



## **LGBT Professionals' Workplace Experiences in STEM-Related Federal Agencies**

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## Abstract

Lesbian, gay, bisexual and transgender (LGBT) individuals in U.S. workplaces often face disadvantages in pay, promotion, and workplace experiences, and emergent research suggests these disadvantages may be particularly pernicious within science and engineering. However, no research has yet examined whether STEM-related organizations really are more disadvantageous for LGBT employees than other organizations. Using representative data of federal employees, over 8000 of whom identify as LGBT, I compare the workplace experiences of LGBT employees in STEM-related federal agencies with their non-LGBT colleagues, and then compare LGBT employees in STEM agencies with LGBT employees in other agencies. Across three dimensions of workplace experiences (perceived treatment as employees, workplace fairness, and work satisfaction), LGBT employees in STEM agencies report systematically more negative workplace experiences than their non-LGBT coworkers, and LGBT employees in STEM-agencies have consistently more negative experiences than LGBT employees in other agencies. I also find that LGBT professionals are under-represented in STEM-related agencies. These results have important implications for STEM workplaces and STEM education: even if LGBT students make it through the heteronormativity and heterosexism within science and engineering education documented in previous research, they may encounter similar hostility in the workplace. It is the responsibility of STEM educators to socialize their students—LGBT and non-LGBT alike—to expect and demand workplaces where anti-LGBT bias is not tolerated, and where all employees, regardless of sexual identity and gender expression, are respected.

## Introduction

Evidence is mounting that lesbian, gay, bisexual and transgender (LGBT) individuals in U.S. workplaces often face disadvantages in pay, promotion, and workplace experiences.<sup>1-7</sup> It is still legal in many states to fire LGBT persons due to sexual identity or gender expression.<sup>8</sup> Recent scholarship on the experiences of LGBT students and professionals suggests that these disadvantages may be particularly pernicious within science and engineering-related fields, given the patterns of heteronormativity and heterosexism documented therein.<sup>9-12</sup> LGBT faculty in science, technology, engineering and math (STEM)-related departments face harassment and discrimination, marginalization, and chilly departmental and classroom climates.<sup>10</sup> In a study of two NASA centers, furthermore, LGBT professionals encountered isolation and marginalization,<sup>13</sup> while a study of engineering students found that LGB students encountered marginalization and pressures to “pass” as heterosexual and “cover” or downplay their sexual identity.<sup>11</sup> These studies point to important but understudied dynamics of LGBT inequality within STEM education and the workforce.

Although decades of research has illustrated that STEM workplaces are disadvantageous for women and racial/ethnic minorities, little research has examined whether LGBT professionals fare worse than their non-LGBT colleagues in STEM-related workplaces, nor whether science and engineering-related organizations really are more disadvantageous for LGBT professionals than other types of organizations. Such findings are important for engineering education for two

reasons: engineering educators need to be aware of the axes of disadvantage that students may face in the workforce, and work to undermine such disadvantages by appropriately training the next generation of engineers to be aware of—and vigilant in undermining—those disadvantages.<sup>14</sup> Second, similar processes of disadvantage identified in the STEM workforce are likely in play for LGBT engineering faculty. Understanding these workplace experience disadvantages broadly can inform more specific examination of the experiences of LGBT inequality in engineering education.

Using representative data of over 270,000 federal employees, over 8000 of whom identify as LGBT, I examine the workplace experiences of LGBT professionals in STEM, and compare the workplace experiences of LGBT professionals within STEM-related federal agencies to the experiences of LGBT professionals in other federal agencies. Federal agencies are a useful sector of the US labor force in which to conduct this analysis because they are, in many ways, “best case scenarios” for the treatment of LGBT employees: federal employees are the only group of workers in the U.S. who are protected by formal anti-discrimination legislation that includes LGBT identity,<sup>1</sup> and the formalized advancement structures within federal agencies are generally more effective at promoting diversity and inclusion than flatter, more informal advancement structures in other labor market sectors.<sup>15-17</sup> Of course, this does not imply that overt and subtle processes of discrimination and bias are absent in federal agencies; just that (a) LGBT employees have baseline legal protections not guaranteed in other sectors, and (b) more formalized advancement structures in federal agencies mean that, at least in theory, hiring, promotion, and disciplinary procedures are under greater scrutiny to align with anti-discrimination policies. As such, although organizations in the private, non-profit and education sectors likely vary widely in their treatment of LGBT professionals, the differential experiences of LGBT professionals in STEM agencies documented here may be equally if not more extreme in other employment sectors.<sup>12,18-19</sup>

I use these data to examine several dimensions of the workplace experiences of LGBT professionals in STEM agencies. The first dimension captures respondents’ perceived *treatment as employees*—whether they feel that their success is fostered, whether they feel respected and supported in their workplace, whether they feel they have adequate resources, whether they feel able to whistleblow. The second dimension examines respondents’ perception of *workplace fairness*: whether respondents feel that their work unit is meritocratic, whether their organization leaders are effective and act with integrity, and whether diversity is valued in their organization. The third dimension of workplace experiences is respondents’ *work satisfaction*—e.g., whether they are satisfied with their working conditions and with their jobs overall. I also examine the extent to which LGBT professionals are under-represented in STEM-related agencies, as compared to non-STEM agencies.

Why might LGBT employees report worse workplace experiences in STEM-related federal agencies than their non-LGBT colleagues? Research on LGBT workplace inequality more broadly helps motivate these expectations. In addition to patterns of pay, hiring, and promotion discrimination,<sup>5-7, 20-22</sup> LGBT employees can face exclusion from workplace networks and resources (exclusion linked to job dissatisfaction and attrition),<sup>3, 23-24</sup> have their competence as

professionals questioned,<sup>13</sup> and face harassment and aggression from colleagues.<sup>25</sup> Although the content of stereotypes directed toward members of different LGBT subcategories may vary, even LGBT persons who are perceived as competent professionals may be stereotyped as cold or untrustworthy.<sup>26-27</sup> In addition to these processes, LGBT employees may face forms of disadvantage that arise out of pressures to “pass” as heterosexual, go “stealth” (transgender individuals who hide their transgender status) or otherwise “cover” (or downplay) their LGBT status out of fear of negative repercussions at work.<sup>28-29</sup> Passing or going stealth does not inoculate LGBT employees from negative workplace experiences, however. Those who hide or downplay their LGBT status may more often be privy to homophobic or heteronormative comments or conversations from colleagues or supervisors than openly-LGBT employees. Additionally, workers who pass, cover, or are stealth are often less likely to feel connected with and supported by their colleagues, less satisfied with their work and more likely to feel exhausted from keeping personal and work lives separate.<sup>30</sup> As such, both “out” and “closeted” LGBT individuals are at risk of discrimination and prejudice that may impact their day-to-day workplace experiences.

Given these potential sources of workplace bias and discrimination, I anticipate that LGBT employees in STEM agencies will report worse workplace experiences than their non-LGBT co-workers. First, overt and subtle experiences of bias and exclusion may lead LGBT employees to report less positive treatment as employees in terms of respect, evaluations, and resources than the treatment reported by non-LGBT employees. Second, bias, exclusion, and questioning of LGBT employees’ competence may lead LGBT employees to be more likely than their non-LGBT colleagues to perceive their workplace as unfair and lacking integrity. Third, bias, exclusion, and pressures to pass, go stealth, and cover may negatively impact LGBT employees’ work satisfaction: they may feel less integrated into workplace social networks, rate their work units less positively, be less satisfied with work conditions, and, in general, feel less personally connected to their work.

Drawing on the existing literature on LGBT persons in STEM and in the workforce more broadly, this paper examines three hypotheses:

**Hypothesis 1:** LGBT-identifying employees will be under-represented in STEM-related federal agencies, compared to their representation in non-STEM-related agencies.

**Hypothesis 2:** LGBT-identifying employees in STEM-related agencies will report significantly more negative workplace experiences (in the form of treatment as employees, workplace fairness, and work satisfaction) than non-LGBT identifying employees.

**Hypothesis 3:** LGBT-identifying employees who work in STEM-related agencies will report significantly more negative workplace experiences than LGBT-identifying employees in other agencies.

Using multivariate regression models, I find robust support for all three of these hypotheses. LGBT-identifying individuals are under-represented in STEM-related agencies compared to national statistics and compared to their representation in non-STEM agencies. Second, among

workers in STEM-related agencies, LGBT-identifying persons have significantly more negative workplace experiences than their non-LGBT coworkers on 19 measures across the three workplace experience dimensions. Third, comparing the experiences of LGBT professionals working in STEM versus non-STEM agencies, I find that LGBT professionals in STEM agencies report significantly worse outcomes on 17 of the 19 workplace experience measures across these three categories.

## Methodology

The results presented below use representative survey data of federal employees collected as part of the 2013 Federal Employee Viewpoint Survey (FEVS). The FEVS is administered annually to workers in federal agencies across the nation that represent 97% of all employees of the executive branch. Typical of workplace surveys, the FEVS achieved a response rate of 48%.<sup>33</sup> The sample contains over 275,000 respondents, 8403 who identify as LGBT and 268,255 who identify as non-LGBT. All analyses are properly weighted and multiple imputation was used to deal with missing data (less than 1% of data on any given question was missing).

Survey respondents were asked “do you consider yourself to be one or more of the following,” with the following response categories offered: “Heterosexual or Straight,” “Gay, Lesbian, Bisexual, or Transgender,” or “Prefer not to say.”

Respondents who answered “prefer not to say” were excluded from this analysis (although other analysis of FEVS data<sup>1</sup> suggests that those who choose “refer not to say” report similar patterns of disadvantage on these work experience measures compared to respondents who answer “Heterosexual or Straight”).

The nineteen workplace experience measures that serve as dependent variables represent three dimensions: perceived treatment as employees, perception of workplace fairness and work satisfaction. These 19 measures are listed in Table 1; detailed operationalization of these workplace experience measures can be found in Cech & Rothwell.<sup>1</sup> All dependent variables have a 1-3 value range, where 1=negative (strongly or somewhat disagree; very or somewhat dissatisfied), 2=neutral, and 3=positive (strongly or somewhat agree; very or somewhat satisfied). Some of these measures (a-d, h-k, m-s) are factor analyzed scale measures (which are then divided by the number of questions included in the scale to retain the 1-3 value range); ordinary least squared (OLS) regression is used for these measures. The remaining workplace experience measures are single-question measures; ordered logistic regression (ologit) are used for these measures as the dependent variable. The next section presents the results related to

**Table 1: Workplace Experience Measures**

***Perceived Treatment as Employee Measures:***

- (a) Work success is fostered
- (b) Transparent evaluations
- (c) Adequate resources
- (d) Respected by supervisor
- (e) Satisfaction with pay
- (f) Able to whistleblow
- (g) Work-life balance is supported

***Workplace Fairness Measures:***

- (h) Meritocratic work unit
- (i) Diversity supported
- (j) Leadership quality
- (k) Leadership integrity
- (l) Favoritism not tolerated

***Workplace Satisfaction Measures:***

- (m) Personal satisfaction from work
- (n) Satisfaction with quality of work unit
- (o) Satisfaction with working conditions
- (p) Employee empowerment
- (q) Co-workers cooperation
- (r) Satisfaction with procedures
- (s) Overall job satisfaction

hypotheses 1-3. All models control for variation by gender, racial/ethnic minority status, employment tenure, and supervisory status.

Over 30 agencies are represented in the FEVS data. Of these, 8 agencies are coded as STEM-related: The Department of Energy, Environmental Protection Agency, Department of Defense (excluding the armed services agencies), National Science Foundation, National Aeronautics and Space Administration, Nuclear Regulatory Commission, Department of Transportation, and Department of Homeland Security. Not all employees in these agencies have STEM degrees or are personally engaged in science and engineering work. However, the climate and character of organizations are often influenced by the cultures of the professional work which is the central focus of those organizations.<sup>15</sup> As such, I expect that heteronormativity and heterosexism within the professional cultures of STEM would impact the climate of STEM-focused agencies overall, even impacting employees within those agencies who are not trained in STEM or who do not engage in engineering or science work on a daily basis.

## **Results**

In the sample overall, 26% are employed in a STEM-related agency. Of those employed in STEM agencies, 2.7% identify as LGBT, 39% are women, and 31% are members of under-represented minority groups. The subsections below present results related to each of the three hypotheses.

### *Are LGBT Professionals Under-Represented in STEM-Related Federal Agencies?*

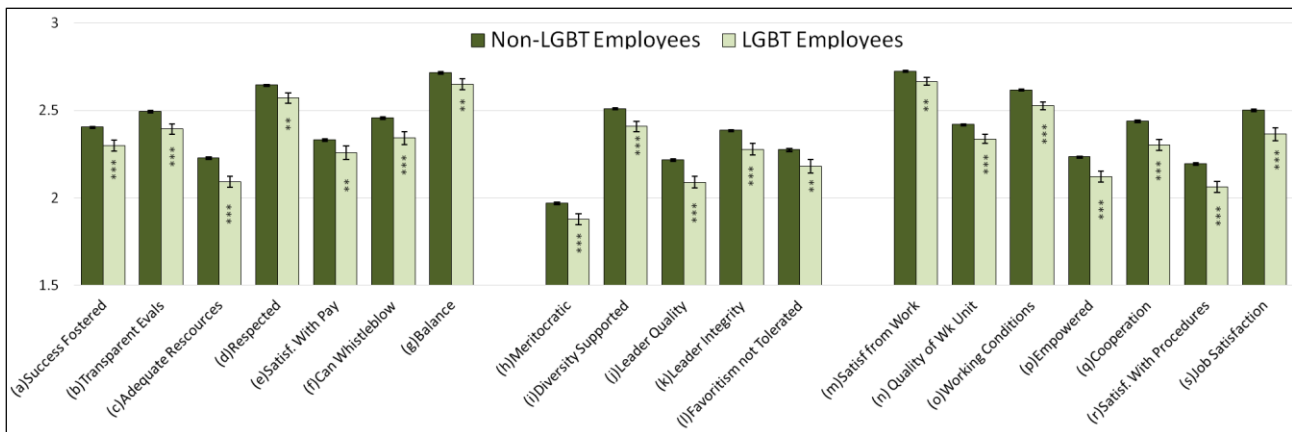
According to nationally-representative survey data, LGBT-identifying persons make up 3.4% of the U.S. population.<sup>31</sup> As stated in hypothesis 1, I expect that, due to systemic disadvantages for LGBT-identifying individuals that likely stretch from k-12 education through higher education in STEM,<sup>11,18</sup> LGBT individuals are under-represented in STEM-related federal agencies, compared to other federal agencies.

Consistent with hypothesis 1, only 2.7% of respondents in STEM-related federal agencies identify as LGBT, compared to 3.1% in other agencies. These figures are both lower than the national estimate, suggesting that LGBT persons are under-represented in federal agencies overall—but especially in STEM-related agencies.

### *Do LGBT Employees in STEM Agencies Experience More Negative Workplace Experiences than their Non-LGBT Colleagues?*

Although the under-representation of LGBT employees in STEM-related federal agencies suggests systemic patterns of disadvantage in these agencies (as well as in the pathways leading up to employment in these agencies), this information does not tell us much about the experiences of LGBT employees *within* STEM-related agencies. The next set of analyses seeks to determine whether LGBT-identifying professionals within STEM agencies fare worse than their non-LGBT colleagues.

Figure 1 presents the means on each of the 19 workplace experience measures for non-LGBT employees and LGBT employees in STEM agencies. The asterisks in the figure indicate the significance of LGBT status in regression models, net of controls for gender, racial/ethnic minority status, employment tenure and supervisor status. As is made clear in the figure, *LGBT employees in STEM agencies fare significantly worse than their non-LGBT co-workers on all 19 workplace experience measures.* LGBT employees in STEM-related organizations, compared to their non-LGBT coworkers, report less positive treatment as employees (success fostered less often, less transparent evaluation, less adequate resources, less respect and pay satisfaction, less comfort whistleblowing, and less support for their work-life balance), are less likely to perceive that their organization is fair (meritocracy and diversity are less supported, favoritism is tolerated more often, and they feel that their leader has less integrity and fairness), and are less satisfied with their work (have less personal satisfaction in their work, in the skill of their unit, in their working conditions, in the procedures of their organization, and in the cooperativeness of their co-workers). Such differences exist net of controls. These results indicate widespread disadvantages for LGBT professionals in these agencies.



**Fig. 1. Workplace Experiences of Non-LGBT (N=70,768) and LGBT (N=1,959) Employees in STEM-related Federal Agencies.** Height of the columns represent that subgroup's mean on each measure, with error bars representing 95% confidence intervals (mean  $\pm$  1.96\*Std.Error). Asterisks indicate the significance of LGBT status net of gender, racial/ethnic minority status, age cohort, tenure, supervisory status, and federal agency in OLS and ologit regression models predicting the outcome measures; (\*\*\*) $p < .001$  (\*\*) $p < .010$ , based on two-tailed test; 1=negative, 2=neutral, 3=positive).

*Are LGBT Employees' Workplace Experiences More Negative if they are Employed in STEM Agencies?*

The final set of analysis asks whether LGBT professionals are particularly disadvantaged in STEM agencies, compared to LGBT professionals in other agencies. Cech & Rothwell found negative workplace experiences for LGBT federal employees across the agencies—differences that are echoed in the analyses above.<sup>1</sup> However, these do not tell us whether STEM agencies harbor an especially disadvantageous workplace environment, compared to other agencies.

**Table 2: Do LGBT Employees in STEM-Related Agencies Have More Negative Workplace Experiences than LGBT Employees in other Agencies?** (Unstandardized coefficients for STEM agency status in regression models predicting workplace experience measures)

	Unst. Coefficient	Std. Error
<b>Perceived Treatment as Employee Measures:</b>		
(a) Work success is fostered	-.132 ***	.027
(b) Transparent evaluations	-.054 *	.027
(c) Adequate resources	-.075 **	.026
(d) Respected by supervisor	-.033	.027
(e) Satisfaction with pay	-.054	.080
(f) Able to whistleblow	-.369 ***	.080
(g) Work-life balance is supported	-.261 ***	.095
<b>Workplace Fairness Measures:</b>		
(h) Meritocratic work unit	-.108 ***	.029
(i) Diversity supported	-.089 **	.030
(j) Leadership quality	-.145 ***	.031
(k) Leadership integrity	-.097 **	.030
(l) Favoritism not tolerated	-.284 ***	.081
<b>Workplace Satisfaction Measures:</b>		
(m) Personal satisfaction from work	-.054 **	.021
(n) Satisfaction with quality of work unit	-.089 ***	.022
(o) Satisfaction with working conditions	-.067 **	.025
(p) Employee empowerment	-.112 ***	.027
(q) Co-workers cooperation	-.123 ***	.027
(r) Satisfaction with procedures	-.117 ***	.028
(s) Overall job satisfaction	-.292 ***	.082

Note: Table reports unstandardized coefficients and significance of the measure indicating whether respondents were employed in STEM-related federal agencies on the 19 workplace experience measures. (In other words, significant coefficients indicate when the experiences on those measures of LGBT employees working in STEM agencies are more negative than the experiences of LGBT employees working in non-STEM agencies. Models predicting each workplace experience were ran separately. Each model includes STEM-Agency measure, along with controls for gender, racial/ethnic minority status, supervisory status, age category, and employment tenure.

Table 2 above presents the unstandardized coefficients of an indicator of working in a STEM-related agency in regression models predicting each of the 19 workplace experience measures. Models include only LGBT respondents and control for gender, racial/ethnic minority status, employment tenure, and supervisory status. Asterisks indicate when LGBT employees in STEM-related agencies report significantly worse workplace experiences compared to LGBT employees in non-STEM-related agencies.

As illustrated by Table 2, LGBT employees in STEM agencies fare significantly worse on 17 of the 19 workplace experience measures compared to LGBT employees in other federal agencies. For example, LGBT employees in STEM agencies report less adequate resources, and less transparent evaluations, and that their success is fostered less often, compared to LGBT



employees in other agencies. LGBT employees in STEM agencies are also less likely to report that their work unit is meritocratic and that diversity is supported in their work unit. LGBT employees in STEM-related agencies also have lower job satisfaction across all measures than those in non-STEM-related agencies.

## Conclusion

The results above present strong evidence that LGBT employees face more negative workplace experiences within STEM agencies compared to their non-LGBT co-workers, and that LGBT employees fare significantly worse in STEM agencies than they do in other agencies. Much more research is required to understand these processes, and more inclusive policies and procedures are needed to undermine these negative workplace experience effects. Given that federal agencies are a “best case scenario” for employment of LGBT employees, the effects are likely similar if not stronger in for-profit industry and in academia than in federal agencies.

These results have important implications for science and engineering-related workplaces and for science and engineering education. Even if LGBT students persist through heteronormativity and heterosexism within science and engineering education documented in previous research, they may encounter similar if not greater forms of disadvantage in the workplace. It is the responsibility of engineering and science educators to set up their students—LGBT and non-LGBT alike—to expect and demand workplaces where subtle and overt heteronormativity and heterosexism are not tolerated, and where all employees, regardless of sexual identity and gender orientation, are respected.

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