM, as national STEM surveys do not yet collect data on LGBTQ status.

13. The SIS did not ask respondents in dynamic project-based teams the size of the pool of team members in their organization or how familiar they were with people that they were placed into teams with. We suspect that people who rotate into teams from smaller pools of familiar colleagues have experiences that are closer to workers in traditional unit-based team structures than to the experiences of respondents who are rotated into teams from big pools of colleagues. This likely introduces some noise into our measure of dynamic project-based work teams that may dampen the strength of the focal relationships examined in the models below. As such, these are likely conservative estimates of differential experiences of LGBTQ persons by work structure.
14. To protect confidentiality, we do not provide the racial/ethnic identities of interview respondents. Although the interview results do not appear to differ substantially by respondent gender, the small sample size prevents us from a more complete analysis by race/ethnicity. We attend to these intersectional differences in the survey data analysis.
15. This “family man” strategy aligns with expectations that non-heterosexual persons play by the rules of heterosexual families to gain others’ respect (Yoshino, 2006).
16. The patterns revealed by these interaction terms are mirrored in supplemental models with LGBTQ respondents only. There, LGBTQ professionals in dynamic project-based teams reported significantly more negative outcomes on each of the marginalization and devaluation than their LGBTQ peers embedded in other work structures (net of controls).
17. This echoes findings on the gender-based benefits of team structures for women (e.g., Kalev, 2009).

References

- Acker, J. (1990). Hierarchies, jobs, bodies: A theory of gendered organizations. *Gender & Society*, 4(2), 139–158. <https://doi.org/10.1177/089124390004002002>
- Albelda, R., Badgett, M. V., Schneebaum, A., & Gates, G. (2009). *Poverty in the lesbian, Gay, and bisexual community*. The Williams Institute.
- Allison, P. D. (2002). *Missing data: quantitative applications in the social sciences*. Sage.
- Badgett, M. V. L., Lau, H., Sears, B., & Ho, D. (2007). *Bias in the workplace: consistent evidence of sexual orientation and gender identity discrimination*. Williams Institute.
- Barley, S. R., & Kunda, G. (2004). *Gurus, hired guns, and warm bodies: itinerant experts in a knowledge economy*. Princeton University Press.
- Berdahl, J. L. (2017). Work as a masculinity contest: measurement, manifestation, and management. *Academy of Management Proceedings*, 2017(1), 17618. <https://doi.org/10.5465/AMBPP.2017.17618symposium>

- Bilimoria, D., & Stewart, A. J. (2009). "Don't ask, don't tell": The academic climate for lesbian, gay, bisexual, and transgender faculty in engineering. *NSWA Journal*, 21(2), 85–103. <https://www.jstor.org/stable/20628175>
- Broyles, P., & Fenner, W. (2010). Race, human capital, and wage discrimination in STEM professions in the United States. *The International Journal of Sociology and Social Policy*, 30(5/6), 251–266. <https://doi.org/10.1108/01443331011054226>
- Cech, E. A., & Pham, M. V. (2017). Queer in STEM organizations: workplace disadvantages for LGBT employees in STEM related federal agencies. *Social Sciences*, 6(1), 12. <https://doi.org/10.3390/socsci6010012>
- Cech, E. A., & Rothwell, W. R. (2018). LGBTQ inequality in engineering education. *Journal of Engineering Education*, 107(4), 583–610. <https://doi.org/10.1002/jee.20239>
- Cech, E. A., & Rothwell, W. R. (2020). LGBT workplace inequality in the federal workforce: intersectional processes, organizational contexts, and turnover considerations. *ILR Review*, 73(1), 25–60. <https://doi.org/10.1177/0019793919843508>
- Cech, E. A., & Waidzun, T. J. (2011). Navigating the heteronormativity of engineering: experiences of lesbian, gay, and bisexual students. *Engineering Studies*, 3(1), 1–24. <https://doi.org/10.1080/19378629.2010.545065>
- Cech, E. A., & Waidzun, T. J. (2021). Systemic inequalities for LGBTQ professionals in STEM. *Science Advances*, 7(3), eabe0933. <https://doi.org/10.1126/sciadv.abe0933>
- Clair, J. A., Beatty, J. E., & Maclean, T. L. (2005). Out of sight but not out of mind: managing invisible social identities in the workplace. *The Academy of Management Review*, 30(1), 78–95. <https://doi.org/10.5465/amr.2005.15281431>
- Clements, K., Katz, M., & Marx, R. (1999). *The transgender community health project: prevalence of HIV infection in transgender individuals in San Francisco*. San Francisco Department of Health.
- Cohen, S. G., & Ledford, G. E. (1994). The effectiveness of self-managing teams: A quasi-experiment. *Human Relations*, 47(1), 13–43. <https://doi.org/10.1177/001872679404700102>
- Collier, M., & Daniel, M. (2017). The production of trans illegality: cisnormativity in the U.S. Immigration system. *Sociology Compass*, 13(4), 13:e12666. <https://doi.org/10.1111/soc4.12666>
- Connell, C. (2015). *School's Out: Gay and lesbian teachers in the classroom*. University of California Press.
- Cooper, M. (2000). Being the "Go-To Guy": fatherhood, masculinity, and the organization of work in silicon valley. *Qualitative Sociology*, 23(4), 379–405. <https://doi.org/10.1023/A:1005522707921>
- Correll, S. J., Kelly, E. L., O'Connor, L. T., & Williams, J. C. (2014). Redesigning, redefining work. *Work and Occupations*, 41(1), 3–17. <https://doi.org/10.1177/0730888413515250>

- Cortina, L. M., Kabat-Farr, D., Leskinen, E. A., Huerta, M., & Magley, V. J. (2013). Selective incivility as modern discrimination in organizations: evidence and impact. *Journal of Management*, 39(6), 1579–1605. <https://doi.org/10.1177/0149206311418835>
- Dovidio, J. F., & Fiske, S. T. (2012). Under the radar: How unexamined biases in decision-making processes in clinical interactions Can contribute to health care disparities. *American Journal of Public Health*, 102(5), 945–952. <https://doi.org/10.2105/AJPH.2011.300601>
- Ely, R., & Padavic, I. (2007). A feminist analysis on organizational research on sex differences. *The Academy of Management Review*, 32(4), 1121. <https://doi.org/10.5465/amr.2007.26585842>
- Faulkner, W. (2007). ‘Nuts and bolts and people’: gender-troubled engineering identities. *Social Studies of Science*, 37(3), 331–356. <https://doi.org/10.1177/0306312706072175>
- Friskopp, A., & Silverstein, S. (1995). *Straight jobs, gay lives: Gay and lesbian professionals, The harvard business school, and the American workplace*. Touchstone.
- Giuffre, P., Dellinger, K., & Williams, C. L. (2008). ‘No retribution for being gay?’: inequality in gay-friendly workplaces. *Sociological Spectrum*, 28(3), 254–277. <https://doi.org/10.1080/02732170801898380>
- Harrison, D. A., Price, K. H., & Bell, M. P. (1998). Beyond relational demography: time and the effects of surface- and deep-level diversity on work group cohesion. *Academy of Management Journal*, 41(1), 96–107. <https://doi.org/10.2307/256901>
- Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. (2002). Time, teams, and task performance: changing effects of surface- and deep-level diversity on group functioning. *Academy of Management Journal*, 45(5), 1029–1045. <https://doi.org/10.5465/3069328>
- Herek, G. M. (Ed.). (1998). *Stigma and sexual orientation: understanding prejudice against lesbians, Gay Men, and bisexuals*. Sage.
- Herek, G. M. (Ed.). (2007). Confronting sexual stigma and prejudice: theory and practice. *Journal of Social Issues*, 63(4), 905–925. <https://doi.org/10.1111/j.1540-4560.2007.00544.x>
- Hodson, R. (2001). *Dignity at work*. Cambridge University Press.
- HRC. (2021). *Corporate equality Index 2021*. Human Rights Campaign.
- Huemann, M., Keegan, A., & Turner, R. (2007). Human resource management in the project-oriented company: A review. *International Journal of Project Management*, 25(3), 315–323. <https://doi.org/10.1016/j.ijproman.2006.10.001>
- James, S. E., Herman, J. L., Rankin, S., Keisling, M., Mottet, L., & Anafi, M. (2016). *Report of the 2015 U.S. Transgender survey*. National Center for Transgender Equality.
- Johnson, C., Markovsky, B., Lovaglia, M., & Heimer, K. (1995). Sexual orientation as a diffuse status characteristic: implications for small group interaction. *Advances in Group Processes*, 12, 115–137.
- Jones, K. P., & King, E. B. (2014). Managing concealable stigmas at work: A review and multilevel model. *Journal of Management*, 40(5), 1466–1494. <https://doi.org/10.1177/0149206313515518>

- Kalev, A. (2009). Cracking the glass cages? Restructuring and ascriptive inequality at work. *American Journal of Sociology*, 114(6), 1591–1643. <https://doi.org/10.1086/597175>
- Kanter, R. M. (1977). *Men and women of the corporation*. Basic Books.
- Kanter, R. M. (1993 [1977]). *Men and women of the corporation*. Basic Books.
- Kvande, E., & Rasmussen, B. (1994). Men in male-dominated organizations and their encounters with women intruders. *Scandinavian Journal of Management*, 10(2), 163–173. [https://doi.org/10.1016/0956-5221\(94\)90018-3](https://doi.org/10.1016/0956-5221(94)90018-3)
- Langfred, C. W. (2007). The downside of self-management: A longitudinal study of the effects of conflict on trust, autonomy, and task interdependence in self-managing teams. *The Academy of Management Journal*, 50(4), 885–900. <https://doi.org/10.2307/20159895>
- Mays, V. M., & Cochran, S. D. (2001). Mental health correlates of perceived discrimination Among lesbian, gay, and bisexual adults in the United States. *American Journal of Public Health*, 91(11), 1869–1876. <https://doi.org/10.2105/AJPH.91.11.1869>
- McFadden, C. (2015). Lesbian, gay, bisexual, and transgender careers and human resource development: A systematic literature review. *Human Resource Development Review*, 14(2), 125–162. <https://doi.org/10.1177/1534484314549456>
- McIlwee, J. S., & Gregg Robinson, J. (1992). *Women in engineering: gender, power, and workplace culture*. SUNY Press.
- Mishel, E. (2016). Discrimination against queer women in the U.S. workforce: A résumé audit study. *Socius*, 2, 1–13. <https://doi.org/10.1177/2378023115621316>
- Mize, T. D. (2016). Sexual orientation in the labor market. *American Sociological Review*, 81(6), 1132–1160. <https://doi.org/10.1177/0003122416674025>
- Ollilainen, M., & Calasanti, T. (2007). Metaphors at work: maintaining the salience of gender in self-managing teams. *Gender & Society*, 21(1), 5–27. <https://doi.org/10.1177/0891243206293378>
- Ollilainen, M., & Rothchild, J. (2001). Can self-managing teams be truly cross-functional? Gender barriers to a “new” division of labor. *The Transformation of Work (Research in the Sociology of Work)*, 10, 141–164. [https://doi.org/10.1016/S0277-2833\(01\)80024-8](https://doi.org/10.1016/S0277-2833(01)80024-8)
- Osnowitz, D. (2010). *Freelancing expertise: contract professionals in the New economy*. Cornell University Press.
- Patridge, E. V., Barthelmy, R. S., & Rankin, S. R. (2014). Factors impacting the academic climate for LGBTQ STEM faculty. *Journal of Women and Minorities in Science and Engineering*, 20(1), 75–98. <https://doi.org/10.1615/JWomenMinorScienEng.2014007429>
- Pedulla, D. (2014). The positive consequences of negative stereotypes: Race, sexual orientation, and the job application process. *Social Psychology Quarterly*, 77(1), 75–94. <https://doi.org/10.1177/01902725135>
- Raeburn, N. C. (2004). *Changing corporate america from the inside Out: lesbian and Gay workplace rights*. University of Minnesota Press.

- Ragins, B. R. (2008). Disclosure disconnects: antecedents and consequences of disclosing invisible stigmas across life domains. *Academy of Management Review*, 33(1), 194–215. <https://doi.org/10.5465/amr.2008.27752724>
- Ragins, B. R., & Cornwell, J. M. (2001). Pink triangles: antecedents and consequences of perceived workplace discrimination against gay and lesbian employees. *Journal of Applied Psychology*, 86(6), 1244. <https://doi.org/10.1037/0021-9010.86.6.1244>
- Rankin, S., Weber, G., Blumenfeld, W., & Frazer, S. (2010). *2010 State of higher education for lesbian, Gay, bisexual, and transgender people*. Campus Pride.
- Reskin, B. F., & McBrier, D. B. (2000). Why not ascription? organizations' employment of male and female managers. *American Sociological Review*, 65(2), 210–233. <https://doi.org/10.2307/2657438>
- Riley, D. M. (2008). LGBT-friendly workplaces in engineering. *Leadership and Management in Engineering*, 8(1), 19–23. [https://doi.org/10.1061/\(ASCE\)1532-6748\(2008\)8:1\(19\)](https://doi.org/10.1061/(ASCE)1532-6748(2008)8:1(19))
- Schilt, K. (2010). *Just one of the guys? Transgender Men and the persistence of gender inequality*. University of Chicago Press.
- Schilt, K., & Westbrook, L. (2009). DOING GENDER, DOING HETERO-NORMATIVITY: “gender normals,” transgender people, and the social maintenance of heterosexuality. *Gender and Society*, 23(4), 440–464. <https://doi.org/10.1177/0891243209340034>
- Sieben, B., Braun, T., & Ferreira, A. I. (2016). Reproduction of ‘typical’ gender roles in temporary organizations--No surprise for whom? The case of cooperative behaviors and their acknowledgement. *Scandinavian Journal of Management*, 32(1), 52–62. <https://doi.org/10.1016/j.scaman.2015.12.001>
- Smith, V. (1997). New forms of work organization. *Annual Review of Sociology*, 23, 315–339. <https://doi.org/10.1146/annurev.soc.23.1.315>
- Smith-Doerr, L. (2004). *Women's work: gender equality vs. Hierarchy in the life sciences*. Lynne Reinner Publishers.
- Sobering, K. (2019). Watercooler democracy: rumors and transparency in a cooperative workplace. *Work and Occupations*, 46(4), 411–440. <https://doi.org/10.1177/0730888419860176>
- Söderlund, J., & Bredin, K. (2006). HRM In project-intensive firms: changes and challenges. *Human Resource Management*, 45(2), 249–265. <https://doi.org/10.1002/hrm.20107>
- Tilcsik, A. (2011). Pride and prejudice: employment discrimination against openly gay men in the United States. *American Journal of Sociology*, 117(2), 586–626. <https://doi.org/10.1086/661653>
- Turner, R., Huemann, M., & Keegan, A. (2008). Human resource management in the project-oriented organization: employee well-being and ethical treatment. *International Journal of Project Management*, 26(5), 577–585. <https://doi.org/10.1016/j.ijproman.2008.05.005>

- Ueno, K., Peña-Talamantes, A. E., & Roach, T. A. (2013). Sexual orientation and occupational attainment. *Work and Occupations*, 40(1), 3–36. <https://doi.org/10.1177/0730888412460532>
- Vallas, S. P. (2003). Why teamwork fails: obstacles to workplace change in four manufacturing plants. *American Sociological Review*, 68(2), 223–250. <https://doi.org/10.2307/1519767>
- Van Mol, C. (2017). Improving web survey efficiency: The impact of an extra reminder and reminder content on web survey response. *International Journal of Social Research Methodology*, 20(4), 317–327. <https://doi.org/10.1080/13645579.2016.1185255>
- Vaughan, D. (1996). *The challenger launch decision: risky technology, culture, and deviance at NASA*. University of Chicago Press.
- Vaughan, D. (1999). The role of the organization in the production of techno-scientific knowledge. *Social Studies of Science*, 29(6), 913–943. <https://doi.org/10.1177/030631299029006005>
- Waite, S., & Denier, N. (2015). Gay Pay for straight work: mechanisms generating disadvantage. *Gender & Society*, 29(4), 561–588. <https://doi.org/10.1177/0891243215584761>
- Ward, J. (2008). *Respectably queer: diversity culture in LGBT activist organizations*. Vanderbilt University Press.
- Weichselbaumer, D. (2003). Sexual orientation discrimination in hiring. *Labour Economics*, 10(6), 629–642. [https://doi.org/10.1016/S0927-5371\(03\)00074-5](https://doi.org/10.1016/S0927-5371(03)00074-5)
- Williams, C., & Giuffre, P. (2011). From organizational sexuality to queer organizations: research on homosexuality and the workplace. *Sociology Compass*, 5(7), 551–563. <https://doi.org/10.1111/j.1751-9020.2011.00392.x>
- Wingfield, A. H. (2013). *No more invisible Man: race and gender in men's work*. Temple University Press.
- Yoshino, K. (2006). *Covering: The hidden assault on our civil rights*. Random House.

Author Biographies

Erin A. Cech is an Associate Professor of Sociology and Mechanical Engineering (by courtesy) at the University of Michigan. Her research investigates seemingly benign cultural mechanisms of inequality. Her first book, *The Trouble with Passion: How Searching for Fulfilment at Work Fosters Inequality* (UCalifornia Press), was published in 2021.

Tom Waidzunus is Associate Professor in the Department of Sociology and is affiliated with the Gender, Sexuality, and Women's Studies Program at Temple University. His research interests are at the intersection of gender and sexuality studies, science and technology studies, sociology of work and occupations, and sociology of social movements.