

The Inequality of LGBTQ Students in U.S. Engineering Education: Report on a Study of Eight Engineering Programs

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Research over the last three decades has provided extensive documentation of processes that reproduce inequalities for women and racial-ethnic minorities in engineering education. In contrast, scholars are only beginning to understand the experiences of lesbian, gay, bisexual, transgender, and queer (LGBTQ) individuals in engineering. Cumulatively, the limited research that does exist suggests that LGBTQ-identifying individuals encounter stereotypes and bias and report negative experiences that fit within a spectrum of discrimination. However, due to data limitations, research has not yet been able to document LGBTQ inequality *relative to* the experiences of non-LGBTQ students at the same institution. In this paper, we utilize new survey data on over 1700 students (both LGBTQ and non-LGBTQ) from eight engineering colleges across the U.S. to paint the landscape of inequalities for LGBTQ students. Specifically, we ask, (1) do LGBTQ students experience *greater marginalization* than their classmates and (2) is their engineering work more likely to be *devalued*? (3) Do LGBTQ students experience greater *personal consequences* than their peers in terms of stress, insomnia, and unhappiness? (4) Do these LGBTQ inequalities vary by school? We find that LGBTQ students face greater marginalization, devaluation and personal consequences relative to their peers. There is little variation in the negative climate for LGBTQ students across the eight schools we study, suggesting that LGBTQ inequality is part of the professional culture of engineering that pervades most engineering programs. Broadly speaking, these initial results highlight crucial considerations regarding the inclusion and respect of talented engineering students and the importance of addressing patterns of disadvantage to promote the inclusion of all students.

Introduction

When you're a minority, and especially when you are a discriminated-against minority, it would be great if I wouldn't have to worry if my professors were weirded out because I brought my girlfriend to social hour. If you're queer, just getting to that point . . . is a lot of work . . . It's just really hard to be isolated somewhere where people just don't understand what you had to do to get where you are in your life. (Sara, lesbian engineering student; Cech & Waidzunus 2011, pp. 18)

Scholars in engineering education and social science have begun to pay attention to issues of the inclusion of sexual minority, transgender, and queer students in engineering alongside other axes of disadvantage like gender and race/ethnicity that have traditionally been the topic of investigation [1-3]. Early research, particularly interview-based studies, explored how LGBTQ persons feel isolated and unwelcome in engineering [2,4-6]. Survey samples of faculty and students have reported disadvantage and marginalization for LGBTQ individuals [7,19]. For example, over 30 percent of LGBTQ STEM students reported that they were not comfortable with the campus climate and 20 percent feared for their physical safety on campus [19]. This study also found that LGBTQ students across many campuses found that LGBTQ persons in STEM were more likely than LGBTQ persons in other academic disciplines to report marginalization and harassment [7].

Despite these important initial steps, no research to our knowledge has yet to compare the experiences of LGBTQ engineering students with their non-LGBTQ classmates in the same institutions. This comparison allows for the systematic documentation of patterns of

disadvantage—where and how LGBTQ-identifying students have more negative experiences than their peers, net of other demographic characteristics such as racial/ethnic category, socio-economic status, first generation status, and university. Evidence that compares the experiences of LGBTQ and non-LGBTQ students in the same engineering programs may also be the most compelling type of data to convince engineering program faculty and leaders that LGBTQ inclusion issues are an important site of action.

Existing research on sexual minority and non-cisgender (i.e., individuals, including transgender persons, who do not identify with the sex category they were assigned at birth) engineering students has found these students encounter prejudicial climates that leave them feeling isolated, undermine their confidence, and pressure them to “pass” as heterosexual or non-transgender or “cover” or downplay their sexual identity or non-cisgender status [4,8,9]. This research has pointed to ubiquitous cultural beliefs within engineering that promote bias toward LGBTQ persons—“heterosexism”—and presume a strict female-male sex binary and the designation of heterosexuality as the “correct” sexual identity—“heteronormativity” [9,10]. Given this emergent body of literature, we suspect that inequality for LGBTQ engineering students is widespread in engineering education.

The goal of this paper is to provide a broad overview of the contours of LGBTQ disadvantage *as inequality*—comparing the experiences of LGBTQ-identifying students with their non-LGBTQ-identifying classmates. To do so, we focus on four areas of inquiry:

- (1) *Do LGBTQ students feel more marginalized than their non-LGBTQ classmates, net of demographics and university?* Existing qualitative research suggests that LGBTQ students in engineering feel isolated from their peers in classroom and social activities. We examine several different indicators of marginalization, including the extent to which LGBTQ students feel they are accepted by students and are included in invitations to social gatherings like lunch after class, whether they have avoided social events with classmates, felt the need to hide their personal life from their classmates, and how frequently (if ever) they have stayed home from school because they did not feel welcome.
- (2) *Are LGBTQ students more likely to have their engineering work devalued than other students?* In addition to feeling marginalized from their classmates, we expect that LGBTQ students may not have their engineering work valued to the same extent or taken as seriously as their non-LGBTQ peers [4]. Specifically, LGBTQ students may be less likely than their peers to report that their classmates treat them with respect and that their engineering work is respected in their classrooms. They may also be more likely to avoid working with a certain team or on a certain engineering project because they did not feel welcome. We also expect that LGBTQ students will be more likely than their peers to have seen or heard offensive comments in their engineering spaces.
- (3) *Are their personal consequences for LGBTQ students in terms of stress, insomnia, happiness, and compartmentalization?* Beyond marginalization and devaluation, LGBTQ students may be more likely to face personal health and wellness issues as a result of the biases they encounter in school. In particular, we examine the extent to which LGBTQ engineering students are more likely than their peers to feel nervous or stressed, unhappy or depressed at school, and experience insomnia to the point that it affects their schoolwork. Additionally, we examine the extent to which respondents are affected by living “compartmentalized lives” [4]—the strict separation of

personal and professional lives. Significant results here would indicate the extent to which these disadvantages get “under the skin” of LGBTQ students, in addition to affecting their day-to-day interactions in their engineering programs.

(4) *Does the climate for LGBTQ students vary by school?* Finally, we are interested in understanding how the climate for LGBTQ persons varies by school context. On the one hand, the climate and culture for LGBTQ persons within organizations is influenced by the local interactional cultures and informal practices of those organizations [11,12]. On the other hand, a heteronormative professional culture may pervade engineering programs across institutions [4]. As such, we examine several measures of climate for LGBTQ persons across the eight schools we study, comparing how LGBTQ students in each context rate their colleges. Large variation in these climate measures would indicate that particular organizational context plays a central role in determining the experiences of LGBTQ students. Little variation would indicate that the anti-LGBTQ bias that perpetuates the marginalization and devaluation is likely part of the culture of engineering education broadly, not of particular engineering programs.

Data and Methods

Data

These data include 1,729 students who are enrolled in eight engineering programs in college and universities across the U.S. These schools were identified through an initial survey of U.S. engineering deans and program directors in fall 2015 (see [13] for details). Ninety deans participated in this survey and 23 of those agreed to be contacted again to discuss the possibility of surveying the engineering students and faculty in their programs. Eight deans ultimately agreed to allow us to send survey links out to their engineering programs. Given this selection process, we expect that the schools in our sample have deans that are more interested than average in diversity and inclusion issues. As such, the patterns of disadvantage we identify here are likely conservative estimates of broader patterns: engineering education programs in the US on average likely have similar if not more extreme patterns of disadvantage than those reported here.

The survey asked students a broad range of questions about their experiences in their engineering classrooms, their perceptions of the engineering profession, and their more general experiences as college students. The survey was called the “ASEE Diversity and Inclusion Survey” and the invitation email mentioned LGBTQ status only briefly alongside other axes of disadvantage that the study investigated. We do not provide the names of the schools we studied to protect confidentiality, but we do provide a general description of the type of institution in Table 1. The sample size for each school ranged from 82 students (school 101) to 909 students (school 109) and response rates ranged from a low of 4% to a high of 45% with an average of 16.5% across the eight schools.¹ 2,575 students began the survey; to improve data quality and reliability, we

¹ School 101: N=82, Approximate response rate[RR]=18%; School 108: N=233, RR=7%; School 109: N=909, RR=45%; School 110: N=128, RR=4%; School 114: N=215, RR=30%; School 116: N=290, RR=7%; School 117: N=620, RR=11%; School 120=98, RR=8%.

use only the 1,729 who passed an attention filter question.² Supplemental analyses ran with this full sample of 2,575 students produce the same patterns of significance as those used here.

Measures

Marginalization Measures

We include five measures of the extent to which respondents feel marginalized from their classmates: “How accepted do you feel by the following: students in your engineering/engineering technology classes” (1=not accepted at all to 4=very accepted); “when my classmates get together after class, for example to go to lunch, I am usually included in the invitation” (1=strongly disagree to 5=strongly agree); “Thinking about the past 12 months, did any of the following happen to you? ... Avoided a social event such as a lunch or a holiday party” (1=never to 5=almost every day); “Felt the need to lie about my personal life to other students” (1=never to 5=almost every day); and “Stayed home from school because you did not feel welcome” (1=never to 5=almost every day).

Devaluation Measures

Devaluation of students’ engineering work is measured through two questions about the respect students receive for their engineering work: “my peers respect me for the work that I do” (1=strongly disagree to 5=strongly agree) and “my schoolwork is respected” (1=strongly disagree to 5=strongly agree). We also include a question about the extent to which students have avoided school work “Thinking about the past 12 months, did any of the following happen to you? ... Avoided working on a certain school project or team” (1=never to 5=almost every day). Finally, we include a question about whether respondents have encountered offensive things in their engineering environments: “Please indicate your level of agreement regarding the climate in your engineering college: “I have read, heard, and/or seen insensitive comments that I found offensive” (1=strongly disagree to 5=strongly agree).

Personal Consequences Measures

We use four measures of negative personal experiences as students navigate their day-to-day lives in school: “Thinking about the past 12 months, did any of the following happen to you... Felt exhausted from spending time and energy keeping my personal and professional lives separate,” “felt nervous or stressed,” “felt unhappy or depressed at school,” “had trouble sleeping to the point that it affected your performance in and out of school” (1=never to 5=almost every day).

Engineering Program Climate Questions

Finally, we include three measures that ask LGBTQ respondents to assess the climate in their engineering programs for LGBTQ-identifying students. The first two ask respondents to indicate the extent to which they agree with the following statements: LGBTQ students are met with thinly veiled hostility (for example, scornful looks or icy tone of voice)” and “some faculty and

² Attention checks significantly improve the quality of the data by excluding respondents who are not reading the options carefully. For this survey, we included a check that was worded as follows: “As a consistency check, please choose “Almost every day” for this question.” Respondents who chose something other than “almost every day” for this response were coded as having failed the attention filter.

students seem condescending toward colleagues who are lesbian, gay, bisexual, transgender or queer” (1=strongly disagree to 5=strongly agree). Finally, students were asked, “Overall, in the last 3 years, have you ever been aware of instances in which students in your engineering/engineering technology classes may possibly have been treated negatively due to their:” “Sexual identity,” and “Gender expression or transgender status.” Students who indicated yes on one or both of these were coded as “yes” on an aggregate measure indicating whether they had observed unfair treatment toward LGBTQ students (1=yes, 0=no).

Independent Measures

LGBTQ status is measured with a set of indicators that asked separately about students’ 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,” “Don’t Know” or “Something Else.” Those who marked “something else” were invited to specify with a text box. Anyone who marked “Gay or Lesbian,” “Bisexual,” or “Queer” is included in our LGBTQ category. Because respondents who marked “don’t know” or “something else” did not choose to identify with one of the categories in the LGBTQ acronym, we did not include them 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 answers for the first and second question were different received 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 substantially limits the number of false positives on transgender or gender non-binary identity—an important step for appropriately capturing proportionally small populations like non-cisgender individuals. Respondents who answered yes to this confirmation question were included in the LGBTQ category. Respondents who marked “something else” or “I don’t know” in the current gender identity question were marked as “gender non-binary” for their current gender category. Due to the very small proportion of respondents in this gender non-binary category, and our desire to protect the confidentiality of respondents, we do not provide data as a separate category for gender non-binary respondents. Instead, the indicator for “woman” is contrasted to both the categories for men and non-binary students in our models.

Students who indicated that their current gender identity is female (whether they are cis-gender or transgender) are coded as women; men who indicated their current gender identity as male (whether they are cis- or transgender) are coded as men.

We also include several controls for other important demographic characteristics. We control for the racial/ethnic categories with which students identify (they could choose multiple): Hispanic, Black, Asian, Native American/Pacific Islander, white, and other racial/ethnic category (1=yes, 0=no). Next, we control for respondents self-report of the socio-economic status (SES) of their family: “what would you say is the economic class of your family growing up:” “working class”=1, “lower-middle class” =2, “middle class”=3, “upper-middle class”=4, “upper class”=5. We also control for whether the respondent is a first-generation college student (1=yes, 0=no). Specifically, students were asked, “Are you the first person in your immediate family

(parents/guardians, siblings) to attend college?” Finally, each model includes controls for schools, with school 114 serving as the comparison category.

Analytic Strategy

The analyses presented below use OLS or logistic regression models to predict each of the outcome variables. Table 1 below provides the means and standard errors for all respondents and separated by LGBTQ status. Table 2 predicts the marginalization variables one at a time with LGBTQ identity and controls. Next, we predict the devaluation measures (Table 3) and personal consequences (Table 4). Finally, we examine the extent to which reports of the climate for LGBTQ persons vary by school by predicting the climate measures by school and other controls among LGBTQ students only (Table 5). As is recommended, we use multiple imputation to handle missing data; specifically, we used the MI chained technique in Stata 14 with 20 imputations [14].

Results

Descriptives

Table 1 provides the means and standard errors of each independent and dependent variable for all respondents and separately by LGBTQ status.³ Approximately 8.7% of the sample of respondents identifies as LGBTQ. This is higher than population-level estimates of college-educated Americans who identify as LGBTQ (2.8%, [15]), but reflects trends where a larger proportion of young adults identifies as LGBTQ than in previous generations. 35% of the sample identifies as women, 64% as men, and around 1% as gender non-binary. We include gender non-binary respondents in the LGBTQ indicator but because of concerns about identifiability of this small proportion, we do not include gender non-binary as a dichotomous indicator in the models nor provide the precise percent of the gender non-binary population in Table 1. As such, the category “woman” (which includes those who identify as cis-gender and transgender women) is compared to both the categories of men (which includes cis-gender and transgender men) and gender non-binary. Compared to national statistics on engineering students [16], our sample has proportionally more women (20% nationally, 35% here) and racial/ethnic minorities (13% nationally, 24% here). However, this over-representation helps bolster statistical power to control for variation along these axes. Fourteen percent of the sample are first-generation college students. There are no significant differences between LGBTQ and non-LGBTQ students along these demographic axes, meaning that gender and racial/ethnic diversity is similar among both groups of students.

The remaining rows in Table 1 present the means and standard errors for the outcome variables of interest and across the school indicators. Suggesting a broad pattern of disadvantage, LGBTQ students have significantly more negative values on all of the marginalization, devaluation, personal consequences, and climate measures than non-LGBTQ students. The next analyses will determine whether these differences remain net of variation by demographics and school.

³ We convert the means on the descriptives in Table 1 (between 0 and 1) into frequencies (out of 100%) for the sake of narrative description in the text.

(1) Experiences of Marginalization

Multivariate regression models help determine whether LGBTQ status is a significant predictor of experiences of marginalization, net of variation by gender identity, race/ethnicity, SES, first generation status, and school. Table 2 presents the regression coefficients, significance levels and standard errors on the LGBTQ measures and controls for each of the five experiences of marginalization measure. Looking to the first column, which measures students' perception that they feel accepted by other engineering students, the LGBTQ coefficient is significant and negative ($B=-0.214$, $p<.001$). This means that, net of variation by gender, race/ethnicity, SES, FirstGen status and school, LGBTQ students are significantly less likely than their non-LGBTQ colleagues to report that they feel accepted by their engineering classmates. LGBTQ students are more likely to report significantly more negative experiences along the other marginalization measures as well: net of controls, LGBTQ students are less likely to report being included in invitations to social gatherings with their engineering classmates and more frequently avoid social events with classmates, feel the need to hide their personal lives from their peers, and even stay home from school because they don't feel welcome.

Consistent with research on the marginalization of women in engineering programs, the models also indicate that women report significantly more negative values on these measures except for the inclusion in social gatherings measure, compared to men and gender non-binary respondents. The models also indicate marginalization for racial/ethnic minority students: Asian students are also more likely than white students to avoid social events, to stay at home from school because they don't feel welcome, and less likely to feel accepted by students. Finally, Black students are also significantly less likely than white students to feel accepted by other students and Native American/Pacific islander respondents are more likely than white students to report that they feel the need to hide their personal life at school.

(2) Devaluation of Engineering Work

Next, we examine whether LGBTQ students are also more likely to have their engineering work devalued in their programs. Specifically, net of controls, we find that LGBTQ students are less likely than their classmates to feel that their engineering peers treat them as equally-skilled students and respect their engineering work. LGBTQ students are also more likely to avoid working with certain projects or teams and are more likely to report having seen or heard offensive comments in their engineering programs.

As with marginalization, we see significant effects of gender and race/ethnicity on the devaluation measures as well: women report significantly more negative values on each of the devaluation measures compared to men and gender non-binary students, Black students are less likely to report that their work is respected, and Native American/Pacific Islander students are more likely to report that they have avoided working with a certain team or on a certain project.

(3) Personal Consequences

The third set of measures we examine measures the extent to which LGBTQ students experience negative consequences that carry into their personal lives, and even into their health and wellness. Specifically, we examine whether LGBTQ identity is related to feeling exhausted from spending energy on compartmentalization, the frequency of feeling nervous or stressed,

feeling unhappy or depressed at school, and having trouble sleeping to the point that it negatively affects their school performance. We find that LGBTQ identity significantly predicts *all* of these measures, indicating that LGBTQ students experience more negative personal experiences than their non-LGBTQ classmates.

As with the previous categories of measures, we find significantly more negative experiences for women across all measures, that Asian students are more likely than whites to feel exhausted from compartmentalization, that Black and Asian students are more likely to feel nervous or stressed, and that Native American/Pacific Islander students and first generation college students are more likely to have sleeping troubles and whites and non-FirstGen students, respectively.

(4) Variation by School Context

Finally, we are interested in the extent to which the climate for LGBTQ students varies by school context. Table 5 predicts three indicators of chilly climate for LGBTQ engineering students among only those who identify as LGBTQ: perception that LGBTQ students face veiled hostility, perceptions that faculty and students sometimes treat LGBTQ students condescendingly, and whether respondents have observed instances of unfair treatment toward students on the basis of sexual identity or gender expression. In contrast to the models above, these models include only LGBTQ students. Here, we are particularly interested in whether there are significant school effects: many school effects would indicate that heteronormativity and heterosexism depend in large part on particular climate of the school. Very few school effects would indicate that heterosexism and heteronormativity are quite common across engineering programs in the US. Out of the eight school controls across the three climate measures, we find only two significant school differences: net of demographic controls, students at school 110 (large public in the northeast) and school 116 (large public school in the south) are more likely than students at school 114 (a small religiously-affiliated college) to report that faculty and students are sometimes condescending toward LGBTQ students. There is no other significant variation by school. This suggests that, although some schools have a slightly better or worse climate, these patterns are quite consistent across the eight schools in our sample.

Conclusions

The purpose of this paper was to present an initial report on a survey of engineering students across eight colleges. These data provide the first opportunity to systematically compare the experiences of LGBTQ-identifying individuals with their non-LGBTQ-identifying peers in the same engineering programs. Previous research has either looked qualitatively at a small number of students at a single university or at LGBTQ-only students across multiple universities. While these studies pioneered this area of research and pointed to several theoretical and empirical patterns that are central to this and other research on heterosexism and heteronormativity in engineering, they cannot provide information on the experiences of LGBTQ students *relative to* their non-LGBTQ classmates. Such an analysis allows us to pinpoint specific inequalities as they are generally understood in social science and engineering education literatures.

We identified four such domains of inequality. First, we found that LGBTQ students are significantly more likely than non-LGBTQ students to report marginalization in their engineering programs. Not only do they feel less accepted and more ignored, but they feel less comfortable joining existing social events among their classmates.

Second, LGBTQ students are less likely than their peers to feel that their work as engineering students is respected. So, not only is LGBTQ inequality an issue of *social* isolation, but of *professional* devaluation as well. This resonates with qualitative research that shows that LGBTQ students feel they have to give “110%” to be taken seriously [4]. Third, our findings suggest that these difficulties take their toll on LGBTQ students personally: compared to their peers, LGBTQ students are significantly more likely to report emotional, sleeping, and stress difficulties and are more likely to feel exhausted by efforts to compartmentalize their lives.

Finally, we investigated three indicators of chilly climate for LGBTQ persons and examined the extent to which these varied by school. Although our schools range from top-ranked engineering programs at public institutions to small, religiously-affiliated private schools, there was surprisingly little variation in the climate for LGBTQ persons across these schools. This suggests that these issues of LGBTQ inequality are part of the general *culture of engineering*. Validating previous theoretical, ethnographic, and interview-based research [4,17,18], the general lack of variation across schools suggests that heteronormativity and homophobia are part of the cultural practices and meanings of engineering education more broadly, not just manifestations of the climate of individual programs.

These findings support previous research by corroborating the findings about the negative experiences of LGBTQ students. They also serve to motivate future research. Specifically, these results make clear the need to better understand the *mechanisms* of these inequalities—how they are perpetuated in informal interactions and through the engineering curriculum—and how best to *subvert* these patterns of heteronormativity and homophobia. What kind of actions on behalf of students and faculty (LGBTQ and non-LGBTQ alike) can push back on these patterns and best support sexual minority and non-cisgender students? What strategies are most effective to combat marginalization?

From a policy perspective, how can we best support LGBTQ students? Engineering college administrators and faculty might consider a number of approaches to improve the climate of their engineering programs for LGBTQ students. These can include “Safe Zone” trainings (offered at most universities, in person at ASEE annual meetings, and/or virtually ASEE webinars—e.g., <https://diversity.asee.org/lgbtq>) that educate students and faculty on appropriate language and inclusionary behaviors. Second, thinking carefully about language use in formal engineering program communication and information structures is important. For example, using “partner” instead of “spouse” or “husband/wife” and allowing students and faculty to designate—and be referred to by—their designated personal gender pronouns can be seemingly small but important steps in making LGBTQ persons feel more welcome. Third, fostering a zero-tolerance policy for homophobic and transphobic joking and commentary in engineering can mitigate some of the most blatant anti-gay and anti-trans sentiments that students encounter. Fourth, ensuring that a variety of underrepresented demographic categories, including LGBTQ status, are included in the non-discrimination statements in engineering faculty job ads, college application materials, and engineering course syllabi can be an important step to supporting and retaining LGBTQ students. Fourth, collaboration with and/or supporting membership in organizations for LGBTQ identifying individuals in STEM such as oSTEM (www.oSTEM.com) can help foster a warmer school culture for these students.

Finally, it is important to make visible to students individuals who are members of underrepresented groups that have “made it” in engineering. One of the most effective methods

for this is to ensure that openly LGBTQ persons are represented in colloquia and speaker series in engineering departments. This can also be done by profiling the work of diverse engineering alumni on departmental websites, brochures, and recruiting materials. The representation in these capacities of LGBTQ persons who have been successful in engineering sends a message to LGBTQ students that they, too, belong in engineering.

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Table 1: Means and Standard Deviations for Independent and Dependent Measures, for All Students and Separately by LGBTQ status (N=1,729)

Variable	ALL		LGBTQ Only		Non-LGBTQ Only		p
	Mean	SE	Mean	SE	Mean	SE	
LGBTQ	0.087	0.007	---	---	---	---	
Hispanic	0.037	0.005	0.079	0.023	0.034	0.005	
Asian	0.120	0.008	0.122	0.028	0.120	0.009	
Black	0.034	0.005	0.014	0.010	0.036	0.005	
White	0.835	0.009	0.878	0.028	0.831	0.010	
Native American/ Pacific Islander	0.017	0.003	0.017	0.012	0.017	0.003	
Other Racial/Ethnic group	0.018	0.003	0.014	0.010	0.018	0.004	
Woman	0.350	0.012	0.528	0.043	0.333	0.012	
SES	2.564	0.032	2.698	0.109	2.554	0.033	
First Generation Student	0.144	0.009	0.189	0.033	0.140	0.009	
Accepted by students in Dept	3.544	0.017	3.335	0.064	3.563	0.017	***
Avoided Social Event	2.036	0.026	2.524	0.104	1.991	0.027	***
Hided Personal Life	1.777	0.026	2.511	0.111	1.706	0.026	***
Treated as Equally Skilled Student	3.997	0.020	3.762	0.076	4.017	0.021	***
Students Respect Engr Work	4.056	0.019	3.842	0.079	4.076	0.019	***
Avoided Team or Project	1.967	0.029	2.510	0.106	1.918	0.030	***
Offensive Comments	2.567	0.034	3.137	0.127	2.516	0.035	***
Exhausted from Compartmentalized	2.149	0.032	2.547	0.116	2.115	0.034	***
Nervous	3.773	0.026	4.115	0.078	3.743	0.028	***
Depressed or Sad at School	2.444	0.032	3.072	0.113	2.386	0.033	***
Sleeping Troubles	2.552	0.030	2.871	0.107	2.524	0.031	**
LGBTQ Students face Veiled Hostility	2.193	0.023	2.439	0.087	2.170	0.023	**
Colleagues Condensing to LGBTQ Students	2.744	0.028	3.053	0.101	2.716	0.029	**
Witnessed mistreatment of LGBTQ student	0.092	0.008	0.359	0.043	0.067	0.007	***
School 101: Small, private school in the NE	0.029	0.004	0.022	0.012	0.030	0.004	
School 108: Large, public flagship in the NE	0.091	0.007	0.086	0.024	0.092	0.008	
School 109: Small Tech school in the Midwest	0.359	0.012	0.439	0.042	0.350	0.013	*
School 110: Large public in the NE	0.044	0.005	0.072	0.022	0.042	0.005	
School 114: Small Catholic school in the West	0.101	0.008	0.129	0.029	0.098	0.008	
School 116: Large public school in the South	0.092	0.007	0.079	0.023	0.094	0.008	
School 117: Large public flagship in the South	0.238	0.011	0.101	0.026	0.251	0.011	**
School 120: Mid-size public school in the NE	0.046	0.005	0.072	0.022	0.043	0.005	

Note: ***p<.001; ** p<.01; * p<.05 (two-tailed test)

Table 2: Regression Measures Predicting Marginalization Measures with LGBTQ Status and Controls (N=1,792)

Variable	Feel Accepted by Other Students			Avoided a Social Event with Classmates			Feel included in Invitations to Social Gatherings			Felt the Need to Hide Personal Life			Stayed Home from School b/c Didn't Feel Welcome		
	Coeff.		SE	Coeff		SE	Coeff.		SE	Coeff.		SE	Coeff.		SE
LGBTQ	-0.214	***	0.057	0.503	***	0.095	-0.330	***	0.094	0.813	***	0.093	0.318	***	0.052
Hispanic	-0.080		0.093	0.050		0.145	-0.078		0.141	-0.017		0.140	0.093		0.076
Asian	-0.154	**	0.059	0.219	*	0.088	-0.042		0.083	0.144		0.081	0.177	***	0.049
Black	-0.220	*	0.091	0.149		0.154	-0.052		0.144	-0.095		0.149	0.095		0.082
Native American/Pacific Islander	-0.035		0.137	0.184		0.206	-0.002		0.210	0.408	*	0.202	0.066		0.119
Other Racial/Ethnic Group	-0.277		0.143	0.051		0.199	-0.242		0.195	0.067		0.188	0.145		0.122
Woman	-0.124	***	0.034	0.226	***	0.056	-0.081		0.055	0.131	*	0.052	0.077	*	0.030
SES	0.010		0.013	0.002		0.021	-0.016		0.021	0.005		0.020	-0.003		0.011
First Generation Student	-0.010		0.049	0.010		0.076	-0.020		0.076	-0.060		0.072	0.060		0.041
School 101	-0.055		0.099	0.073		0.160	0.176		0.165	0.019		0.155	0.078		0.089
School 108	0.020		0.077	-0.110		0.114	-0.035		0.119	-0.077		0.112	-0.036		0.064
School 109	-0.038		0.064	-0.120		0.088	0.020		0.093	0.033		0.086	0.058		0.050
School 110	-0.155		0.090	0.053		0.143	-0.070		0.148	0.214		0.139	0.013		0.079
School 116	0.043		0.089	-0.278	*	0.111	-0.072		0.117	-0.133		0.108	-0.004		0.063
School 117	0.018		0.065	-0.121		0.093	-0.054		0.099	-0.082		0.091	0.088		0.053
School 120	0.032		0.084	-0.273	*	0.138	0.003		0.145	-0.090		0.136	0.012		0.078
Constant	3.617	***	0.067	1.990	***	0.098	3.574	***	0.103	1.659	***	0.097	1.060	***	0.056

Note: ***p<.001; ** p<.01; * p<.05 (two-tailed test); School 114 is the comparison category for institution; white is the comparison category for race/ethnicity; men and gender non-binary are the combined comparison category for women.

Table 3: Regression Measures Predicting Devaluation Measures with LGBTQ Status and Controls

Variable	Classmates Treat Me with Respect			My Work is Respected			Avoided Working with a Certain Team or on a Certain Project			Seen or Heard Offensive Comments in Engineering Spaces		
	Coeff.		SE	Coeff		SE	Coeff.		SE	Coeff.		SE
LGBTQ	-0.195	**	0.073	-0.212	**	0.068	0.575	***	0.100	0.441	***	0.117
Hispanic	-0.065		0.106	-0.013		0.104	-0.007		0.150	0.091		0.174
Asian	-0.112		0.062	-0.139	*	0.058	-0.004		0.093	0.056		0.105
Black	-0.031		0.114	-0.115		0.107	-0.171		0.155	0.131		0.191
Native American/Pacific Islander	-0.097		0.158	-0.153		0.151	0.451	*	0.223	0.417		0.257
Other Racial/Ethnic Group	-0.326		0.167	-0.021		0.161	0.063		0.206	0.182		0.257
Woman	-0.255	***	0.042	-0.153	***	0.040	0.274	***	0.060	0.627	***	0.069
SES	0.001		0.016	0.018		0.015	-0.018		0.023	0.037		0.025
First Generation Student	-0.082		0.058	-0.016		0.054	-0.016		0.080	0.008		0.093
School 101	-0.155		0.123	-0.237	*	0.116	0.045		0.175	0.066		0.201
School 108	-0.018		0.088	-0.077		0.082	-0.046		0.125	0.046		0.145
School 109	0.050		0.068	-0.008		0.063	0.056		0.097	0.247	*	0.112
School 110	-0.063		0.111	-0.037		0.103	-0.180		0.157	0.122		0.179
School 116	0.057		0.087	0.004		0.080	-0.203		0.122	-0.204		0.140
School 117	0.032		0.072	0.001		0.067	-0.050		0.103	0.008		0.119
School 120	-0.030		0.107	0.023		0.102	0.052		0.159	0.057		0.170
Constant	4.110	***	0.074	4.114	***	0.070	1.889	***	0.110	2.105	***	0.121

Note: ***p<.001; ** p<.01; * p<.05 (two-tailed test) School 114 is the comparison category for institution; white is the comparison category for race/ethnicity; men and gender non-binary are the combined comparison category for women.

Table 4: Regression Measures Predicting Personal Consequences with LGBTQ Status and Controls

Variable	Felt Exhausted from Spending Energy Keeping Personal/Professional Life Separate			Felt Nervous or Stressed			Felt Unhappy or Depressed at School			Had Trouble Sleeping to the Point that it Affected your Performance in/out of School		
	Coeff.		SE	Coeff		SE	Coeff.		SE	Coeff.		SE
LGBTQ	0.436	***	0.117	0.256	***	0.089	0.638	***	0.112	0.291	**	0.105
Hispanic	-0.115		0.173	0.008		0.135	-0.104		0.164	-0.017		0.164
Asian	0.255	*	0.105	-0.296	***	0.079	0.007		0.099	0.013		0.093
Black	0.226		0.183	-0.548	***	0.139	-0.121		0.171	0.084		0.163
Native American/Pacific Islander	0.292		0.253	0.188		0.194	0.282		0.251	0.481	*	0.228
Other Racial/Ethnic Group	0.070		0.231	-0.178		0.185	0.174		0.234	0.362		0.223
Woman	0.154	*	0.068	0.539	***	0.053	0.254	***	0.065	0.327	***	0.062
SES	0.013		0.026	0.018		0.020	0.013		0.025	-0.006		0.024
First Generation Student	0.024		0.090	0.074		0.073	-0.021		0.087	0.246	***	0.083
School 101	-0.027		0.197	0.068		0.154	0.105		0.191	0.089		0.183
School 108	0.016		0.142	0.007		0.110	0.011		0.137	0.136		0.131
School 109	0.016		0.110	0.105		0.085	0.174		0.107	0.208	*	0.101
School 110	0.339		0.174	0.160		0.135	0.259		0.169	0.137		0.162
School 116	0.121		0.137	-0.059		0.107	-0.019		0.133	0.086		0.127
School 117	0.121		0.117	0.187	*	0.091	0.146		0.113	0.187		0.108
School 120	-0.189		0.177	0.008		0.132	-0.042		0.175	0.012		0.161
Constant	1.924	***	0.128	3.470	***	0.095	2.164	***	0.121	2.233	***	0.112

Note: ***p<.001; ** p<.01; * p<.05 (two-tailed test); School 114 is the comparison category for institution; white is the comparison category for race/ethnicity; men and gender non-binary are the combined comparison category for women.

Table 5: Regression Models predicting School Climate Measures among LGBTQ Students Only (N=141)

Variable	LGBTQ Students Face Veiled Hostility			Some faculty and students seem condescending toward people who are LGBTQ			Have Witnessed Instances of Unfair Treatment toward LGBTQ Students		
	Coeff.		SE	Coeff		SE	Coeff.		SE
Hispanic	.198		.359	-.088		.447	.032		.192
Asian	.091		.289	.105		.358	-.112		.145
Black	-.653		.877	.402		1.060	-.328		.426
Native American/Pacific Islander	.442		.881	-.343		1.088	-.164		.430
Other Racial/Ethnic Group	.266		.711	-.070		.874	.619		.353
Woman	-.157		.189	.040		.234	.046		.095
SES	.019		.074	-.065		.092	.031		.038
First Generation Student	.222		.232	.242		.289	.063		.120
School 101	-.537		.578	.138		.718	-.015		.284
School 108	-.464		.401	.128		.491	.054		.211
School 109	-.152		.288	.659		.358	.141		.147
School 110	-.127		.439	1.186	*	.545	-.010		.231
School 116	.820		.422	1.668	**	.515	.249		.205
School 117	.158		.381	.140		.473	.172		.196
School 120	-.531		.414	-.050		.514	.038		.206
Constant	2.515	***	.360	2.042	***	.448	.158		.179

Note: ***p<.001; ** p<.01; * p<.05 (two-tailed test); School 114 is the comparison category for institution; white is the comparison category for race/ethnicity; men and gender non-binary are the combined comparison category for women.