Examining the Effect of Institutional Policies at BUSPH/BUMC on the Stress, Social Inclusion and Wellness of Sexual and Gender Minority Graduate Students
By Emily Assarian, Dieyna Drame, DL Lundberg, Sridevi Prasad

Abstract
Introduction: Sexual and Gender Minorities (SGM) in the US face discrimination, oppression and social stigma due to their sexual orientation and/or gender identity. Often, these have profound negative effects on their mental health and well-being. This study focused on Boston University School of Public Health (BUSPH) graduate SGM students, examining the association between their stress, social inclusion and existing institutional policies on the Boston University Medical Campus (BUMC). The overall study objective was to compare the differences in these outcomes between cisgender non-LGBTQ and SGM students.

Methods: A mixed methods study was conducted to assess two key outcomes. The primary outcome was to examine SGM and cisgender non-LGBTQ students’ perception of stress. The secondary outcome was to examine SGM and cisgender non-LGBTQ students’ perspectives of institutional policy changes. Multivariable linear regressions assessed the impact of predictors such as gender identity and sexual orientation on perceived stress. A multivariable logistic regression was performed to further identify predictors of a dichotomous perceived stress variable.

Results: The final analytic sample was made of 104 BUSPH graduate students, 21 of which self-identified as SGM. The multivariable logistic regression indicated that SGM students had 2.71 times the odds of having a higher stress score compared to cisgender non-LGBTQ students (p-value=0.155). Themes from the focus group and in-depth interviews included “lack of inclusive space, resources or representation”, “LGBTQ stress”, and a portrayal of BUSPH as “pretend liberal land.”

Discussion: Study results confirmed that SGM students experienced higher stress that could be reduced with more supportive policies for SGM students. On average, MPH students at BUSPH self-reported awareness of problems that SGM students encounter. Finally, BUSPH MPH students in both the discussions and the survey expressed their support for policy change in order to have a more inclusive campus.

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Introduction

In the US, sexual and gender minorities (SGM) face widespread discrimination, oppression, and social stigma due to their identities. The term, sexual and gender minority, encompasses individuals whose gender identity and sexual orientation vary from traditional norms present within society. Individuals who identify as sexual minorities include identities such as lesbian, gay or bisexual as opposed to heterosexual. Those who identify as a gender minority do not identify as cisgender and include identities such as transgender, gender non-conforming, genderqueer, intersex, or gender variant. It is important to note that terms and definitions for gender identities vary by individual and by region and have evolved over time.

The discrimination, oppression, and social stigma that SGM individuals face due to their identity has profound negative effects on their well-being and stress. Stigma acts at the structural and institutional levels to deny SGM individuals access to healthcare and exclude them from equal protections under the law which further perpetuates adverse physical and mental health outcomes. A report by the Institute of Medicine found that lesbian, gay and bisexual adults were more likely to experience anxiety disorders, depression and suicidal ideation compared to heterosexual adults. The National Transgender Discrimination Survey reported that 41% of adult, transgender and gender non-conforming respondents reported attempting suicide compared to the general population average of 1.6%. Rates increased if respondents had been bullied in school (51%) or lost their job due to bias (55%). In public spaces, one study reported that 65% of transgender study participants had experienced discrimination in public settings (transportation, retail, restaurants, public gatherings, and health care) within the past year. In another study, transgender and gender non-conforming participants aged 25-40 years old reported that they expected to encounter rejection and discrimination in public spaces with clear
gender markers or a binary system (public restrooms, lockers, and healthcare facilities), which increased their anxiety and stress levels and led to substance use coping strategies.7

On college campuses, experiences of subtle and blatant discrimination against SGM students are associated with lower self-esteem, higher perceived stress, and anxiety.8 Transgender undergraduate and graduate students are known to face exclusions in health care services and inadequacies within counseling services that fail to consider their specific needs.9 Encountering barriers to preventive services, transgender college students describe social anxiety, stress reduction, and self-esteem as a motivation for drinking more often than their cisgender peers and report more frequent drinking and more alcohol related blackouts and consequences.10

Institutional policies on campuses can act as a facilitator or barrier to SGM wellness. Lack of access to gender-appropriate bathrooms and campus housing is related to feelings of unsafety, low quality of life, and suicide among SGM students.11-13 As of 2017, less than one-tenth of pharmacy schools surveyed across the U.S. have gender-neutral or single-occupancy bathrooms available to students.14 Examples of proposed interventions to improve wellness among SGM students include such campus programing and resources as systems for changing names and pronouns on campus, enforcement of anti-discrimination policies, and active recruitment and representation of SGM individuals.15

Although previous studies have assessed anxiety and isolation among SGM individuals related to institutionalized stigma, significant gaps in knowledge remain. Most existing studies have utilized undergraduate students or US adults non-specific to graduate school as their populations. While graduate students tend to spend less time on their campuses overall, graduate school is a determining phase in an individual’s life that is often associated with stress.16
Emerging adulthood is also a critical time for sexual and gender identity development among SGM individuals as they explore their identities within their work, educational, and community environments and navigate heteronormative expectations about adulthood in dating, marriage, and parenthood. As such, there is a substantial need to better understand stress and isolation among SGM graduate students. Furthermore, it is unclear how institutional policies at graduate schools affect this population. In fact, previous literature has suggested that more research needs to be done on how institutional policies play a role in the discrimination of SGM students on campus and how administrators can improve upon these policies.

Considering these significant gaps in knowledge, this study aimed to assess the wellness and social inclusion of SGM graduate students in the MPH program at Boston University School of Public Health (BUSPH) and whether institutional policies have shaped these outcomes. More specifically, this mixed methods study explored the association between stress, social inclusion, and existing institutional policies for SGM students on the Boston University Medical Campus (BUMC). In this study, SGM was defined by self-identification as transgender or gender non-conforming (TGNC) or self-identification as a member of the LGBTQ community. Furthermore, close attention was paid to awareness about issues related to SGM and attitudes towards administrative policy changes in the BUSPH MPH student body. The overall objective of this study was to compare the differences in these outcomes between cisgender non-LGBTQ and SGM students.

**Methods**

*Study Design*

This mixed methods study assessed the impact of BUSPH institutional factors on the perceived stress and well-being of SGM students in comparison to cisgender non-LGBTQ
students. Quantitative and qualitative data were collected using a fifty-four question survey, a focus group, and four in-depth interviews. The survey was launched using Kobo Toolbox and collected information on demographic characteristics, perceived stress, social inclusion, and awareness of BUSPH institutional policies (see Annex III). The focus group was open to the general BUSPH MPH student body while the in-depth interviews were conducted with SGM students. The desired sample size for the focus group was 3-5 students, and the final focus group had five participants. At least one in-depth interview was planned, but a total of four in-depth interviews were conducted. The same interview guide was used for both the focus group and the in-depth interviews (see Annex III). The guide covered such themes as perceptions of BUSPH institutional policies, SGM representation on campus, and potential interventions for BUSPH space accommodations. Pilot tests of the questionnaire and interview guides were conducted among the GH 811: Applied Research Methods class as well as with the Boston University Center for Gender, Sexuality & Activism. Feedback from these pilot tests were incorporated into the questionnaire and interview guide before the final versions were launched.

Previous literature reported that 26-38% TGNC adults reported anxiety in comparison to 28.8% of the general population. In order to detect a 10% difference when comparing the proportion of TGNC students reporting anxiety versus non-TGNC students with 80% power and 95% confidence, we calculated a sample size of 412 students (Sup. Figure 1). Due to class restrictions in the scope of the research, non-probability convenience sampling was used for this study in an effort to maximize the number of participants given the restrictions. To ensure adequate representation of SGM students which was critical to this study, the research team partnered with BUSPH student organizations such as SPH Queer Alliance and Students of Color for Public Health in order to publicize the survey and recruit for the qualitative data collection.
The main inclusion criteria for this study was that respondents must be current BUSPH Master of Public Health students. Data were collected online, through Facebook BUSPH MPH groups and class email listservs, as well as in-person through tabling in the BUSPH Student Lounge and Crosstown Center and by visiting classes. Missing observations for the primary outcome of perceived stress were excluded from the final analytic sample.

Key Measures

Demographic Indicators

In order to determine the characteristics of respondents, several demographic questions were included such as the following: enrollment status (full vs. part time), residency status (domestic vs. international), race/ethnicity (Hispanic/Latinx, Non-Hispanic Black, Non-Hispanic White, All Other Identities), age, SES (defined by respondents’ personal income over past 12 months and parents’/childhood guardians’ income), gender identity (Cisgender, Transgender, and Non-binary), if respondents had friends or family who identify as transgender or gender non-conforming, and if respondents identified as members of the LGBTQ+ community.

SGM Status

The key explanatory variable used in this analysis is whether the respondent identified as a sexual or gender minority. This status was assessed through two questions on the quantitative survey regarding gender identity and self-reported membership in the LGBTQ+ community. Options for gender identity included Cisgender, Transgender, and Non-binary while options for membership in the LGBTQ+ community included yes or no. An SGM status indicator variable (1 vs 0) was created using the gender and LGBTQ+ membership variables. A respondent was considered to be a sexual or gender minority if they indicated that they were transgender or non-binary and/or if they indicated that they were a member of the LGBTQ+ community.
Perceived Stress

Respondents’ perceived stress levels were assessed through questions which utilized a 5- and 7-point Likert rating scale system. Participants were asked to rate their stress levels and the frequency with which they experienced feelings of anxiety over the past two weeks. For example, “While at BUSPH, how often have you felt nervous and ‘stressed’?” Response options for frequency ranged from never (1) to very often (5).

Satisfaction

Participants were also asked to report on their levels of satisfaction by rating their level of agreement with the provided statements on a 7-point Likert rating scale system. Some examples of statements included the following: “I am satisfied with my experience as a graduate student at BUSPH” and “Overall, I am satisfied my interactions with my professors.” Options for levels of agreement ranged from strongly disagree (1) to strongly agree (7).

Social Inclusion

Social inclusion was defined as students’ perceived connection to the BUSPH community, their experiences with BUSPH professors, and their experiences on the larger BU Medical Campus. Respondents’ feelings of social inclusion were assessed by utilizing a 5-point Likert Scale that asked them to rate the frequency with which the outlined statements of inclusion applied to them at BUSPH. Some examples of statements included the following: “How often have you felt that your presence was wanted on campus?” “I feel part of a group of friends at BUSPH”, and “My professors ask their students what their names and pronouns are”. Options for frequency ranged from never (1) to very often (5).
Awareness and Knowledge of Administrative Policies

Participants’ awareness and knowledge of both BUSPH administrative policies and general topics related to gender and sexual minorities were assessed using a 7-point Likert Scale. This scale asked participants to rate their level of agreement with the outlined statements. Some examples of statements included the following: “I am aware of institutional policies at BUSPH that specifically address the needs of gender and sexual minority students” and “I am aware of gender and sexual minority students and the problems/conflicts they face”. Options for level of agreement ranged from strongly disagree (1) to strongly agree (7).

Awareness and Perspectives of Institutional Policy Changes

In order to assess awareness and perspectives of BUSPH institutional policy changes, participants were asked to rate their level of agreement with the outlined statements. Some examples of statements included the following: “I am able to give directions to an all gender or gender-neutral bathroom on Boston University Medical Campus (BUMC)” and “I support the construction of new all gender or gender-neutral single-stall bathrooms on Boston University Medical Campus (BUMC)”. Options for level of agreement ranged from strongly disagree (1) to strongly agree (7).

Score Tabulation and Aggregation

Each question had a series of sub-statements that were each rated according to the 5-point and 7-point Likert scales. The meaning of a high score versus a low score varied based on the structure of the sub-statements in the question. For example, a high score for the perceived stress questions indicated a high level of stress while a low score indicated lower levels of stress. A high score for questions regarding social inclusion indicated that the respondent felt a strong connection with BUSPH while a low score indicated that the respondent felt little connection
with BUSPH. For BUSPH administrative policies related to gender and sexual minorities, a high score indicated greater knowledge and awareness of issues faced by students who identify as gender and sexual minorities both in general and specifically at BUSPH and the BU Medical Campus while a lower score indicated decreased awareness and knowledge. Finally, in terms of institutional policy changes, a higher score indicated an increased awareness and positive perspectives of BUSPH adopting inclusive institutional policies while a lower score indicated a decreased awareness and a more negative perspective.

For six sub-statements which spanned two Likert scale questions (coping with stress and professors use of gendered honorifics in class), the 5-point Likert scales were inverted so that 5 indicated a frequency of “Never” and 1 indicated a frequency of “Very Often”. This was done in an effort to keep the interpretation of the scale the same for every sub-statement that made up the survey questions.

All Likert scale sub-statements of survey questions were aggregated to create five continuous outcome variables. These outcome variables included the following: perceived stress, social inclusion, awareness of BUSPH policies related to SGM students, perspectives about BUSPH policy changes, and satisfaction at BUSPH. In order to aggregate sub-statements using different Likert scales (5-point vs 7-point), the 7-point scale values were condensed to a 5-point scale with the following values: Strongly Disagree = 1, Disagree = 1.67, Partially Disagree = 2.33, Neither Agree nor Disagree = 3, Partially Agree = 3.67, Agree = 4.33, Strongly Agree = 5. The Data Dictionary in Annex 3 provides a breakdown of the specific sub-statements that make up each of the five continuous outcome variables.
**Quantitative Analysis**

Descriptive statistics were calculated for demographic variables including age, race, enrollment status, residency, and socioeconomic status (personal income). For the bivariate analyses, two sample t-tests were conducted using the key explanatory variable of SGM status and each of the five continuous outcome variables. These outcome variables included perceived stress, social inclusion, awareness of BUSPH policies, perspectives about BUSPH policy changes, and overall satisfaction at BUSPH.

A series of multivariable regressions were used to assess the impact of predictors on perceived stress, inclusion and interactions between specific outcome variables. Two multivariable linear regressions were performed to assess the impact of predictors (SGM status, age, race/ethnicity, residency and personal income) on perceived stress and inclusion. Another multivariable linear regression was performed to identify predictors of perceived stress. This model included an interaction between SGM status and the policy awareness score to explore the impact of policy awareness on stress among SGM students. Using this model, individuals with differing SGM statuses and race/ethnicity identities and either a low policy awareness score or a high policy awareness score were constructed in order to generate predicted perceived stress scores. Finally, a multivariable logistic regression was performed to further explore predictors of perceived stress. The continuous perceived stress outcome variable was made into a dichotomous variable with stress scores from 3.5-5 as “High Stress” (top 20% of sample) and stress scores of 1-3.4 as “Low Stress” (bottom 80% of sample).

This study used KoboToolbox for data collection and R Studio for data analysis.18,21
Qualitative Analysis

This study included one focus group discussion and four in-depth interviews with BUSPH MPH students. The focus group consisted of five students that were recruited from the general student body regardless of their gender identity or affiliation with the LGBTQ+ community. The four in-depth interviews were conducted with BUSPH MPH students who identified as sexual and gender minorities. These four participants were recruited from the general student body as well as from the Queer Alliance at BUSPH, which is a student organization with members who are part of BUSPH’s SGM population. The de-identified focus group data were collected by two team members. One member was the primary facilitator while the other member took notes on their laptop. The in-depth interviews were conducted by two group members who each conducted the interviews in a one-on-one format. The interviewer asked questions and took notes on their computer during the interview. The data were then examined for recurring themes about awareness and knowledge of institutional policies related to sexual and gender minority students as well as feelings of stress and inclusion. Quotes, personal anecdotes and relevant information were used to emphasize students’ opinions and feelings about institutional policies as well as the link between stress and social inclusion at BUMC/BUSPH. Analysis of themes was performed using NVivo 11.22

Ethics

IRB approval was not needed for this research project as the criteria for course-related projects were met as determined by the Professor of the course. Sensitive information was not asked in survey questionnaire or focus groups and all data was collected anonymously to ensure confidentiality for each participant.
Results

Descriptive Statistics

After excluding observations that were missing the perceived stress outcome data, the final analytic sample was 104 BUSPH graduate students. 21 students were SGM and 83 were cisgender non-LGBTQ students (Table 1). The majority of students surveyed were 24-29 years (53.40%), non-Hispanic White (56.31%), full-time (81.55%), domestic residents (88.35%), and self-reported their personal income as less than $12,000 in the past year (51.46%). A similar pattern was found when comparing the demographic information of cisgender non-LGBTQ students and SGM students with the exception that there were more 18-23 year old SGM students (47.62%) than 24-29 (42.86%). Cisgender non-LGBTQ students had an average mean score of 2.74 (SD: 0.67) on the perceived stress scale. SGM students averaged 3.04 (SD: 0.59) with the total sample average score of 2.81 (SD: 0.66). SGM students had an average mean score of 3.66 (SD: 0.65) for perceived social inclusion whereas cisgender non-LGBTQ students had an average mean score of 3.81 (SD: 0.77). In the entire sample, the average mean score for social inclusion was 3.78 (SD: 0.75).

Bivariate Analyses

Bivariate analyses were performed by computing two sample t-tests on the association of students’ SGM status and the outcome variables of perceived stress, policy awareness, social inclusion, satisfaction, and opinions on policy change. Although statistical significance on the basis of a p-value <0.05 was not observed on any of the test results, the following results reflect the observed magnitude of effect.

On a scale from 1 - 5 with an overall score of 5 indicating high stress, SGM minority students had a higher average mean score of 3.04 (SD=0.59) compared to 2.75 (SD=0.67) for
cisgender non-LGBTQ students on the perceived stress scale (Sup. Figure 2), with a p-value of 0.064. Regarding BUSPH policy awareness where an overall score of 5 indicating that BUSPH had good policies for SGM students, the pattern was different (Sup. Figure 3). Cisgender non-LGBTQ students had a higher average mean score of 3.22 (SD=0.53) compared to 3.02 (SD=0.39) for SGM minority students, with a p-value of 0.066. Furthermore, on a scale from 1 - 5 with an overall score of 5 indicating high satisfaction, cisgender non-LGBTQ students had a higher mean average score of 3.78 (SD=0.61) compared to 3.58 (SD=0.54) for SGM minority students (Sup. Figure 4), with a p-value of 0.215. Additionally, on a scale from 1 - 5 with an overall score of 5 indicating high social inclusion, cisgender non-LGBTQ students had a higher mean average score of 3.81 (SD=0.77) compared to 3.66 (SD=0.65) for SGM minority students (Sup. Figure 5), with a p-value of 0.370. Finally, on a scale from 1 - 5 with an overall score of 5 indicating high support for policy change, minority SGM students had a higher mean average score of 4.19 (SD=0.67) compared to 4.05 (SD=0.83) for cisgender non-LGBTQ students (Sup. Figure 6), with a p-value of 0.424.

Two sample t-tests were also performed on the individual policy questions that were used to construct the mean policy awareness variable. Regarding support for construction of new all-gender or gender-neutral single stall bathrooms with an overall score of 5 indicating that students supported the construction of these bathrooms, there were differences between both groups. SGM minority students had an average mean score of 4.27 (SD=0.59) compared to 4.15 (SD=0.89) for cisgender non-LGBTQ students with a p-value of 0.467. For support for construction of new all-gender or gender-neutral multi-stall bathrooms with an overall score of 5 indicating that students supported the construction of these bathrooms, SGM minority students had an average mean score of 4.11 (SD=0.88) compared to 3.93 (SD=1.03) for cisgender non-
LGBTQ students with a p-value of 0.421. On a scale from 1-5 where 5 indicates support to change the signage for at least one existing bathroom from single sex to all-gender or gender-neutral, SGM students had a higher mean score of 4.21 (SD=0.69) compared to cisgender non-LGBTQ students who had a mean of 4.17 (SD = 0.90) with a p-value of 0.873. Additional statistics by SGM status on individual policy questions can be found in Sup. Table 1.

Multivariable Analyses

A multivariable logistic regression analysis was performed to identify predictors for high stress. High stress was characterized as individuals who had a perceived stress score greater than 3.5 (top 20% of the sample). SGM students had 2.71 (95% CI: 0.664, 11.003, p-value = 0.155) times the odds of having a high stress score when compared to cisgender non-LGBTQ students (Table 2). Students who identified as “All Other Identities” for their race/ethnicity were 3.25 (95% CI: 0.337, 76.528, p-value = 0.356) times more likely to have a high stress score.

Multivariable linear regression analyses were performed to characterize predictors for the perceived stress and perceived social inclusion outcomes. In the linear regression model for perceived stress, being a SGM student increased the predicted stress outcome by 0.31 units (Sup. Table 2, 95% CI: -0.003, 0.632, p-value = 0.052). Identifying as “All Other Identities” increased the predicted stress outcome by 0.33 units (95% CI: -0.169, 0.834, p-value = 0.192). In the model for perceived social inclusion, SGM status decreased social inclusion by 0.21 units (Table 3, 95% CI: -0.578, 0.162, p-value = 0.267). Identifying as “All Other Identities” for race/ethnicity increased the social inclusion score by 0.17 units (95% CI: -0.416, 0.753, p-value = 0.569).

To explore the impact of BUSPH policies on stress, a multivariable linear regression analysis was performed where SGM status interacted with the constructed policy awareness
variable. This variable measured students’ awareness of policies that were directed specifically for SGM students. Within this model, being a SGM student increased the predicted stress outcome by 1.48 units (Table 4, 95% CI: -1.009, 3.973, p-value = 0.240). Students that perceived BUSPH had good policies for SGM students had a predicted stress score that was 0.12 points lower (95% CI: -0.391, 0.152, p-value = 0.384). When SGM status was interacted with policy awareness, it was predicted that stress scores would be lowered by 0.39 units (95% CI: -1.202, 0.415, p-value = 0.336). For SGM students who have a high perception of policies specifically for them, the combined effect lowers their stress by 0.51 units.

This model was then used to generate predictions on the impact that improving BUSPH policies can have in lowering stress for SGM students. Identities were constructed such to contrast the effects of having differing race/ethnicity identities (Non-Hispanic White, Non-Hispanic Black, and All Other Identities), SGM status (SGM vs cisgender non-LGBTQ), and differing scores of policy awareness (low policy perception score of 1 vs high policy perception score of 5) had on predicted stress levels. In these predictions, residency status, age, and personal income quartiles were kept constant for all of the identities. The results from this prediction model are shown in Figure 1. The overall pattern is that having a higher perception of policies that are supportive for SGM students decreased predicted stress scores. For the “Other” identity SGM students (ID 1 & 6), predicted stress scores dropped from 4.54 (95% CI: 2.47, 6.62) to 2.49 (95% CI: 0.48, 4.50) when the policy awareness score increased to 5. For Non-Hispanic Black SGM students (ID 2 & 7), predicted stress scores dropped from 4.22 (95% CI: 2.13, 6.31) to 2.16 (95% CI: 0.09, 4.24). For Non-Hispanic White SGM students (ID 3 & 8), predicted stress scores dropped from 4.17 (95% CI: 2.11, 6.23) to 2.12 (95% CI: 0.12, 4.12). This was also found to be
the same for the two cisgender non-LGBTQ students (ID 4 & 5) where the predicted stress score dropped from 3.47 (95% CI: 2.03, 4.91) to 2.99 (95% CI: 1.57, 4.42).

Qualitative Themes

Across the general focus group discussion and the four in-depth interviews with SGM students, the following themes were present in all discussions: Lack of inclusive spaces, Disappointment regarding BUSPH’s “pretend liberal land”, Lack of resources, Support from Queer Alliance, LGBTQ stress, Gender-inclusive bathrooms, and Issues beyond bathrooms.

Lack of Inclusive Spaces

Almost all of the focus group participants and all of the interviewees expressed that inclusive spaces were not present on the BUSPH/BUMC campus. Focus group participants and interviewees spoke both about the lack of physical space as well as the lack of inclusive space in curricula and classes.

- SGM interviewee: “It shouldn’t be our job to provide our space. If we are here and they [BUSPH] want to be an inclusive space for all students, then they should be active in providing those spaces. It is not on the burden of the oppressed to provide the spaces ourselves.”

- SGM focus group participant: “It’s very difficult to find a safe space that’s on campus. There is no rainbow room like some universities have in their space. There’s no place you can go to where you can feel safe and be accepted.”

- SGM interviewee: “[In the core], we emphasize race but don’t talk about intersectionality.”
• SGM interviewee: “University is very diverse and focused on social justice but I don’t think they create spaces where people are encouraged to proclaim their identities...at BU, passing is encouraged.”

• SGM interviewee: “In the [course] materials, there’s not much on gay people or LGBTQ. And I’ve never heard anything in the course materials on gender non-conforming people.”

• SGM interviewee: “ICPH [Individual, Community, and Population Health – MPH core course] stance and some SSG [Sex, Sexuality & Gender] courses (a lot of my focus is on sexual reproductive health) is often presented in a way that is heteronormative or assuming partners are opposite sex.”

Disappointment regarding BUSPH’s “pretend liberal land”

All interviewees and some focus group participants expressed a feeling of disappointment regarding BUSPH’s “pretend liberal land”. The term was coined by one of the interviewees to express the fact that the school seems to care a lot about issues of inclusion on the surface level but does not make enough tangible actions regarding diversity and inclusion.

• SGM interviewee: “A lot of talk, not a lot of do. Disappointing! When I applied, I thought they were engaged in things, gender non-conforming, gender-neutral...At the School of Public Health [Talbot building in contrast to Crosstown Center and BU Medical Building], there are gender neutral restrooms. I feel kind of manipulated by the school every time I bring up concern to deans and administrators and they respond that they are going to get it done in two or three years…” 
• Non-SGM focus group participant: “I feel like the policies are surface-level because BUSPH often gives off the vibe that they are inclusive and do these things...We only have one building with all-gender restrooms on campus.”

• SGM interviewee: “[Regarding designated gender inclusive spaces], there is a general climate of inclusivity” and, “[regarding gender pronouns], In SSG [Sex, Sexuality & Gender] classes, we definitely talk about it in an academic sense or readings, but no one has asked about gender specific pronouns. If it had been asked, it would have been welcomed.”

• SGM interviewee: “I don’t see anything conclusive that suggests [BUSPH] is entirely gender inclusive...the lack of gender neutral bathrooms anywhere on the campus...that could be one way they show [gender inclusivity] but they don’t have those and it would be pretty easy to implement I think.”

• SGM interviewee: “As far as the SSG certificate, applied to BUSPH because it did present an image that health around SGM [Sexual & Gender Minorities] was something they took very seriously and they were willing to offer a certificate on it and there is a course on LGBT health but when I got here, it was very focused on women’s health and women’s rights.”

Lack of Resources

Focus group participants and interviewees all spoke about the lack of mental health resources available on the BUSPH/BUMC campus. The majority of the focus group participants all spoke to the lack of advertisement of mental health resources and the difficulty in trying to access resources.
• SGM interviewee: “I hear more about the boat cruise than any resources that have any meaning.”

• Non-SGM focus group participant: “Especially for being a school with a lot of money, it’s so disturbing that you can only get services once a month and only if it’s dire.”

• SGM interviewee: “I think they half ass it. Sometimes they have that destress yoga and sometimes during mental health awareness day or National Public Health Week, the health management students association have a billboard of how you destress and you write it on a sticky note. But really what is that doing?”

Queer Alliance

All of the focus group participants and interviewees spoke about the student group, SPH Queer Alliance, as a student-led space available to SGM students.

• SGM interviewee: “Queer alliance are people who are open. Not everyone has that comfort. Not everyone has the comfort of being out in the open.”

• SGM interviewee: “That’s definitely a space that I think is non-judgmental…I think it’s really welcoming.”

LGBTQ Stress

Most interviewees and participants mentioned that they think that TGNC and LGBTQ+ students face different sources of stress on campus compared to other students.

• SGM focus group participant: “We just talked about all of the stressors of being a grad student and a grad student at BU in this microcosm. And it’s also being in a space where you don’t feel welcome; a simple thing as going to the restroom one time can be a whole ordeal and it’s not great.”
• SGM focus group participant: “I’ve been playing with my gender over the last few months. And it takes a lot to dress how I want to and how I’m going to present. And, analyzing how I’m going to dress to class one day so my gender could be expressed on top of dealing with class and everything that comes with it.”

Gender-Inclusive Bathrooms

Interviewees and focus group participants elaborated on why they thought there were no gender-inclusive bathrooms on the medical campus, other than the ones in Talbot.

• SGM focus group participant: “I don’t think it is a priority of BU or what they think students do in general. If you think about the funding or how extravagant the career fair is or the speed dating job fair alumni thing and how much money they put into that with free food and open bar. You see how much money they put towards selling the university and making sure they look good.”

• SGM focus group participant: “[BUSPH administrators] also leverage that we cycle through here quickly. They know we’re not going to be here for that long so they leverage that to not get stuff done.”

• SGM interviewee: “BUSPH says cost-effectiveness. I think it’s ingrained transphobia.”

• Non-SGM focus group participant: “I don’t want to provide an excuse so maybe it’s a capacity issue with the number of students.”

Issues Beyond Bathrooms

When asked about last remarks, many ideas were brought up but the following were agreed upon in the focus group discussion and one SGM interviewee shared an interesting point.

• SGM focus group participant: “For trans and gender non-conforming students, a lot of people fixate on bathrooms. While it’s important, it’s not the only thing that trans and
gender non-conforming students need. It’s way outside of just having a bathroom space to use.”

- SGM interviewee: “Generally BU as a whole does not have a resource center for LGBT students...there are no university led programming specific to LGBTQ+ students.”

Discussion

*Perceived Stress, Inclusion & Satisfaction by SGM Status*

In this study, 21 (20.19%) of the 104 participants were SGM students (Table 1). On average, these students reported higher perceived stress than cisgender non-LGBTQ students. Although these results were not statistically significant due to the limited sample size (p-value = 0.155), SGM students had 2.71 times the odds of having a high stress score when compared to cisgender non-LGBTQ students (Table 2). SGM students also had a lower score for social inclusion compared to cisgender non-LGBTQ students (Table 3). Previous literature has established that experiences of subtle and blatant discrimination contribute to higher stress among SGM students on college campuses.\(^7\)\(^-\)\(^8\) The results of this study appear to confirm this phenomenon on the BUMC campus. SGM graduate students in the MPH program at BUSPH experienced higher perceived stress than cisgender non-LGBTQ students. Furthermore, SGM student stress was related to BUSPH administrative policies. A multivariable linear regression model found that SGM students who had higher awareness of BUSPH policies that were specifically designed to support them had lower stress levels (Table 4). This model also predicted that having a higher perception of policies that specifically support SGM students decreased predicted stress scores across race/ethnicity (Figure 1). Thus, this study suggests that improving BUSPH policies at an administrative level for SGM students can lower stress for SGM students.
Student Awareness of SGM Policies & Attitudes about Policy Changes

This study also assessed student awareness at BUSPH about existing policies that support the well-being and social inclusion of SGM students and student attitudes about policy changes (Sup. Table 1). About half of MPH students at BUSPH self-reported awareness about problems that SGM students encounter. The majority of students reported agreement with the statement that professors use gendered honorifics in class and reported disagreement that professors typically ask students for their names and pronouns. In other contexts, frequent misgendering of TGNC individuals has previously been associated with psychological distress.23 Only 7% of students at BUSPH agreed that they were aware of institutional policies supporting SGM students. Lastly, although about 40% of cisgender non-LGBTQ students agreed that BUSPH is a welcoming space for SGM students and views their health and well-being as a priority, less than 15% of SGM students agreed with these statements. This indicates that SGM students in the MPH program at BUSPH are unsure if the administration views their health, well-being and safety as a priority.

Regarding bathrooms, only 14% of students at BUSPH reported their ability to direct an SGM student to a gender-neutral bathroom. This finding indicates a lack of easily accessible gender-neutral bathrooms on BUMC campus and/or a lack of awareness about their locations. Majority of students at BUSPH expressed agreement that making gender neutral bathrooms accessible to students is important and supported changing signage on single-sex bathrooms to gender-neutral signage. They also supported construction of single-stall, gender-neutral bathrooms and 54% of students reported agreement with constructing multi-stall, gender-neutral bathrooms. Majority of SGM students expressed agreement with multi-stall, gender-neutral bathrooms.
Priorities Expressed by SGM Students during Focus Groups & Interviews

All interviewees and some focus group participants referenced disappointment in BUSPH’s “pretend liberal” policies. This term was introduced by an interviewee to refer to the disconnect between student expectations about inclusion and the reality, which is a lack of tangible actions for inclusion of SGM students. One interviewee expressed that “policies are surface level because BUSPH often gives off the vibe that they are inclusive.” Other students confirmed this statement, “There is a general climate of inclusivity” but “A lot of talk, not a lot of do”. The lack of inclusive spaces or resources on campus was also brought up unanimously across discussions with students reporting that “it is very difficult to find a safe space that’s on campus” and that “It is so disturbing that you can only get services once a month and only if it’s dire.”

Regarding LGBTQ stress, most students found that transgender and gender non-conforming and LGBTQ students experienced different sources of stress on campus compared to other students. While gender-inclusive restrooms were mentioned on multiple occasions as a source of stress, the following was shared by an interviewee and was agreed upon during the focus group: “While [bathrooms are] important, it’s not the only thing that trans and gender non-conforming students need. It’s way outside of just having a bathroom space to use.”

Strengths and Limitations

The strengths of this study were the utilization of a mixed methods design which enabled the exploration of the research question using qualitative and quantitative data. The qualitative themes provided context to the quantitative data collected. Also, this study focused on SGM graduate students, a population which has not been extensively studied. The limitations in this study were the small sample size, which may have been the reason that most of the association
between the two groups were not statistically significant. Additionally, the SGM subgroup only had 21 students and therefore, the findings in this paper may not be generalizable to the SGM student population at BUSPH. Certain demographic characteristics, such as race/ethnicity, were grouped into broad categories which did not allow for the exploration of specific intersectional identities that may be predictors of stress. By collapsing categories, this may have led to residual confounding being present from other uncharacterized predictors of stress that were not accounted for in this analysis.

**Conclusion**

Although the small sample size limited the statistical significance of the analyses, the results of this project demonstrate potential evidence for the impact of BUSPH/BUMC administrative policies on the feelings of stress and social inclusion among BUSPH MPH students who are sexual and gender minorities. These findings could be used to draw the attention of Boston University administrators to the fact that the environment fostered by institutional policies affects the health and well-being of their students. Furthermore, these results suggest that research should be formally conducted to examine not only the effect of BU institutional policies on the feelings of stress and inclusion among sexual and gender minority students, but to also expand this examination beyond what was assessed in this project. By taking steps to “practice what they preach,” Boston University can create an optimal environment to support SGM students by devoting the resources necessary to make all their campuses safe and meaningfully inclusive.
References
15. Seelman KL. Recommendations of transgender students, staff, and faculty in the USA for


Annexes

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<tr>
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### Table 1: Descriptive Statistics Stratified by Sexual and Gender Minority Status

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<td>18-23 years</td>
<td>27 (32.93)</td>
<td>10 (47.62)</td>
<td>37 (35.92)</td>
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<tr>
<td>24-29 years</td>
<td>46 (56.10)</td>
<td>9 (42.86)</td>
<td>55 (53.40)</td>
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<td>30 years and more</td>
<td>9 (10.98)</td>
<td>2 (9.52)</td>
<td>11 (10.68)</td>
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<td><strong>Race/Ethnicity, n (%)</strong></td>
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<td>2 (9.52)</td>
<td>10 (9.71)</td>
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<td>6 (7.23)</td>
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<td>8 (7.77)</td>
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<td><strong>Enrollment Status, n (%)</strong></td>
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<td>Full-time</td>
<td>64 (77.11)</td>
<td>20 (95.24)</td>
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<td>Part-time</td>
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<td>19 (18.45)</td>
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<td><strong>Residency, n (%)</strong></td>
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<tr>
<td>Domestic</td>
<td>72 (87.95)</td>
<td>19 (90.48)</td>
<td>91 (88.35)</td>
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<td>International</td>
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<td>Quartile 1</td>
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<td>10 (47.62)</td>
<td>53 (51.46)</td>
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<td>Quartile 2</td>
<td>8 (9.76)</td>
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<td>10 (9.71)</td>
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<td>9 (10.98)</td>
<td>1 (4.76)</td>
<td>10 (9.71)</td>
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<td>6 (7.32)</td>
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<td>16 (19.51)</td>
<td>7 (33.33)</td>
<td>23 (22.33)</td>
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<td>2.74 (0.67)</td>
<td>3.04 (0.59)</td>
<td>2.81 (0.66)</td>
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<td><strong>Perceived Inclusion</strong>*, mean (SD)**</td>
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<td>3.81 (0.77)</td>
<td>3.66 (0.65)</td>
<td>3.78 (0.75)</td>
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Notes: *Personal Income was measured by self-report of annual income within past year: Quartile 1 (less than $12,000); Quartile 2 ($12,000-$25,000); Quartile 3 ($25,000-$50,000); Quartile 4 ($50,000 and up)

**Perceived Stress questions were measured on a scale from 1 - 5 with an overall tabulated score of 5 indicating high stress

***Perceived Inclusion questions were measured on a scale from 1-5 with an overall score of 5 indicating a high sense of social inclusion
Table 2: Multiple Logistic Regression of Perceived High Stress with SGM Status

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<th>Adj. 95% CI</th>
<th>Adj. P-value</th>
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<td>SGM Minority Status</td>
<td>2.71</td>
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<td><strong>Age</strong></td>
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<td>24-29 years</td>
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<td>(0.300, 6.119)</td>
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<td>Non-Hispanic Black</td>
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<td>(0.004, 42.545)</td>
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<td>Non-Hispanic White</td>
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<td>International</td>
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<td>(1.1<em>10^-174, 3.19</em>10^34)</td>
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<td>0.43</td>
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*Interaction of SGM Minority Status with the mean policy awareness score; **indicates p-value <0.05; ***Personal Income was measured by self-report of annual income within past year: Quartile 1 (less than $12,000); Quartile 2 ($12,000-$25,000); Quartile 3 ($25,000-$50,000); Quartile 4 ($50,000 and up)
Table 3: Multiple Linear Regression of Perceived Social Inclusion with SGM Status

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<tr>
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<td><strong>Age</strong></td>
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<td>18-23 years (Ref)</td>
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<td>24-29 years</td>
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*Personal Income was measured by self-report of annual income within past year: Quartile 1 (less than $12,000); Quartile 2 ($12,000-$25,000); Quartile 3 ($25,000-$50,000); Quartile 4 ($50,000 and up)
Table 4: Multiple Linear Regression of Perceived Stress with SGM Status interacted with Policy Awareness

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<td>SGM Minority Status and Policy Awareness*</td>
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<td>24-29 years</td>
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<td>Quartile 3</td>
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<td>(-0.151, 1.071)</td>
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<td>Quartile 4</td>
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<td>(-0.710, 0.469)</td>
<td>0.685</td>
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*Interaction of SGM Minority Status with the mean policy awareness score; **indicates p-value <0.05; ***Personal Income was measured by self-report of annual income within past year: Quartile 1 (less than $12,000); Quartile 2 ($12,000-$25,000); Quartile 3 ($25,000-$50,000); Quartile 4 ($50,000 and up)
Annex II: Figures

Figure 1. Predicted Stress Scores by SGM Status and Policy Awareness Scores

*All individuals had their residency, age group, and personal income kept constant.

**ID 1: Other race/ethnicity, SGM, low policy score of 1

***ID 2: Non-Hispanic Black, SGM, low policy score of 1;

****ID 3: Non-Hispanic White, SGM, low policy score of 1;

*****ID 4: Non-Hispanic White, non-SGM, low policy score of 1;

******ID 5: Non-Hispanic White, non-SGM, high policy score of 5;

*******ID 6: Other race/ethnicity, SGM, high policy score of 5

********ID 7: Non-Hispanic Black, SGM, high policy score of 5

*********ID 8: Non-Hispanic White, SGM, high policy score of 5
# Annex III: Supplementary Materials

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<td>5. Qualitative Interview Guide</td>
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<td>6. Quantitative Data Dictionary</td>
<td>19-22</td>
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<tr>
<td>7. R Markdown Script</td>
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**Supplementary Table 1.** Student Awareness of Policies for SGM Students at BUSPH and Attitudes about Policy Changes

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<th>Individual Policy or Policy Change Proposal</th>
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<th>SGM Students n=21</th>
<th>Cisgender, Non-LGBTQ Students n=83</th>
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<td>Proportion of Agreement</td>
<td>Proportion of Agreement</td>
</tr>
<tr>
<td>Professors use gendered honorifics in class</td>
<td>72 (68.93)</td>
<td>11 (52.4)</td>
<td>60 (73.2)</td>
</tr>
<tr>
<td>Students discussed transgender topics in class</td>
<td>27 (26.21)</td>
<td>7 (33.3)</td>
<td>20 (24.4)</td>
</tr>
<tr>
<td>Professors ask student for their names &amp; pronouns</td>
<td>17 (16.50)</td>
<td>4 (19.0)</td>
<td>13 (15.9)</td>
</tr>
<tr>
<td>Aware of GSM students and their problems</td>
<td>54 (52.43)</td>
<td>12 (57.1)</td>
<td>42 (51.2)</td>
</tr>
<tr>
<td>BUSPH is a welcoming place for GSM students</td>
<td>36 (34.95)</td>
<td>3 (14.3)</td>
<td>33 (40.2)</td>
</tr>
<tr>
<td>Comfortable explaining meaning of transgender</td>
<td>48 (47.06)</td>
<td>12 (60.0)</td>
<td>36 (43.9)</td>
</tr>
<tr>
<td>Awareness of institutional policies to support GSM students</td>
<td>7 (6.86)</td>
<td>1 (4.76)</td>
<td>6 (7.41)</td>
</tr>
<tr>
<td>Health and safety of GSM students is priority at BUSPH</td>
<td>23 (22.55)</td>
<td>1 (4.76)</td>
<td>22 (27.2)</td>
</tr>
<tr>
<td>TGNC representation in recruitment and publicity</td>
<td>12 (11.76)</td>
<td>3 (14.3)</td>
<td>9 (11.1)</td>
</tr>
<tr>
<td>Able to give directions to gender-neutral bathrooms at BUSPH</td>
<td>14 (13.73)</td>
<td>1 (5.0)</td>
<td>13 (15.9)</td>
</tr>
<tr>
<td>Making gender-neutral bathrooms accessible is important</td>
<td>56 (54.90)</td>
<td>13 (65.0)</td>
<td>43 (52.4)</td>
</tr>
<tr>
<td>Support for single-stall gender-neutral bathrooms</td>
<td>65 (64.36)</td>
<td>14 (66.7)</td>
<td>51 (63.8)</td>
</tr>
<tr>
<td>Support for multi-stall gender-neutral bathrooms</td>
<td>56 (54.90)</td>
<td>12 (57.1)</td>
<td>44 (54.3)</td>
</tr>
<tr>
<td>Support changing signage from single-sex to gender-neutral</td>
<td>67 (65.69)</td>
<td>14 (66.7)</td>
<td>53 (65.4)</td>
</tr>
</tbody>
</table>

*Agreement is indicated by scores greater than or equal to 4 (on a scale of 1-5) with disagreement being any score less than 4*
**Supplementary Table 2.** Multiple Linear Regression of Perceived Stress with SGM Status

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Adjusted Coefficient</th>
<th>Adjusted 95% CI</th>
<th>Adj. P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SGM Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cisgender Non-LGBTQ (Ref)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SGM Minority Status</td>
<td>0.31</td>
<td>(-0.003, 0.632)</td>
<td>0.052</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-23 years (Ref)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>24-29 years</td>
<td>0.05</td>
<td>(-0.247, 0.343)</td>
<td>0.749</td>
</tr>
<tr>
<td>30 years and above</td>
<td>0.19</td>
<td>(-0.327, 0.697)</td>
<td>0.474</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latinx (Ref)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>0.04</td>
<td>(-0.580, 0.662)</td>
<td>0.895</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>-0.04</td>
<td>(-0.487, 0.399)</td>
<td>0.844</td>
</tr>
<tr>
<td>All Other Identities</td>
<td>0.33</td>
<td>(-0.169, 0.834)</td>
<td>0.192</td>
</tr>
<tr>
<td><strong>Residency</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic (Ref)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>International</td>
<td>-0.18</td>
<td>(-0.624, 0.260)</td>
<td>0.415</td>
</tr>
<tr>
<td><strong>Personal Income</strong>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quartile 1 (Ref)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Quartile 2</td>
<td>0.19</td>
<td>(-0.252, 0.632)</td>
<td>0.396</td>
</tr>
<tr>
<td>Quartile 3</td>
<td>0.61</td>
<td>(0.149, 1.066)</td>
<td>0.010*</td>
</tr>
<tr>
<td>Quartile 4</td>
<td>-0.14</td>
<td>(-0.725, 0.437)</td>
<td>0.624</td>
</tr>
</tbody>
</table>

*indicates p-value <0.05; **Personal Income was measured by self-report of annual income within past year: Quartile 1 (less than $12,000); Quartile 2 ($12,000-$25,000); Quartile 3 ($25,000-$50,000); Quartile 4 ($50,000 and up)
Supplementary Figure 1. Determination of Sample Size Needed to Detect Differences in Population Means
Supplementary Figure 2. Boxplot of Perceived Stress by SGM Status
Supplementary Figure 3. Boxplot of Policy Awareness by SGM Status
**Supplementary Figure 4.** Boxplot of Satisfaction by SGM Status
**Supplementary Figure 5.** Boxplot of Social Inclusion by SGM Status
Supplementary Figure 6. Boxplot of Policy Change Support by SGM Status
Quantitative Survey

4/15/2018

Survey of BUSPH Students for GH811 Course

This survey is being administered as part of the GH811 Applied Research Methods course in the MPH Program at the BU School of Public Health. The purpose of this survey is to explore institutional policies at BUSPH/BUMC and their impact on stress levels and well-being among cisgender students, TGNC (transgender and gender non-conforming) students, and students who identify with the LGBTQ+ community at BUSPH. Your responses are anonymous.

<table>
<thead>
<tr>
<th>What is your enrollment status at BUSPH?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Part-Time</td>
</tr>
<tr>
<td>☐ Full-Time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Which best describes your student status at BUSPH?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ International Student</td>
</tr>
<tr>
<td>☐ Domestic Student</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Which race/ethnicity group do you identify as?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Hispanic/Latinx</td>
</tr>
<tr>
<td>☐ Non-Hispanic Black</td>
</tr>
<tr>
<td>☐ Non-Hispanic White</td>
</tr>
<tr>
<td>☐ All Other Identities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What is your age group?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ 18 - 23 years old</td>
</tr>
<tr>
<td>☐ 24 - 29 years old</td>
</tr>
<tr>
<td>☐ 30-39 years old</td>
</tr>
<tr>
<td>☐ 40 years old and above</td>
</tr>
</tbody>
</table>
Which of these categories best describes your own personal income for the past 12 months?

- Less than $5,000
- $5,000 through $11,999
- $12,000 through $15,999
- $16,000 through $24,999
- $25,000 through $34,999
- $35,000 through $49,999
- $50,000 through $74,999
- $75,000 through $99,999
- $100,000 and greater
- Don't Know
- Prefer Not to Respond

Which of these categories best describes your parents' or childhood guardians' household income?

- Less than $17,999
- $18,000 through $34,999
- $35,000 through $99,999
- $100,000 through $349,999
- $350,000 and greater
- Don't Know
- Prefer Not to Respond

Do you consider yourself a member of the Lesbian, Gay, Bisexual, Transgender, Queer and other sexual and gender identities (LGBTQ+) community?

- Yes
- No

What is your current gender?

- Cisgender
- Transgender
- Non-binary
Do you have family and/or friends who are transgender or gender non-conforming?
- Yes
- No
- Unsure

| Please rate your responses to the following statements about your experiences with BUSPH professors. |
|--------------------------------------------------|------------------|---------------|-------------|-------------|-------------|
|                                                          | Never | Almost Never | Sometimes | Fairly Often | Very Often |
| My professors call on students using gendered honorifics (Mr., Mrs., Miss, sir, ma’am). |       |               |            |             |             |
| I have discussed transgender and gender non-conforming topics in class. |       |               |            |             |             |
| My professors ask their students what their names and pronouns are. |       |               |            |             |             |

| Please rate your responses to the following questions about your experiences on the BUMC campus. |
|--------------------------------------------------------------------------------------------------|------------------|---------------|-------------|-------------|-------------|
|                                                                                                  | Never | Almost Never | Sometimes | Fairly Often | Very Often |
| Since you joined BUSPH, how often have you felt at ease socially around your colleagues?       |       |               |            |             |             |
| Since you joined BUSPH, how often have you felt welcome at events hosted by the school?        |       |               |            |             |             |
| How often have you felt that your presence was wanted on campus?                               |       |               |            |             |             |
| How often did you feel at ease socially on campus?                                              |       |               |            |             |             |

| Please rate your responses to the following questions about your stress level at BUSPH in the last two weeks. |
|--------------------------------------------------------------------------------------------------|------------------|---------------|-------------|-------------|-------------|
|                                                                                                  | Never | Almost Never | Sometimes | Fairly Often | Very Often |
| While at BUSPH, how often have you been upset because of something that happened unexpectedly? |       |               |            |             |             |
| While at BUSPH, how often have you felt nervous and “stressed”?                                 |       |               |            |             |             |
| While at BUSPH, how often have you felt that you were effectively coping with important changes? |       |               |            |             |             |

https://be.kobota.box.org/#/yhx5
<table>
<thead>
<tr>
<th>Question</th>
<th>Never</th>
<th>Almost Never</th>
<th>Sometimes</th>
<th>Fairly Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>While at BUSPH, how often have you felt confident about your ability to handle your problems?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>While at BUSPH, how often have you felt that things were going your way?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>While at BUSPH, how often have you felt that you were on top of things?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>While at BUSPH, how often have you been able to control the way you spend your time?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Over the last two weeks, how often have you been bothered by the following problems?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling nervous, anxious or on edge</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Continuously worrying without being able to stop</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Having trouble relaxing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Becoming easily annoyed or irritable</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Feeling afraid as if something awful might happen</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Not being able to sleep due to worry</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Please rate how often over the last two weeks these statements apply to you.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel in tune with other students at BUSPH.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel part of a group of friends at BUSPH.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I have a lot in common with other students at BUSPH.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>There are people I can talk to at BUSPH.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>There are people I can turn to at BUSPH.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Please provide your level of agreement with the following statements.</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Partially Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Partially Agree</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------</td>
<td>---------</td>
<td>--------------------</td>
<td>---------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>I am aware of gender and sexual minority students and the problems/conflicts they face.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>BUSPH is a welcoming environment for gender and sexual minority students.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel comfortable explaining the meaning of the word &quot;transgender&quot; or &quot;gender non-conforming&quot; to someone at BUSPH.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Please provide your level of agreement with the following statements.</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Partially Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Partially Agree</td>
</tr>
<tr>
<td>I am aware of institutional policies at BUSPH that specifically address the needs of gender and sexual minority students.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>BU views the safety and health of its gender and sexual minority students as a priority.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Transgender and gender non-conforming students are represented in BUSPH recruitment and campus publicity efforts.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Please provide your level of agreement with the following statements.</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Partially Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Partially Agree</td>
</tr>
<tr>
<td>On the whole, I am satisfied with myself.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I feel that I have a number of good qualities.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I take a positive attitude towards myself.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Please provide your level of agreement with the following statements.</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Partially Disagree</td>
<td>Neither Agree nor Disagree</td>
<td>Partially Agree</td>
</tr>
<tr>
<td>I am able to give directions to an all gender or gender-neutral bathroom on the BU Medical Campus.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>It is important to me that BUSPH makes all gender or gender-neutral bathrooms easily accessible to students on the BU Medical Campus.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Team EDDD (Group C)
DL, EA, NDD, SKP

Survey of BUSPH Students for GH611 Course

<table>
<thead>
<tr>
<th>Please provide your level of agreement with the following statements.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Partially Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Partially Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I support the construction of new all gender or gender-neutral single-stall bathrooms on the BU Medical Campus.</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I support the construction of new all gender or gender-neutral multi-stall bathrooms on the BU Medical Campus.</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I support changing signage to at least one existing bathroom on the BU Medical Campus from single-sex to all gender or gender-neutral.</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please provide your level of agreement with the following statements.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Partially Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Partially Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am satisfied with my experience as a graduate student at BUSPH.</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall, I am satisfied with my interactions with my professors.</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am satisfied with my interactions with BU Medical Campus staff.</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am satisfied with my interaction with other students.</td>
<td>○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you have any feedback about the survey, please let us know using the text box below.

Please also find a well-being resource list from BU Student Health Services at the link here: [http://www.bu.edu/shs/getting-started/resources-for-well-being/](http://www.bu.edu/shs/getting-started/resources-for-well-being/)

Thank you for participating in our survey! We appreciate your input. If you have any questions about the survey or the study project, please contact us at the following email addresses: lundberg@bu.edu, nddrame@bu.edu, srisedi@bu.edu, cassaria@bu.edu.
Study Title: The Effect of Institutional Policies at BUSPH/BUMC on the Stress, Isolation and Well-being of students who identify as TGNC or LGBTQ+

GH811 Team: EDDD
Team Members: DL, EA, NDD, SKP

Qualitative Interview Guide
(30 Minutes)

Target Populations:
Focus Group 1: 3-5 students who identify as TGNC* or LGBTQ+**
Focus Group 2: 3-5 students from the general BUSPH student body

Definitions for starred terms are included at the bottom of the interview guide and will be posted in the focus group room for reference.

Introduction ~5 minutes
• Greeting: Thank participants for volunteering to take part in the focus group discussion.
• Introduce ourselves as BUSPH students in the GH811 Course
• Purpose:
  o We hope to explore how institutional policies at BUSPH/BUMC contribute to stress levels and feelings of social isolation among TGNC (transgender and gender non-conforming students) and students who identify with the LGBTQ+ community at BUSPH. By talking with you today, we hope to learn more about your knowledge of BUSPH/BUMC policies that address the specific needs of these students. Also, we hope to discover how these policies, or lack thereof, impact students’ stress levels and abilities to connect with other students, faculty and staff at BUSPH.
  o The results from these discussions may be used to advocate for BUSPH/ BUMC policies that specifically address the needs of BUSPH students who identify as transgender and gender non-conforming or members of the LGBTQ+ community.
• Confidentiality:
  o Your participation in this focus group discussion is entirely voluntary. You may take breaks and refuse to answer any questions. You are able to leave and exit the discussion at any point. Your participation is expected to last no longer than 1 hour. We will be taking handwritten notes during the course of the discussion. All notes will be anonymous. No personal identifying information will be recorded. Notes will only be accessible to team members, our course Teaching Assistant, and our professor.
  o Before we start with our questions, we would like to establish ground rules with your input. We will take about 5 minutes to create these together. Suggestions include “Listen to each other”, “be respectful”, “ask for term clarification”, etc.

Interview Questions ~45 minutes
0. Voluntary, anonymous survey asking about gender identity, sexual orientation, and LGBTQ+ community ally status.
1. Introduce yourselves briefly and please list your first name (or nickname) and pronouns on placard in front of you (if you are comfortable sharing: your name, your pronouns, enrollment status i.e. full time/part time?)

2. What is your perception of BUSPH administrative policies when it comes to gender inclusiveness?
   - **Probe:** Do you think there are gender inclusive spaces on campus?
     - **Probe:** If so, what spaces come to mind as being gender inclusive?
   - **Probe:** Have you ever experienced or heard about any difficulties in trying to change name, gender, pronoun for campus use?
     - **Probe:** For those who have heard or experienced barriers when it comes to gender inclusiveness, can you please elaborate and give us examples? In what settings were those?

3. What type of environment do faculty, staff and students create for TGNC or LGBTQ+ students at BUSPH?
   - **Probe:** Do you feel that there is a heteronormative environment perpetuated by faculty, staff or students at BUSPH? Please provide examples.

4. Relating to gender and sexual identity, how is diversity represented on the BUSPH/BUMC campus?
   - **Probe:** In your graduating class?
   - **Probe:** Are there any student groups that you know of? Which ones?
   - **Probe:** At an administrative level or in institutional promotional materials?

5. What is your perception of well-being & stress at BUSPH?
   - **Probe:** Do you think TGNC and LGBTQ+ students face different sources of stress on campus compared to other students?
   - **Probe:** Is there enough access (or lack thereof) to campus mental health resources?
   - **Probe:** Are any of these resources on the BUMC/BUSPH campus? *If so, where?*

6. Do you have any thoughts for suggested intervention about space accommodations for TGNC students on the BUMC/BUSPH campus?
   - **Probe:** An example of a space accommodation would be explicitly labeled gender inclusive bathrooms on the BUMC/BUSPH campus.
   - **Probe:** Why do you think BUSPH has not already implemented these interventions?

7. Before we end today, is there anything else you would like to share that was not mentioned in our discussion?

**Conclusion:**
Thank you for your participation in this discussion! We appreciate your input and for helping understand the effect of institutional policies at BUSPH/BUMC on the stress, isolation and well-being of students who identify as TGNC and/or are a part of the LGBTQ+ community.

Please contact us at the email addresses provided [provide contact sheet] on the contact sheet if you have any questions or concerns. If you haven’t done so already, please make sure to take our survey as well. A link to the survey is at the bottom of the contact sheet.

**Acronyms and terms definition based on the Merriam Webster online dictionary**

**Cisgender:** of, relating to, or being a person whose gender identity corresponds with the sex the person had or was identified as having at birth. For example: A cisgender woman is a
person who was born female and whose gender identity is woman. A cisgender man is a person who was born male and whose gender identity is man.

**Transgender:** of, relating to, or being a person whose gender identity differs from the sex the person had or was identified as having at birth; especially: of, relating to, or being a person whose gender identity is opposite the sex the person had or was identified as having at birth

**Genderqueer:** of, relating to, or being a person whose gender identity cannot be categorized as solely male or female

**Gender non-conforming:** a state in which a person has physical and behavioral characteristics that do not correspond with those typically associated with the person’s sex

**Agender:** a person who does not identify themselves as having a particular gender

*TGNC:* Transgender and Gender Non-Conforming people.

**LGBTQ+:** lesbian, gay, bisexual, transgender, and queer. Plus refers to additional sexual and gender identities such as asexual, intersex, agender, genderqueer, gender non-conforming, ect…

**Heteronormative:** of, relating to, or based on the attitude that heterosexuality and cisgender is the only normal and natural expression of sexuality and gender identity
<table>
<thead>
<tr>
<th>Question #</th>
<th>Variable Name</th>
<th>Category</th>
<th>Description</th>
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<th>Coding</th>
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<td>enroll_stat</td>
<td>demographic</td>
<td>Enrollment Status - Part v Full Time</td>
<td>Dichotomous</td>
<td>Prefer not to respond=97; Don’t Know/Unsure=98; Missing=99</td>
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<td>demographic</td>
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<td>Dichotomous</td>
<td>Domestic=1; International=2</td>
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<td>race_ethn</td>
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<td>Categorical</td>
<td>Hispanic/Latinx=1; Non-Hispanic Black=2; Non-Hispanic White=3; All Other Identities=4</td>
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<td>age_grp</td>
<td>demographic</td>
<td>Age Grouping</td>
<td>Categorical</td>
<td>18-23 years old=1; 24-29 years old=2; 30-39 years old=3; 40 years old and above=4</td>
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<td>5</td>
<td>pers_inc</td>
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<td>Personal Income Level</td>
<td>Categorical</td>
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<td>demographic</td>
<td>Parent/Guardian Income Level</td>
<td>Categorical</td>
<td>Prefer Not to Respond=97; Less than $17,999=1; $18,000 through $34,999=2; $35,000 through $99,999=3; $100,000 through $349,999=4; $350,000 and greater=5; Don’t Know=98; Prefer Not to Respond=97</td>
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<td>demographic</td>
<td>Member of LGBTQ+ Community</td>
<td>Dichotomous</td>
<td>Yes=1; No=0</td>
</tr>
<tr>
<td>8</td>
<td>gender</td>
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<td>Current Gender</td>
<td>Categorical</td>
<td>Cisgender=1; Transgender=2; Non-Binary=3</td>
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<td>ff_tgnc</td>
<td>demographic</td>
<td>Family and/or friends who identify as TGNC</td>
<td>Categorical</td>
<td>Yes=1; No=0; Unsure=98</td>
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<td>10</td>
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<td>mean_policies</td>
<td>Professors use gendered honorifics</td>
<td>Ordinal</td>
<td>Never=5, Almost Never=4, Sometimes=3, Fairly Often=2, Very Often=1</td>
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<td>Discussed transgender topics in class</td>
<td>Ordinal</td>
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<td>Professors ask student for names &amp; pronouns</td>
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<td>ease_coll</td>
<td>mean_inclusion</td>
<td>Feeling at social ease around colleagues</td>
<td>Ordinal</td>
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<td>mean_inclusion</td>
<td>Feeling of being wanted on campus</td>
<td>Ordinal</td>
<td>Never=1, Almost Never=2, Sometimes=3, Fairly Often=4, Very Often=5</td>
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<td>17</td>
<td>upset_un</td>
<td>mean_stress</td>
<td>Feeling upset about something happening unexpectedly</td>
<td>Ordinal</td>
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<td>nerv_stress</td>
<td>mean_stress</td>
<td>Feeling nervous and stressed</td>
<td>Ordinal</td>
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<td>diff_pile</td>
<td>mean_stress</td>
<td>Feeling like difficulties are piling up uncontrollably</td>
<td>Ordinal</td>
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<td>cope_change</td>
<td>mean_stress</td>
<td>Feeling like effectively coping with changes</td>
<td>Ordinal</td>
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<td>21</td>
<td>conf_prob</td>
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<td>Feeling confident about ability to handle problems</td>
<td>Ordinal</td>
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<td>22</td>
<td>going_way</td>
<td>mean_stress</td>
<td>Feeling like things are going your way</td>
<td>Ordinal</td>
<td></td>
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<td>23</td>
<td>on_top</td>
<td>mean_stress</td>
<td>Feeling on top of things</td>
<td>Ordinal</td>
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<tr>
<td>24</td>
<td>control_time</td>
<td>mean_stress</td>
<td>Feeling like you can control how you spend your time</td>
<td>Ordinal</td>
<td></td>
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<td>25</td>
<td>nerv_anx</td>
<td>mean_stress</td>
<td>Feeling nervous, anxious, or on edge</td>
<td>Ordinal</td>
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<td>26</td>
<td>worry_stop</td>
<td>mean_stress</td>
<td>Continuously worrying without being able to stop</td>
<td>Ordinal</td>
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<tr>
<td>27</td>
<td>troub_relax</td>
<td>mean_stress</td>
<td>Having trouble relaxing</td>
<td>Ordinal</td>
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<tr>
<td>28</td>
<td>bec_annoy</td>
<td>mean_stress</td>
<td>Becoming easily annoyed or irritated</td>
<td>Ordinal</td>
<td></td>
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<td>29</td>
<td>afraid_awf</td>
<td>mean_stress</td>
<td>Feeling afraid as if something awful might happen</td>
<td>Ordinal</td>
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<tr>
<td>30</td>
<td>not_sleep</td>
<td>mean_stress</td>
<td>Not being able to sleep due to worry</td>
<td>Ordinal</td>
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<tr>
<td>31</td>
<td>tune_bu</td>
<td>mean_inclusion</td>
<td>Feeling in tune with students at BUSPH</td>
<td>Ordinal</td>
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<td>32</td>
<td>friend_grp</td>
<td>mean_inclusion</td>
<td>Feeling like part of a group of friends at BUSPH</td>
<td>Ordinal</td>
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<tr>
<td>33</td>
<td>comm_bu</td>
<td>mean_inclusion</td>
<td>Feeling a lot in common with other students at BUSPH</td>
<td>Ordinal</td>
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<tr>
<td>34</td>
<td>talk_bu</td>
<td>mean_inclusion</td>
<td>Feeling that there are people to talk to at BUSPH</td>
<td>Ordinal</td>
<td></td>
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</table>
35 turn_bu mean_inclusion Feeling that there are people to turn to at BUSPH Ordinal
Never=1, Almost Never=2, Sometimes=3, Fairly Often=4, Very Often=5
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
36 gsm_aware mean_policies Aware of GSM students and their problems Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
37 gsm_welc mean_policies BUSPH is a welcoming place for GSM students Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
38 comf_trans mean_policies Comfort explaining meaning of transgender to students Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
39 pol_aware mean_policies Awareness of institutional policies for GSM students Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
40 health_safe mean_policies Health and safety of GSM students is priority at BUSPH Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
41 rep_pub mean_policies TGNC representation in recruitment and publicity Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
42 self_sat agg_satisfied Feeling satisfied with self Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
43 good_qual agg_satisfied Feeling like you possess a number of good qualities Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
44 pos_self agg_satisfied Having a positive attitude about self Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
45 dir_bath mean_policies Able to give directions to gender-neutral bathrooms at BUSPH Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
46 imp_bath mean_changes Importance of making gender-neutral bathrooms accessible Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
47 sing_stall mean_changes Support for single-stall gender-neutral bathrooms Ordinal
Strongly Disagree=1, Disagree=2, Partially Degree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7
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<tr>
<th>Question</th>
<th>Scale</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 multi_stall mean_changes</td>
<td>Ordinal</td>
<td>Support for multi-stall gender-neutral bathrooms</td>
<td>Strongly Disagree=1, Disagree=2, Partially Agree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7</td>
</tr>
<tr>
<td>49 sign_change mean_changes</td>
<td>Ordinal</td>
<td>Support changing signage from single-sex to gender-neutral</td>
<td>Strongly Disagree=1, Disagree=2, Partially Agree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7</td>
</tr>
<tr>
<td>50 exp_bu mean_satisfied</td>
<td>Ordinal</td>
<td>Feeling satisfied with experience at BUSPH</td>
<td>Strongly Disagree=1, Disagree=2, Partially Agree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7</td>
</tr>
<tr>
<td>51 exp_prof mean_satisfied</td>
<td>Ordinal</td>
<td>Feeling satisfied with interactions with professors</td>
<td>Strongly Disagree=1, Disagree=2, Partially Agree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7</td>
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<tr>
<td>52 exp_staff mean_satisfied</td>
<td>Ordinal</td>
<td>Feeling satisfied with interactions with staff</td>
<td>Strongly Disagree=1, Disagree=2, Partially Agree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7</td>
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<tr>
<td>53 exp_stud mean_satisfied</td>
<td>Ordinal</td>
<td>Feeling satisfied with interactions with other students</td>
<td>Strongly Disagree=1, Disagree=2, Partially Agree=3, Neither Agree or Disagree=4, Partially Agree=5, Agree=6, Strongly Agree=7</td>
</tr>
<tr>
<td>54 feedback</td>
<td>Open Response</td>
<td>Feedback on survey</td>
<td>Range: 1-5; *high score on policies corresponds to good polices</td>
</tr>
</tbody>
</table>

**Derived** metrics:

- **mean_policies**: Derived from questions above. Continuous
- **mean_inclusion**: Derived from questions above. Continuous
- **mean_stress**: Derived from questions above. Continuous
- **mean_changes**: Derived from questions above. Continuous
- **mean_satisfied**: Derived from questions above. Continuous

*high score on policies corresponds to good policies
*high score on stress corresponds to high social inclusion
*high score on change corresponds to high support for policy change
*high score on satisfied corresponds to high satisfaction
R Markdown File

R Code for Data Analysis

4/21/2018

0. Clean Raw Dataset

0a. Load and Describe Raw Dataset and Load Packages

Raw data set contained 106 observations for 75 variables.

```
datasource <- "C:/Users/Sridevi/Desktop/BU SPH/Spring 2018 Courses/GH 811/Group Project/Week 10 Materials"
setwd(datasource)
surveydata <- read.csv("surveydata.csv", header=T)
require(tidyrr)
require(dplyr)
require(stringr)
require(ggplot2)
```

0b. Rename Unformatted Variable Names to Formatted Names

```
names(surveydata)[names(surveydata)=="What.is.your.enrollment.status.at.BUSPH.""] <- "enroll_stat"
names(surveydata)[names(surveydata)=="Which.best.describes.your.student.status.at.BUSPH."] <- "stud_stat"
names(surveydata)[names(surveydata)=="Which.race.ethnicity.group.do.you.identify.as."] <- "race_ethn"
names(surveydata)[names(surveydata)=="What.is.your.age.group."] <- "age_grp"
names(surveydata)[names(surveydata)=="Which.of.these.categories.best.describes.your.personal.income.for.the.past.12.months."] <- "pers_inc"
names(surveydata)[names(surveydata)=="Which.of.these.categories.best.describes.your.parents.or.childhood.guardians.household.income."] <- "par_guar_inc"
names(surveydata)[names(surveydata)=="Do.you.consider.yourself.a.member.of.the.Lesbian..Gay..Bisexual..Transgender..Queer.and.other.sexual.and.gender.identities..LGBTQ...community."] <- "lgbtq_mem"
names(surveydata)[names(surveydata)=="What.is.your.current.gender."] <- "gend"
names(surveydata)[names(surveydata)=="Do.you.have.family.and.or.friends.who.are.transgender.or.gender.non.conforming."] <- "ff_tgnc"
```

```
names(surveydata)[names(surveydata)=="My.professors.call.on.students.using.gendered.honorifics..Mr...Mrs...Miss..sir..ma.am.."] <- "gen_hon"
names(surveydata)[names(surveydata)=="I.have.discussed.transgender.and.gender.non.conforming.topics.in.class."] <- "disc_top"
names(surveydata)[names(surveydata)=="My.professors.ask.their.students.what.their.names.and.pronouns.are."] <- "prof_names"
names(surveydata)[names(surveydata)=="Since.you.joined.BUSPH..how.often.have.
```
you.felt.at.ease.socially.around.your.colleagues.."] <- "ease_coll"
names(surveydata)[names(surveydata)=="Since.you.joined.BUSPH..how.often.have.
you.felt.welcome.at.events.hosted.by.the.school."] <- "sch_events"
names(surveydata)[names(surveydata)=="How.often.have.you.felt.that.your.presence.was.wanted.on.campus."] <- "want_camp"
names(surveydata)[names(surveydata)=="How.often.did.you.feel.at.ease.socially.on.campus.."] <- "ease_cam"

names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.been.upset.because.of.something.that.happened.unexpectedly."] <- "upset_un"
names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.felt.nervous.and..stressed.."] <- "nerv_stress"

names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.felt.difficulties.were.piling.up.so.high.that.you.could.not.overcome.them."] <- "diff_pile"

names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.felt.that.you.were.effectively.coping.with.important.changes."] <- "cope_change"

names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.felt.confident.about.your.ability.to.handle.your.problems."] <- "conf_prob"
names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.felt.that.things.were.going.your.way."] <- "going_way"

names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.felt.that.you.were.on.top.of.things."] <- "on_top"

names(surveydata)[names(surveydata)=="While.at.BUSPH..how.often.have.you.been.able.to.control.the.way.you.spend.your.time."] <- "control_time"

names(surveydata)[names(surveydata)=="Feeling.nervous..anxious.or.on.edge"] <- "nerv_anx"
names(surveydata)[names(surveydata)=="Continuously.worrying.without.being.able.to.stop"] <- "worry_stop"

names(surveydata)[names(surveydata)=="Having.trouble.relaxing"] <- "troub_relax"

names(surveydata)[names(surveydata)=="Becoming.easily.annoyed.or.irritable"] <- "bec_annoy"

names(surveydata)[names(surveydata)=="Feeling.afraid.as.if.something.awful.might.happen"] <- "afraid_awf"

names(surveydata)[names(surveydata)=="Not.being.able.to.sleep.due.to.worry"] <- "not_sleep"

names(surveydata)[names(surveydata)=="I.feel.in.tune.with.other.students.at.BUSPH.."] <- "tune_bu"

names(surveydata)[names(surveydata)=="I.feel.part.of.a.group.of.friends.at.BUSPH."] <- "friend_grp"

names(surveydata)[names(surveydata)=="I.have.a.lot.in.common.with.other.students.at.BUSPH.""] <- "comm_bu"

names(surveydata)[names(surveydata)=="There.are.people.I.can.talk.to.at.BUSPH."] <- "talk_bu"

names(surveydata)[names(surveydata)=="There.are.people.I.can.turn.to.at.BUSPH.."] <- "turn_bu"
names(surveydata)[names(surveydata)=="I.am.aware.of.gender.and.sexual.minority.students.and.the.problems.conflicts.they.face."] <- "gsm_aware"
names(surveydata)[names(surveydata)=="BUSPH.is.a.welcoming.environment.for.gender.and.sexual.minority.students."] <- "gsm_welc"
names(surveydata)[names(surveydata)=="I.feel.comfortable.explaining.the.meaning.of.the.word.transgender.or.gender.non.conforming.to.someone.at.BUSPH."] <- "comf_trans"

names(surveydata)[names(surveydata)=="I.am.aware.of.institutional.policies.at.BUSPH.that.specitically.address.the.needs.of.gender.and.sexual.minority.students."] <- "pol_aware"
names(surveydata)[names(surveydata)=="BU.views.the.safety.and.health.of.its.gender.and.sexual.minority.students.as.a.priority."] <- "health_safe"
names(surveydata)[names(surveydata)=="Transgender.and.gender.non.conforming.students.are.represented.in.BUSPH.recruitment.and.campus.publicity.efforts."] <- "rep_pub"

names(surveydata)[names(surveydata)=="On.the.whole..I.am.satisfied.with.myself."] <- "self_sat"
names(surveydata)[names(surveydata)=="I.feel.that.I.have.a.number.of.good.qualities."] <- "good_qual"
names(surveydata)[names(surveydata)=="I.take.a.positive.attitude.towards.myself."] <- "pos_self"

names(surveydata)[names(surveydata)=="I.am.able.to.give.directions.to.an.all.gender.or.gender.neutral.bathroom.on.the.BU.Medical.Campus."] <- "dir_bath"
names(surveydata)[names(surveydata)=="It.is.important.to.me.that.BUSPH.makes.all.gender.or.gender.neutral.bathrooms.easily.accessible.to.students.on.the.BU.Medical.Campus."] <- "imp_bath"

names(surveydata)[names(surveydata)=="I.support.the.construction.of.new.all.gender.or.gender.neutral.single.stall.bathrooms.on.the.BU.Medical.Campus."] <- "sing_stall"
names(surveydata)[names(surveydata)=="I.support.the.construction.of.new.all.gender.or.gender.neutral.multi.stall.bathrooms.on.the.BU.Medical.Campus."] <- "multi_stall"
names(surveydata)[names(surveydata)=="I.support.changing.signage.to.at.least.one.existing.bathroom.on.the.BU.Medical.Campus.from.single.sex.to.all.gender.or.gender.neutral."] <- "sign_change"

names(surveydata)[names(surveydata)=="I.am.satisfied.with.my.experience.as.a.graduate.student.at.BUSPH."] <- "exp_bu"
names(surveydata)[names(surveydata)=="Overall..I.am.satisfied.with.my.interactions.with.my.professors."] <- "exp_prof"
names(surveydata)[names(surveydata)=="I.am.satisfied.with.my.interactions.with.BU.Medical.Campus.staff."] <- "exp_staff"
names(surveydata)[names(surveydata)=="I.am.satisfied.with.my.interaction.with.other.students."] <- "exp_stud"
0c. Subset dataset to necessary variables only

Limit to 54 variables. The 21 variables removed were topic headers and start/finish time for survey.

```r
```

0d. Recode Demographic Variables from Character to Numeric Values

**Enrollment Status**

(1: Part-Time, 2: Full-Time, 99: Missing)

```r
surveydata_new$enroll_stat <- ifelse(surveydata_new$enroll_stat=="Part-Time", 1, ifelse(surveydata_new$enroll_stat=="Full Time", 2, 99))
```

**Student Status**

(1: Domestic Student, 2: International Student, 99: Missing)

```r
surveydata_new$stud_stat <- ifelse(surveydata_new$stud_stat=="Domestic Student", 1, ifelse(surveydata_new$stud_stat=="International Student", 2, 99))
```
Race/Ethnicity
(1: Hispanic/Latinx, 2: Non-Hispanic Black, 3: Non-Hispanic White, 4: All Other Identities)
surveydata_new$race_ethn <- ifelse(surveydata_new$race_ethn=="Hispanic/Latinx", 1, ifelse(surveydata_new$race_ethn=="Non-Hispanic Black", 2, ifelse(surveydata_new$race_ethn=="Non-Hispanic White", 3, ifelse(surveydata_new$race_ethn=="All Other Identities", 4, 99))))

Age Category
(1: 18-23, 2: 24-29, 3: 30-39, 4: 40 and older)
surveydata_new$age_grp <- ifelse(surveydata_new$age_grp=="18 - 23 years old", 1, ifelse(surveydata_new$age_grp=="24 - 29 years old", 2, ifelse(surveydata_new$age_grp=="30-39 years old" | surveydata_new$age_grp=="40 years old and above", 3, 99))))

Personal Income
surveydata_new$pers_inc <- ifelse(surveydata_new$pers_inc=="Less than $5,000", 1, ifelse(surveydata_new$pers_inc=="$5,000 through $11,999", 2, ifelse(surveydata_new$pers_inc=="$12,000 through $24,999", 3, ifelse(surveydata_new$pers_inc=="$25,000 through $34,999", 4, ifelse(surveydata_new$pers_inc=="$35,000 through $49,999", 5, ifelse(surveydata_new$pers_inc=="$50,000 through $74,999", 6, ifelse(surveydata_new$pers_inc=="$75,000 through $99,999", 7, ifelse(surveydata_new$pers_inc=="$100,000 and greater", 8, ifelse(surveydata_new$pers_inc=="Don't Know", 98, 99))))))))}}
Recode into Broader Categories (1&2 as 1, 3&4 as 2, 5&6 as 3, 7&8 as 4 and 99 as 99)

```r
surveydata_new$pers_inc <- ifelse(surveydata_new$pers_inc==1 | surveydata_new$pers_inc==2, 1, ifelse(surveydata_new$pers_inc==4, 2, ifelse(surveydata_new$pers_inc==6, 3, ifelse(surveydata_new$pers_inc==8, 4, 99)))))
```

Parent/Guardian Income

(1: <$17,999, 2: $18,000-$34,999, 3: $35,000-$99,999, 4: $100,000-$349,999, 5: $350,000 and up, 98: Don't know, 97: Prefer Not to Respond, 99: Missing)

```r
surveydata_new$par_guar_inc <- ifelse(surveydata_new$par_guar_inc=="Less than $17,999", 1, ifelse(surveydata_new$par_guar_inc=="$18,000 through $34,999", 2, ifelse(surveydata_new$par_guar_inc=="$35,000 through $99,999", 3, ifelse(surveydata_new$par_guar_inc=="$100,000 through $349,999", 4, ifelse(surveydata_new$par_guar_inc=="$350,000 and greater", 5, ifelse(surveydata_new$par_guar_inc=="Don't Know", 98, ifelse(surveydata_new$par_guar_inc=="Prefer Not to Respond", 97, 99)))))
```

LGBTQ Identification

(1: LGBTQ, 0: Not-LGBTQ, 99: Missing)

```r
surveydata_new$lgbtq_mem <- ifelse(surveydata_new$lgbtq_mem=="Yes", 1, ifelse(surveydata_new$lgbtq_mem=="No", 0, 99))
```

Gender

(1: Cisgender, 2: Transgender, 3: Non-Binary, 99: Missing)

```r
```
Friends and Family who are Trans or Gender Non-Conforming

(1: Yes, 0: No, 98: Unsure, 99: Missing)

```r
surveydata_new$ff_tgnc <- ifelse(surveydata_new$ff_tgnc=="Yes", 1, ifelse(surveydata_new$ff_tgnc=="No", 0, ifelse(surveydata_new$ff_tgnc=="Unsure", 98, 99)))
```

0e. Remove space at end of character string for value “Fairly Often”

For Likert scale questions, the option for “Fairly Often” contained a space at the end of the value as follows: “Fairly Often_”. The following code removes the space at the end of the value to allow for recoding from character to numeric values in the next step.

```r
surveydata_new$gen_hon <- str_trim(surveydata_new$gen_hon, side="right")
surveydata_new$disc_top <- str_trim(surveydata_new$disc_top, side="right")
surveydata_new$prof_names <- str_trim(surveydata_new$prof_names, side="right")
surveydata_new$ease_coll <- str_trim(surveydata_new$ease_coll, side="right")
surveydata_new$want_camp <- str_trim(surveydata_new$want_camp, side="right")
surveydata_new$ease_camp <- str_trim(surveydata_new$ease_camp, side="right")
surveydata_new$upset_un <- str_trim(surveydata_new$upset_un, side="right")
surveydata_new$nerv_stress <- str_trim(surveydata_new$nerv_stress, side="right")
surveydata_new$diff_pile <- str_trim(surveydata_new$diff_pile, side="right")
surveydata_new$cope_change <- str_trim(surveydata_new$cope_change, side="right")
surveydata_new$conf_prob <- str_trim(surveydata_new$conf_prob, side="right")
surveydata_new$going_way <- str_trim(surveydata_new$going_way, side="right")
surveydata_new$on_top <- str_trim(surveydata_new$on_top, side="right")
surveydata_new$control_time <- str_trim(surveydata_new$control_time, side="right")
surveydata_new$nerv_anx <- str_trim(surveydata_new$nerv_anx, side="right")
surveydata_new$worry_stop <- str_trim(surveydata_new$worry_stop, side="right")
surveydata_new$troub_relax <- str_trim(surveydata_new$troub_relax, side="right")
surveydata_new$bec_annoy <- str_trim(surveydata_new$bec_annoy, side="right")
surveydata_new$afraid_awf <- str_trim(surveydata_new$afraid_awf, side="right")
surveydata_new$not_sleep <- str_trim(surveydata_new$not_sleep, side="right")
surveydata_new$tune_bu <- str_trim(surveydata_new$tune_bu, side="right")
surveydata_new$friend_grp <- str_trim(surveydata_new$friend_grp, side="right")
surveydata_new$comm_bu <- str_trim(surveydata_new$comm_bu, side="right")
surveydata_new$talk_bu <- str_trim(surveydata_new$talk_bu, side="right")
surveydata_new$turn_bu <- str_trim(surveydata_new$turn_bu, side="right")
```
0f. Recode Likert 5-Point Scale Questions from Character to Numeric Values

(5: Never, 4: Almost Never, 3: Sometimes, 2: Fairly Often, 1: Very Often, NA)

For values where “5: never” corresponds to high social inclusion, stress, awareness of policies, or awareness of policy changes

```r
surveydata_new$gen_hon <- ifelse(surveydata_new$gen_hon=="Never", 5,
                                          ifelse(surveydata_new$gen_hon=="Almost Never", 4,
                                              ifelse(surveydata_new$gen_hon=="Sometimes", 3,
                                                  ifelse(surveydata_new$gen_hon=="Fairly Often", 2,
                                                      ifelse(surveydata_new$gen_hon=="Very Often", 1, NA))))

surveydata_new$cope_change <- ifelse(surveydata_new$cope_change=="Never", 5,
                                          ifelse(surveydata_new$cope_change=="Almost Never", 4,
                                              ifelse(surveydata_new$cope_change=="Sometimes", 3,
                                                  ifelse(surveydata_new$cope_change=="Fairly Often", 2,
                                                      ifelse(surveydata_new$cope_change=="Very Often", 1, NA))))

surveydata_new$conf_prob <- ifelse(surveydata_new$conf_prob=="Never", 5,
                                          ifelse(surveydata_new$conf_prob=="Almost Never", 4,
                                              ifelse(surveydata_new$conf_prob=="Sometimes", 3,
                                                  ifelse(surveydata_new$conf_prob=="Fairly Often", 2,
                                                      ifelse(surveydata_new$conf_prob=="Very Often", 1, NA))))

surveydata_new$going_way <- ifelse(surveydata_new$going_way=="Never", 5,
                                          ifelse(surveydata_new$going_way=="Almost Never", 4,
                                              ifelse(surveydata_new$going_way=="Sometimes", 3,
                                                  ifelse(surveydata_new$going_way=="Fairly Often", 2,
                                                      ifelse(surveydata_new$going_way=="Very Often", 1, NA))))

surveydata_new$on_top <- ifelse(surveydata_new$on_top=="Never", 5,
                                          ifelse(surveydata_new$on_top=="Almost Never", 4,
                                                  ifelse(surveydata_new$on_top=="Some
```

30
times", 3,  
ifelse(surveydata_new$on_top=="Fairly Often", 2,  
ifelse(surveydata_new$on_top=="Very Often", 1, NA))))))

surveydata_new$control_time <- ifelse(surveydata_new$control_time=="Never", 5,  
ifelse(surveydata_new$control_time=="Almost Never", 4,  
ifelse(surveydata_new$control_time=="Sometimes", 3,  
ifelse(surveydata_new$control_time=="Fairly Often", 2,  
ifelse(surveydata_new$control_time=="Very Often", 1, NA))))))

0g. Recode Likert 5-Point Scale Questions from Character to Numeric Values
(1: Never, 2: Almost Never, 3: Sometimes, 4: Fairly Often, 5: Very Often, NA)

For values where "5: very often" corresponds to high social inclusion, stress, awareness of policies, or awareness of policy changes

surveydata_new$disc_top <- ifelse(surveydata_new$disc_top=="Never", 1,  
ifelse(surveydata_new$disc_top=="Almost Never", 2,  
ifelse(surveydata_new$disc_top=="Sometimes", 3,  
ifelse(surveydata_new$disc_top=="Fairly Often", 4,  
ifelse(surveydata_new$disc_top=="Very Often", 5, NA))))))

surveydata_new$prof_names <- ifelse(surveydata_new$prof_names=="Never", 1,  
ifelse(surveydata_new$prof_names=="Almost Never", 2,  
ifelse(surveydata_new$prof_names=="Sometimes", 3,  
ifelse(surveydata_new$prof_names=="Fairly Often", 4,  
ifelse(surveydata_new$prof_names=="Very Often", 5, NA))))))

surveydata_new$ease_coll <- ifelse(surveydata_new$ease_coll=="Never", 1,  
ifelse(surveydata_new$ease_coll=="Almost Never", 2,  
ifelse(surveydata_new$ease_coll=="Sometimes", 3,  
ifelse(surveydata_new$ease_coll=="Fairly Often", 4,  
ifelse(surveydata_new$ease_coll=="Very Often", 5, NA))))))
Sometimes", 3,
coll=="Fairly Often", 4,
elseifelse(surveydata_new$ease_coll=="Very Often", 5, NA)))))

surveydata_new$sch_events <- ifelse(surveydata_new$sch_events=="Never", 1,
elseifelse(surveydata_new$sch_events=="Almost Never", 2,
"Sometimes", 3,
elseifelse(surveydata_new$sch_events=="Fairly Often", 4,
elseifelse(surveydata_new$sch_events=="Very Often", 5, NA)))))

surveydata_new$want_camp <- ifelse(surveydata_new$want_camp=="Never", 1,
elseifelse(surveydata_new$want_camp=="Almost Never", 2,
"Sometimes", 3,
elseifelse(surveydata_new$want_camp=="Fairly Often", 4,
elseifelse(surveydata_new$want_camp=="Very Often", 5, NA)))))

surveydata_new$ease_camp <- ifelse(surveydata_new$ease_camp=="Never", 1,
elseifelse(surveydata_new$ease_camp=="Almost Never", 2,
"Somet"
....
surveydata_new$nerv_stress <- ifelse(surveydata_new$nerv_stress == "Fairly Often", 4, ifelse(surveydata_new$nerv_stress == "Very Often", 5, NA)))

surveydata_new$diff_pile <- ifelse(surveydata_new$diff_pile == "Never", 1, ifelse(surveydata_new$diff_pile == "Almost Never", 2, ifelse(surveydata_new$diff_pile == "Sometimes", 3, ifelse(surveydata_new$diff_pile == "Fairly Often", 4, ifelse(surveydata_new$diff_pile == "Very Often", 5, NA)))))

surveydata_new$nerv_anx <- ifelse(surveydata_new$nerv_anx == "Never", 1, ifelse(surveydata_new$nerv_anx == "Almost Never", 2, ifelse(surveydata_new$nerv_anx == "Sometimes", 3, ifelse(surveydata_new$nerv_anx == "Fairly Often", 4, ifelse(surveydata_new$nerv_anx == "Very Often", 5, NA)))))

surveydata_new$worry_stop <- ifelse(surveydata_new$worry_stop == "Never", 1, ifelse(surveydata_new$worry_stop == "Almost Never", 2, ifelse(surveydata_new$worry_stop == "Sometimes", 3, ifelse(surveydata_new$worry_stop == "Fairly Often", 4, ifelse(surveydata_new$worry_stop == "Very Often", 5, NA)))))


surveydata_new$bec_annoy <- ifelse(surveydata_new$bec_annoy == "Never", 1, ifelse(surveydata_new$bec_annoy == "Almost Never", 2, ifelse(surveydata_new$bec_annoy == "Sometimes", 3, ifelse(surveydata_new$bec_annoy == "Fairly Often", 4, ifelse(surveydata_new$bec_annoy == "Very Often", 5, NA))))
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```r
3, ifelse(surveydata_new$bec_annoy=="Fairly Often", 4,
          ifelse(surveydata_new$bec_annoy=="Very Often", 5, NA)))

surveydata_new$afraid_awf <- ifelse(surveydata_new$afraid_awf=="Never", 1,
                                      ifelse(surveydata_new$afraid_awf=="Almost Never", 2,
                                            ifelse(surveydata_new$afraid_awf=="Sometimes", 3,
                                                  ifelse(surveydata_new$afraid_awf=="Fairly Often", 4,
                                                        ifelse(surveydata_new$afraid_awf=="Very Often", 5, NA))))))

surveydata_new$not_sleep <- ifelse(surveydata_new$not_sleep=="Never", 1,
                                    ifelse(surveydata_new$not_sleep=="Almost Never", 2,
                                          ifelse(surveydata_new$not_sleep=="Sometimes", 3,
                                                ifelse(surveydata_new$not_sleep=="Fairly Often", 4,
                                                      ifelse(surveydata_new$not_sleep=="Very Often", 5, NA))))))

surveydata_new$tune_bu <- ifelse(surveydata_new$tune_bu=="Never", 1,
                                   ifelse(surveydata_new$tune_bu=="Almost Never", 2,
                                         ifelse(surveydata_new$tune_bu=="Sometimes", 3,
                                               ifelse(surveydata_new$tune_bu=="Fairly Often", 4,
                                                     ifelse(surveydata_new$tune_bu=="Very Often", 5, NA))))))

surveydata_new$friend_grp <- ifelse(surveydata_new$friend_grp=="Never", 1,
                                    ifelse(surveydata_new$friend_grp=="Almost Never", 2,
                                          ifelse(surveydata_new$friend_grp=="Sometimes", 3,
                                                ifelse(surveydata_new$friend_grp=="Fairly Often", 4,
                                                      ifelse(surveydata_new$friend_grp=="Very Often", 5, NA))))))

surveydata_new$comm_bu <- ifelse(surveydata_new$comm_bu=="Never", 1,
                                   ifelse(surveydata_new$comm_bu=="Almost Never", 2,
                                         ifelse(surveydata_new$comm_bu=="Sometimes", 3,
                                               ifelse(surveydata_new$comm_bu=="Fairly Often", 4,
                                                     ifelse(surveydata_new$comm_bu=="Very Often", 5, NA))))))
```
 Often”, 4, 

 surveydata_new$talk_bu <- ifelse(surveydata_new$talk_bu=="Never", 1, 
 ifelse(surveydata_new$talk_bu=="Almost Never", 2, 
 ifelse(surveydata_new$talk_bu=="Sometimes", 3, 
 u="Fairly Often", 4, 
 ifelse(surveydata_new$talk_bu=="Very Often", 5, NA)))))

 surveydata_new$turn_bu <- ifelse(surveydata_new$turn_bu=="Never", 1, 
 ifelse(surveydata_new$turn_bu=="Almost Never", 2, 
 ifelse(surveydata_new$turn_bu=="Sometimes", 3, 
 u="Fairly Often", 4, 
 ifelse(surveydata_new$turn_bu=="Very Often", 5, NA))))

 0h. Recode Likert 7-Point Scale Questions from Character to 5-Point Numeric Values


 surveydata_new$gsm_aware <- ifelse(surveydata_new$gsm_aware=="Strongly Disagree", 1, 
 ifelse(surveydata_new$gsm_aware=="Disagree", 1.67, 
 ifelse(surveydata_new$gsm_aware=="Partially Disagree", 2.33, 
 ifelse(surveydata_new$gsm_aware=="Neither Agree nor Disagree", 3, 
 ifelse(surveydata_new$gsm_aware=="Partially Agree", 3.67, 
 ifelse(surveydata_new$gsm_aware=="Agree", 4.33, 
 ifelse(surveydata_new$gsm_aware=="Strongly Agree", 5, NA)))))))

 surveydata_new$gsm_welc <- ifelse(surveydata_new$gsm_welc=="Strongly Disagree", 1, 
 ifelse(surveydata_new$gsm_welc=="Disagree", 1.67, 
 ifelse(surveydata_new$gsm_welc=="Partially Disagree", 2.33, 
 ifelse(surveydata_new$gsm_welc=="Neither A


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```r
surveydata_new$gsm_welc <- ifelse(surveydata_new$gsm_welc=="Partially Disagree", 2.33,
                                   ifelse(surveydata_new$gsm_welc=="Neither Agree nor Disagree", 3,
                                        ifelse(surveydata_new$gsm_welc=="Partially Agree", 3.67,
                                               ifelse(surveydata_new$gsm_welc=="Agree", 4.33,
                                                        ifelse(surveydata_new$gsm_welc=="Strongly Agree", 5, NA)))))))
```

```r
surveydata_new$comf_trans <- ifelse(surveydata_new$comf_trans=="Strongly Disagree", 1,
                                       ifelse(surveydata_new$comf_trans=="Disagree", 1.67,
                                              ifelse(surveydata_new$comf_trans=="Partially Disagree", 2.33,
                                                     ifelse(surveydata_new$comf_trans=="Neither Agree nor Disagree", 3,
                                                            ifelse(surveydata_new$comf_trans=="Partially Agree", 3.67,
                                                                   ifelse(surveydata_new$comf_trans=="Agree", 4.33,
                                                                            ifelse(surveydata_new$comf_trans=="Strongly Agree", 5, NA)))))))
```

```r
surveydata_new$pol_aware <- ifelse(surveydata_new$pol_aware=="Strongly Disagree", 1,
                                     ifelse(surveydata_new$pol_aware=="Disagree", 1.67,
                                            ifelse(surveydata_new$pol_aware=="Partially Disagree", 2.33,
                                                   ifelse(surveydata_new$pol_aware=="Neither Agree nor Disagree", 3,
                                                            ifelse(surveydata_new$pol_aware=="Partially Agree", 3.67,
                                                                     ifelse(surveydata_new$pol_aware=="Agree", 4.33,
                                                                            ifelse(surveydata_new$pol_aware=="Strongly Agree", 5, NA))))))))
```

```r
surveydata_new$health_safe <- ifelse(surveydata_new$health_safe=="Strongly Disagree", 1,
                                       ifelse(surveydata_new$health_safe=="Disagree", 1.67,
                                              ifelse(surveydata_new$health_safe=="Partially Disagree", 2.33,
                                                     ifelse(surveydata_new$health_safe=="Neither Agree nor Disagree", 3,
                                                            ifelse(surveydata_new$health_safe=="Partially Agree", 3.67,
                                                                     ifelse(surveydata_new$health_safe=="Agree", 4.33,
                                                                            ifelse(surveydata_new$health_safe=="Strongly Agree", 5, NA))))))))
```

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```r
surveydata_new$rep_pub <- ifelse(surveydata_new$rep_pub == "Strongly Disagree", 1,
ifelse(surveydata_new$rep_pub == "Disagree", 1.67,
ifelse(surveydata_new$rep_pub == "Partially Disagree", 2.33,
ifelse(surveydata_new$rep_pub == "Neither Agree nor Disagree", 3,
ifelse(surveydata_new$rep_pub == "Partially Agree", 3.67,
ifelse(surveydata_new$rep_pub == "Agree", 4.33,
ifelse(surveydata_new$rep_pub == "Strongly Agree", 5, NA)))))))
```

```r
surveydata_new$self_sat <- ifelse(surveydata_new$self_sat == "Strongly Disagree", 1,
ifelse(surveydata_new$self_sat == "Disagree", 1.67,
ifelse(surveydata_new$self_sat == "Partially Disagree", 2.33,
ifelse(surveydata_new$self_sat == "Neither Agree nor Disagree", 3,
ifelse(surveydata_new$self_sat == "Partially Agree", 3.67,
ifelse(surveydata_new$self_sat == "Agree", 4.33,
ifelse(surveydata_new$self_sat == "Strongly Agree", 5, NA))))))))
```

```r
surveydata_new$good_qual <- ifelse(surveydata_new$good_qual == "Strongly Disagree", 1,
ifelse(surveydata_new$good_qual == "Disagree", 1.67,
ifelse(surveydata_new$good_qual == "Partially Disagree", 2.33,
ifelse(surveydata_new$good_qual == "Neither Agree nor Disagree", 3,
ifelse(surveydata_new$good_qual == "Partially Agree", 3.67,
ifelse(surveydata_new$good_qual == "Agree", 4.33,
ifelse(surveydata_new$good_qual == "Strongly Agree", 5, NA))))))))
```
surveydata_new$pos_self <- ifelse(surveydata_new$pos_self=="Strongly Disagree ", 1, 
    ifelse(surveydata_new$pos_self=="Disagree", 1.67, 
        ifelse(surveydata_new$pos_self=="Partially Disagree", 2.33, 
            ifelse(surveydata_new$pos_self=="Neither Agree nor Disagree", 3, 
                ifelse(surveydata_new$pos_self=="Partially Agree", 3.67, 
                    ifelse(surveydata_new$pos_self=="Agree", 4.33, 
                        ifelse(surveydata_new$pos_self=="Strongly Agree", 5, NA)))))))))

surveydata_new$dir_bath <- ifelse(surveydata_new$dir_bath=="Strongly Disagree ", 1, 
    ifelse(surveydata_new$dir_bath=="Disagree", 1.67, 
        ifelse(surveydata_new$dir_bath=="Partially Disagree", 2.33, 
            ifelse(surveydata_new$dir_bath=="Neither Agree nor Disagree", 3, 
                ifelse(surveydata_new$dir_bath=="Partially Agree", 3.67, 
                    ifelse(surveydata_new$dir_bath=="Agree", 4.33, 
                        ifelse(surveydata_new$dir_bath=="Strongly Agree", 5, NA))))))))

surveydata_new$imp_bath <- ifelse(surveydata_new$imp_bath=="Strongly Disagree ", 1, 
    ifelse(surveydata_new$imp_bath=="Disagree", 1.67, 
        ifelse(surveydata_new$imp_bath=="Partially Disagree", 2.33, 
            ifelse(surveydata_new$imp_bath=="Neither Agree nor Disagree", 3, 
                ifelse(surveydata_new$imp_bath=="Partially Agree", 3.67, 
                    ifelse(surveydata_new$imp_bath=="Agree", 4.33, 
                        ifelse(surveydata_new$imp_bath=="Strongly Agree", 5, NA))))))))

surveydata_new$sing_stall <- ifelse(surveydata_new$sing_stall=="Strongly Disagree ", 1, 
    ifelse(surveydata_new$sing_stall=="Disagree", 1.67, 
        ifelse(surveydata_new$sing_stall=="Partially Disagree", 2.33, 
            ifelse(surveydata_new$sing_stall=="Neither Agree nor Disagree", 3, 
                ifelse(surveydata_new$sing_stall=="Partially Agree", 3.67, 
                    ifelse(surveydata_new$sing_stall=="Agree", 4.33, 
                        ifelse(surveydata_new$sing_stall=="Strongly Agree", 5, NA))))))))
ifelse(surveydata_new$sing_stall=="Partially Disagree", 2.33,
ifelse(surveydata_new$sing_stall=="Neither Agree nor Disagree", 3,
ifelse(surveydata_new$sing_stall=="Partially Agree", 3.67,
ifelse(surveydata_new$sing_stall=="Agree", 4.33,
ifelse(surveydata_new$sing_stall=="Strongly Agree", 5, NA)))))))

surveydata_new$multi_stall <- ifelse(surveydata_new$multi_stall=="Strongly Disagree", 1,
ifelse(surveydata_new$multi_stall=="Disagree", 1.67,
ifelse(surveydata_new$multi_stall=="Partially Disagree", 2.33,
ifelse(surveydata_new$multi_stall=="Neither Agree nor Disagree", 3,
ifelse(surveydata_new$multi_stall=="Partially Agree", 3.67,
ifelse(surveydata_new$multi_stall=="Agree", 4.33,
ifelse(surveydata_new$multi_stall=="Strongly Agree", 5, NA)))))))

surveydata_new$sign_change <- ifelse(surveydata_new$sign_change=="Strongly Disagree", 1,
ifelse(surveydata_new$sign_change=="Disagree", 1.67,
ifelse(surveydata_new$sign_change=="Partially Disagree", 2.33,
ifelse(surveydata_new$sign_change=="Neither Agree nor Disagree", 3,
ifelse(surveydata_new$sign_change=="Partially Agree", 3.67,
ifelse(surveydata_new$sign_change=="Agree", 4.33,
ifelse(surveydata_new$sign_change=="Strongly Agree", 5, NA)))))))

surveydata_new$exp_bu <- ifelse(surveydata_new$exp_bu=="Strongly Disagree", 1,
ifelse(surveydata_new$exp_bu=="Disagree", 1.67,
ifelse(surveydata_new$exp_bu=="Partially Disagree", 2.33,
ifelse(surveydata_new$exp_bu=="Neither Agree nor Disagree", 3,
ifelse(surveydata_new$exp_bu=="Partially Agree", 3.67,
ifelse(surveydata_new$exp_bu=="Agree", 4.33,
ifelse(surveydata_new$exp_bu=="Strongly Agree", 5, NA)))))))
Team EDDD (Group C)
DL, EA, NDD, SKP

```
33,
ifelse(surveydata_new$exp_bu=="Agree", 4.
        ifelse(surveydata_new$exp_bu=="Strong
ly Agree", 5, NA))))))

surveydata_new$exp_prof <- ifelse(surveydata_new$exp_prof=="Strongly Disagree ", 1,
        ifelse(surveydata_new$exp_prof=="Disagree", 1.67
        ifelse(surveydata_new$exp_prof=="Partially Di
gree", 2.33,
        ifelse(surveydata_new$exp_prof=="Neither Ag
ree nor Disagree", 3,
        ifelse(surveydata_new$exp_prof=="Partially Ag
ly Agree", 3.67,
        ifelse(surveydata_new$exp_prof=="Strongly Agree", 5, NA))))))

surveydata_new$exp_staff <- ifelse(surveydata_new$exp_staff=="Strongly Disagre ", 1,
        ifelse(surveydata_new$exp_staff=="Disagree", 1.67
        ifelse(surveydata_new$exp_staff=="Partially D
isagree", 2.33,
        ifelse(surveydata_new$exp_staff=="Neither A
gree nor Disagree", 3,
        ifelse(surveydata_new$exp_staff=="Partially A
gree", 3.67,
        ifelse(surveydata_new$exp_staff=="Agree", 4.33,
        ifelse(surveydata_new$exp_staff=="Strongly Agree", 5, NA))))))

surveydata_new$exp_stud <- ifelse(surveydata_new$exp_stud=="Strongly Disagre ", 1,
        ifelse(surveydata_new$exp_stud=="Disagree", 1.67
        ifelse(surveydata_new$exp_stud=="Partially Di
agree", 2.33,
        ifelse(surveydata_new$exp_stud=="Neither Ag
ree nor Disagree", 3,
        ifelse(surveydata_new$exp_stud=="Partially Ag
ly Agree", 3.67,
        ifelse(surveydata_new$exp_stud=="Agree", 4.33,
        ifelse(surveydata_new$exp_stud=="Strongly Agree", 5, NA)))))))
```
1. Create Long Dataset for Analyzing Aggregated Outcomes by GSM Indicator

1a. Create GSM Indicator Variable

(1: GSM Student, 0: Non-GSM Student)

GSM student occurs when Gender=2 (trans) or Gender=3 (non-binary) or LGBTQ_mem=1 (identifies as LGBTQ+)

\[
surveydata\_new\$gsm <- \text{ifelse}\left(\text{surveydata}\_new\$gender==2 \mid \text{surveydata}\_new\$gender==3, 1, \text{ifelse}(\text{surveydata}\_new\$lgbtq\_mem==1, 1, 0)\right)
\]

1b. Create long dataset with an additional column called person for observation number

Create final dataset containing person, demographic information, and gsm indicator variable.

\[
surveydata\_new <- surveydata\_new \%\% \text{mutate}(\text{person} = \text{row_number}())
surveydata\_final <- \text{select}(surveydata\_new, \text{person}, \text{gsm}, \text{gender}, \text{lgbtq}\_\text{mem}, \text{ff}\_\text{tgnc}, \text{enroll}\_\text{stat}, \text{stud}\_\text{stat}, \text{race}\_\text{ethn}, \text{age}\_\text{grp}, \text{pers}\_\text{inc}, \text{par}\_\text{guar}\_\text{inc}, \text{pol}\_\text{aware}, \text{health}\_\text{safe}, \text{sing}\_\text{stall}, \text{multi}\_\text{stall}, \text{sign}\_\text{change}, \text{gen}\_\text{hon}, \text{disc}\_\text{top}, \text{prof}\_\text{names}, \text{gsm}\_\text{aware}, \text{gsm}\_\text{welc}, \text{comf}\_\text{trans}, \text{rep}\_\text{pub}, \text{dir}\_\text{bath}, \text{imp}\_\text{bath})
\]

1c. Create Long Dataset with Aggregated Stress (mean_stress) and Calculate Mean Value

\[
surveydata\_long <- surveydata\_new
\]
\[
surveydata\_long <- \text{gather}(surveydata\_long, \text{agg}\_\text{stress}, \text{val}\_\text{stress}, \text{upset}_\text{un}, \text{nerv}\_\text{stress}, \text{diff}\_\text{pile}, \text{cope}\_\text{change}, \text{conf}\_\text{prob}, \text{going}\_\text{way}, \text{on}\_\text{top}, \text{control}\_\text{time}, \text{nerv}\_\text{anx}, \text{worry}\_\text{stop}, \text{troub}\_\text{relax}, \text{bec}\_\text{annoy}, \text{afraid}\_\text{awf}, \text{not}\_\text{sleep}, \text{na.rm=F})
\]
\[
\text{mean}\_\text{stress}\_\text{dummy} <- surveydata\_long \%\% \text{group}\_\text{by}(\text{person}) \%\% \text{summarize}(\text{mean}\_\text{stress} = \text{mean}(\text{val}\_\text{stress}, \text{na.rm=T}))
\]

## Warning: package 'bindrcpp' was built under R version 3.4.3

\[
\text{mean}\_\text{stress}\_\text{dummy} <- \text{mean}\_\text{stress}\_\text{dummy}[, 2]
surveydata\_final\$\text{mean}\_\text{stress} <- \text{as.vector}(\text{mean}\_\text{stress}\_\text{dummy}\$\text{mean}\_\text{stress})
\]
1d. Create Long Dataset with Aggregated Inclusion (mean_inclusion) and Calculate Mean Value

```r
surveydata_long <- surveydata_new
surveydata_long <- gather(surveydata_long, agg_inclusion, val_inclusion, ease_coll, sch_events, want_camp, ease_camp, tune_bu, friend_grp, comm_bu, talk_bu, turn_bu, na.rm=F)
mean_inclusion_dummy <- surveydata_long %>%
  group_by(person) %>%
  summarize(mean_inclusion = mean(val_inclusion, na.rm=T))
mean_inclusion_dummy <- mean_inclusion_dummy[,2]
surveydata_final$mean_inclusion <- as.vector(mean_inclusion_dummy$mean_inclusion)
```

1e. Create Long Dataset with Aggregated Policies (mean_policies) and Calculate Mean Value

```r
surveydata_long <- surveydata_new
surveydata_long <- gather(surveydata_long, agg_policies, val_policies, gen_hon, disc_top, prof_names, gsm_aware, gsm_welc, comf_trans, pol_aware, health_safe, rep_pub, dir_bath, na.rm=F)
mean_policies_dummy <- surveydata_long %>%
  group_by(person) %>%
  summarize(mean_policies = mean(val_policies, na.rm=T))
mean_policies_dummy <- mean_policies_dummy[,2]
surveydata_final$mean_policies <- as.vector(mean_policies_dummy$mean_policies)
```

1f. Create Long Dataset with Aggregated Policy Changes (mean_changes) and Calculate Mean Value

```r
surveydata_long <- surveydata_new
surveydata_long <- gather(surveydata_long, agg_changes, val_changes, imp_bath, sing_stall, multi_stall, sign_change, na.rm=F)
mean_changes_dummy <- surveydata_long %>%
  group_by(person) %>%
  summarize(mean_changes = mean(val_changes, na.rm=T))
mean_changes_dummy <- mean_changes_dummy[,2]
surveydata_final$mean_changes <- as.vector(mean_changes_dummy$mean_changes)
```

1h. Create Long Dataset with Aggregated Satisfaction (mean_satisfied) and Calculate Mean Value

```r
surveydata_long <- surveydata_new
surveydata_long <- gather(surveydata_long, agg_satisfied, val_satisfied, self
```
```r
_sat, good_qual, pos_self, exp_bu, exp_prof, exp_staff, exp_stud, na.rm=F
mean_satisfied_dummy<-surveydata_long %>%
group_by(person) %>%
summarize(mean_satisfied = mean(val_satisfied, na.rm=T))
mean_satisfied_dummy <- mean_satisfied_dummy[,2]
surveydata_final$mean_satisfied <- as.vector(mean_satisfied_dummy$mean_satisfied)
```

2. Descriptive Statistics

2a. Delete Observations that Lack Aggregated Stress and Inclusion

2 observations deleted; 104 observations remain.

```r
surveydata_final$delete <- ifelse(surveydata_final$mean_stress=="NaN" & surveydata_final$mean_inclusion="NaN", 1, 0)
surveydata_final <- surveydata_final[surveydata_final$delete==0,]
surveydata_final <- subset(surveydata_final, select = -delete)
```

2b. Determine N by GSM Indicator Variable

GSM Students: 83, Non-GSM Students: 21

```r
table(surveydata_final$gsm)
##
## 0  1
## 82 21
```

2c. Subset Data According to GSM Indicator Variable

21 GSM students are in final_gsm1; 103 Non-GSM students are in final_gsm0.

```r
final_gsm1 <- surveydata_final[surveydata_final$gsm==1,]
final_gsm0 <- surveydata_final[surveydata_final$gsm==0,]
```

2d. Determine N% by Age Category

For gsm=0 - 1: 32.530120, 2: 56.626506, 3:7.228916, 4:3.614458
For gsm=1 - 1: 47.61905, 2: 42.85714, 3:9.52381

```r
prop.table(table(final_gsm0$age_grp))*100
##
## 1  2  3
## 32.92683 56.09756 10.97561
```
**Propositions**

- **2e. Determine N% by Race/Ethnicity**
  - For $gsm=0$ - 1: 9.638554, 2: 7.228916, 3: 56.626506, 4: 26.506024

- **2f. Determine N% for Domestic/International Student Status**
  - For $gsm=0$ - 1: 22.89157, 2: 77.10843
  - For $gsm=1$ - 1: 4.761905, 2: 95.238095

- **2g. Determine N% for Full-Time/Part-Time Student Status**
  - For $gsm=0$ - 1: 87.95181, 2: 12.04819
  - For $gsm=1$ - 1: 90.47619, 2: 9.52381
##
##        1        2
## 87.80488 12.19512

```r
prop.table(table(final_gsm1$stud_stat))*100
```
##
##        1        2
## 90.47619  9.52381

2h. Determine N% for Personal Income Category


```r
prop.table(table(final_gsm0$pers_inc))*100
```
##
##         1         2         3         4        99
## 52.439024  9.756098 10.975610  7.317073 19.512195

```r
prop.table(table(final_gsm1$pers_inc))*100
```
##
##         1         2         3         4        99
## 47.619048  9.523810  4.761905  4.761905 33.333333

3. Bivariate Analyses

3a. Boxplots for Each Mean Variable to Determine if Equal Variances Exist

Boxplot for Mean Stress by GSM Variable (1: GSM, 0: Non-GSM)

```r
boxplot(surveydata_final$mean_stress~surveydata_final$gsm)
```
Boxplot for Mean Inclusion by GSM Variable (1: GSM, 0: Non-GSM)

```r
boxplot(surveydata_final$mean_inclusion ~ surveydata_final$gsm)
```
Boxplot for Mean Awareness of Policy Changes by GSM Variable (1: GSM, 0: Non-GSM)

\texttt{boxplot(surveydata_final$mean\_changes\sim surveydata\_final$gsm)}

Boxplot for Mean Awareness of Policies by GSM Variable (1: GSM, 0: Non-GSM)

\texttt{boxplot(surveydata_final$mean\_policies\sim surveydata\_final$gsm)}
Boxplot for Mean Satisfaction with BUSPH by GSM Variable (1: GSM, 0: Non-GSM)

```r
boxplot(surveydata_final$mean_satisfied~surveydata_final$gsm)
```
3b. Variances Test

Variance Test for Mean Stress by GSM Variable (1: GSM, 0: Non-GSM)

\[
\text{var}(\text{surveydata_final$mean\_stress[\text{surveydata_final$gsm==1}]})
\]

## [1] 0.3478614

\[
\text{var}(\text{surveydata_final$mean\_stress[\text{surveydata_final$gsm==0}]})
\]

## [1] 0.4399889

Variance Test for Mean Inclusion by GSM Variable (1: GSM, 0: Non-GSM)

\[
\text{var}(\text{surveydata_final$mean\_inclusion[\text{surveydata_final$gsm==1}]})
\]

## [1] 0.420341

\[
\text{var}(\text{surveydata_final$mean\_inclusion[\text{surveydata_final$gsm==0}]})
\]

## [1] 0.5942832

Variance Test for Mean Awareness of Policy Changes by GSM Variable (1: GSM, 0: Non-GSM)

\[
\text{var}(\text{surveydata_final$mean\_changes[\text{surveydata_final$gsm==1}]})
\]

## [1] 0.4466443

\[
\text{var}(\text{surveydata_final$mean\_changes[\text{surveydata_final$gsm==0}]})
\]

## [1] 0.6955874

Variance Test for Mean Awareness of Policies by GSM Variable (1: GSM, 0: Non-GSM)

\[
\text{var}(\text{surveydata_final$mean\_policies[\text{surveydata_final$gsm==1}]})
\]

## [1] 0.1529158

\[
\text{var}(\text{surveydata_final$mean\_policies[\text{surveydata_final$gsm==0}]})
\]

## [1] 0.2820408

Variance Test for Mean Satisfaction with BUSPH by GSM Variable (1: GSM, 0: Non-GSM)

\[
\text{var}(\text{surveydata_final$mean\_satisfied[\text{surveydata_final$gsm==1}]})
\]

## [1] 0.4124368

\[
\text{var}(\text{surveydata_final$mean\_satisfied[\text{surveydata_final$gsm==0}]})
\]

## [1] 0.3708223
3c. T-tests

T-Test for Differences in Mean Stress by GSM Variable (1: GSM, 0: Non-GSM)

```r
t.test(surveydata_final$mean_stress~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

##
## Welch Two Sample t-test

## data:  surveydata_final$mean_stress by surveydata_final$gsm
## t = -1.9173, df = 34.17, p-value = 0.06359
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.58483098  0.01696745
## sample estimates:
## mean in group 0 mean in group 1
##    2.751652    3.035583
```

T-Test for Differences in Mean Inclusion by GSM Variable (1: GSM, 0: Non-GSM)

```r
t.test(surveydata_final$mean_inclusion~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

##
## Welch Two Sample t-test

## data:  surveydata_final$mean_inclusion by surveydata_final$gsm
## t = 0.90808, df = 35.941, p-value = 0.3699
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.1849528  0.4848302
## sample estimates:
## mean in group 0 mean in group 1
##    3.811314    3.661376
```

T-Test for Differences in Mean Awareness of Policies by GSM Variable (1: GSM, 0: Non-GSM)

```r
t.test(surveydata_final$mean_policies~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

##
## Welch Two Sample t-test

## data:  surveydata_final$mean_policies by surveydata_final$gsm
## t = 1.8892, df = 41.093, p-value = 0.06594
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.01348502  0.40470646
## sample estimates:
T-Test for Differences in Mean Attitudes about Policy Changes by GSM Variable (1: GSM, 0: Non-GSM)

```r
t.test(surveydata_final$mean_changes~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

## mean in group 0 mean in group 1
## 3.211246 3.015635

T-Test for Differences in Mean Satisfaction with BUSPH by GSM Variable (1: GSM, 0: Non-GSM)

```r
t.test(surveydata_final$mean_satisfied~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

## mean in group 0 mean in group 1
## 4.050671 4.190238

T-Test for Differences in Single Stall Policy by GSM Variable (1: GSM, 0: Non-GSM)

```r
t.test(surveydata_final$sing_stall~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

## mean in group 0 mean in group 1
## 3.772893 3.575782
### -0.4481088  0.2085612
### sample estimates:
### mean in group 0 mean in group 1
### 4.149750  4.269524

**T-Test for Differences in Multi Stall Policy by GSM Variable (1: GSM, 0: Non-GSM)**

```r
t.test(surveydata_final$multi_stall~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

### Welch Two Sample t-test
### data:  surveydata_final$multi_stall by surveydata_final$gsm
### t = -0.81438, df = 35.757, p-value = 0.4208
### alternative hypothesis: true difference in means is not equal to 0
### 95 percent confidence interval:
### -0.6337856  0.2706816
### sample estimates:
### mean in group 0 mean in group 1
### 3.929877  4.111429

**T-Test for Differences in Multi Stall Policy by GSM Variable (1: GSM, 0: Non-GSM)**

```r
t.test(surveydata_final$sign_change~surveydata_final$gsm, mu=0, alt="two.sided", conf=0.95, var.eq=F, paired=F)
```

### Welch Two Sample t-test
### data:  surveydata_final$sign_change by surveydata_final$gsm
### t = -0.16156, df = 39.628, p-value = 0.8725
### alternative hypothesis: true difference in means is not equal to 0
### 95 percent confidence interval:
### -0.3925233  0.3344281
### sample estimates:
### mean in group 0 mean in group 1
### 4.176667  4.205714

**3d. Determine Mean and SDs of Aggregated Variables by GSM Indicator Value**

**Determine Mean and SD of Aggregated Stress by GSM Variable (1: GSM, 0: Non-GSM)**

```r
surveydata_final %>%
  group_by(gsm) %>%
  summarize(Mean = mean(mean_stress), sd=sd(mean_stress))
```

## A tibble: 2 x 3
##   gsm  Mean   sd
##   <fct> <dbl> <dbl>
Determine Mean and SD of Aggregated Inclusion by GSM Variable (1: GSM, 0: Non-GSM)

```r
surveydata_final %>%
  group_by(gsm) %>%
  summarize(Mean = mean(mean_inclusion), sd = sd(mean_inclusion))
```

## A tibble: 2 x 3
##   gsm  Mean    sd
##   <dbl> <dbl> <dbl>
## 1    0  3.81  0.771
## 2    1  3.66  0.648

Determine Mean and SD of Aggregated Awareness of Policies by GSM Variable (1: GSM, 0: Non-GSM)

```r
surveydata_final %>%
  group_by(gsm) %>%
  summarize(Mean = mean(mean_policies), sd = sd(mean_policies))
```

## A tibble: 2 x 3
##   gsm  Mean    sd
##   <dbl> <dbl> <dbl>
## 1    0  3.21  0.531
## 2    1  3.02  0.391

Determine Mean and SD of Aggregated Attitudes about Policy Changes by GSM Variable (1: GSM, 0: Non-GSM)

```r
surveydata_final %>%
  group_by(gsm) %>%
  summarize(Mean = mean(mean_changes), sd = sd(mean_changes))
```

## A tibble: 2 x 3
##   gsm  Mean    sd
##   <dbl> <dbl> <dbl>
## 1    0  4.05  0.834
## 2    1  4.19  0.668

Determine Mean and SD of BUSPH Satisfaction by GSM Variable (1: GSM, 0: Non-GSM)

```r
surveydata_final %>%
  group_by(gsm) %>%
  summarize(Mean = mean(mean_satisfied), sd = sd(mean_satisfied))
```
## # A tibble: 2 x 3
##     gsm  Mean    sd
##   <dbl> <dbl> <dbl>
## 1    0.  3.77 0.609
## 2    1.  3.58 0.642

Determine SD of Single Stall Policy Question by GSM Variable (1: GSM, 0: Non-GSM)

```r
tapply(surveydata_final$sing_stall, surveydata_final$gsm, sd, na.rm=TRUE)
```

```
# 0  1
# 0.8929938 0.5915697
```

Determine SD of Multi Stall Policy Question by GSM Variable (1: GSM, 0: Non-GSM)

```r
tapply(surveydata_final$multi_stall, surveydata_final$gsm, sd, na.rm=TRUE)
```

```
# 0  1
# 1.0306012 0.8765289
```

Determine SD of Sign Change Policy Question by GSM Variable (1: GSM, 0: Non-GSM)

```r
tapply(surveydata_final$sign_change, surveydata_final$gsm, sd, na.rm=TRUE)
```

```
# 0  1
# 0.8955068 0.6862257
```

### 4. Multivariate Analyses

#### 4a. Table 2. Logistic Regression for Dichotomous Stress Variable

Begin by making mean_stress into dichotomous variable (greater than or less than 3.5).

```r
surveydata_final$dich_stress<-ifelse(surveydata_final$mean_stress>=3.5, 1, 0)
table(surveydata_final$dich_stress)
```

```
#  0  1
# 86 17
```

```r
logstress<- glm(as.factor(dich_stress)~as.factor(gsm)+ as.factor(race_ethn) + as.factor(stud_stat) + as.factor(age_grp)+as.factor(pers_inc), data=surveydata_final, family="binomial")
summary(logstress)
```

```
# Call:
# glm(formula = as.factor(dich_stress) ~ as.factor(gsm) + as.factor(race_ethn) +
#     as.factor(stud_stat) + as.factor(age_grp) + as.factor(pers_inc),
```
family = "binomial", data = surveydata_final)

Deviance Residuals:
Min 1Q Median 3Q Max
-1.26962 -0.60227 -0.43708 -0.00014 2.18897

Coefficients:
Estimate Std. Error z value Pr(>|z|)
(Intercept) -2.9946 1.2450 -2.405 0.0162 *
as.factor(gsm)1 0.9981 0.7016 1.423 0.1548
as.factor(race_ethn)2 0.2181 1.6264 0.134 0.8933
as.factor(race_ethn)3 0.6943 1.1794 0.589 0.5561
as.factor(race_ethn)4 1.1789 1.2762 0.924 0.3556
as.factor(stud_stat)2 -16.8098 1829.5043 -0.009 0.9927
as.factor(age_grp)2 0.2533 0.7508 0.337 0.7358
as.factor(age_grp)3 1.5981 1.1425 1.399 0.1619
as.factor(pers_inc)2 0.3812 0.9742 0.391 0.6956
as.factor(pers_inc)3 2.0458 0.8554 2.392 0.0168 *
as.factor(pers_inc)4 -0.8491 1.3778 -0.616 0.5377
as.factor(pers_inc)99 -0.5664 0.9614 -0.589 0.5558
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 92.277 on 102 degrees of freedom
Residual deviance: 76.633 on 91 degrees of freedom
AIC: 100.63

Number of Fisher Scoring iterations: 17

exp(cbind(OR = coef(logstress), confint(logstress)))

OR 2.5% 97.5%
(Intercept) 5.005811e-02 2.128060e-03 3.895611e-01
as.factor(gsm)1 2.713257e+00 6.641691e-01 1.100334e+01
as.factor(race_ethn)2 1.243755e+00 3.664339e-02 4.254468e+01
as.factor(race_ethn)3 2.002309e+00 2.671785e-01 4.215468e+01
as.factor(race_ethn)4 3.250886e+00 3.365943e-01 7.652840e+01
as.factor(stud_stat)2 -16.8098 1829.5043 -0.009 0.9927
as.factor(age_grp)2 1.288316e+00 2.995249e-01 6.118539e+00
as.factor(age_grp)3 4.943427e+00 5.325260e-01 5.242990e+01
as.factor(pers_inc)2 1.464055e+00 1.704334e-01 9.072046e+00
as.factor(pers_inc)3 7.35132e+00 1.480213e+00 4.499423e+01
as.factor(pers_inc)4 4.277953e-01 1.565541e-02 4.960978e+00
as.factor(pers_inc)99 5.675793e-01 6.710428e-02 3.253102e+00
4b. Table 3. Linear Regression for Social Inclusion

```r
model.gsminclusion <- lm(mean_inclusion ~ as.factor(gsm) + as.factor(race_ethn) + as.factor(stud_stat) + as.factor(age_grp) + as.factor(pers_inc), data=surveydata_final)
summary(model.gsminclusion)
```

```
##
## Call:
## lm(formula = mean_inclusion ~ as.factor(gsm) + as.factor(race_ethn) +
##     as.factor(stud_stat) + as.factor(age_grp) + as.factor(pers_inc),
##     data = surveydata_final)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.94405 -0.47795 -0.08361  0.52222  1.47194
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)     3.96817    0.25560  15.525   <2e-16 ***
## as.factor(gsm)1 -0.20797    0.18618  -1.117   0.2669
## as.factor(race_ethn)2 -0.01795    0.36449  -0.049   0.9608
## as.factor(race_ethn)3  0.13438    0.25979   0.517   0.6062
## as.factor(race_ethn)4  0.16850    0.29440   0.572   0.5685
## as.factor(stud_stat)2  0.07664    0.25944   0.295   0.7684
## as.factor(age_grp)2  -0.29109    0.17309  -1.682   0.0960 .
## as.factor(age_grp)3  -0.57102    0.30043  -1.901   0.0605 .
## as.factor(pers_inc)2  0.11832    0.25939   0.456   0.6494
## as.factor(pers_inc)3  0.16850    0.29440   0.572   0.5685
## as.factor(pers_inc)4  0.13460    0.34109   0.395   0.6940
## as.factor(pers_inc)99 -0.08963    0.19941  -0.449   0.6542
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.744 on 91 degrees of freedom
## Multiple R-squared:  0.115,  Adjusted R-squared:  0.007993
## F-statistic: 1.075 on 11 and 91 DF,  p-value: 0.3903
```

```r
confint(model.gsminclusion)
```

```
##               2.5 %       97.5 %
## (Intercept)     3.4604462  4.47588650
## as.factor(gsm)1 -0.5777953  0.16184748
## as.factor(race_ethn)2 -0.7419722  0.70606561
## as.factor(race_ethn)3 -0.3816622  0.65042343
## as.factor(race_ethn)4 -0.4162885  0.75329572
## as.factor(stud_stat)2 -0.4387010  0.59198332
## as.factor(age_grp)2  -0.6349039  0.05272440
## as.factor(age_grp)3  -1.1677910  0.02570224
## as.factor(pers_inc)2  -0.3969312  0.63356971
```
4c. Table 4. Interaction Between Policy Awareness Score and SGM Status for Stress

Linear Regression analysis where policy awareness score & SGM status are interacted together so we can explore how being both SGM status and high policy score affects predicted stress scores

```
intersgmpolmean <- lm(mean_stress ~ as.factor(gsm) * mean_policies + as.factor(race_ethn) + as.factor(stud_stat) + as.factor(age_grp) + as.factor(pers_inc), data = surveydata_final)
summary(intersgmpolmean)
```

```
## Call:
## lm(formula = mean_stress ~ as.factor(gsm) * mean_policies + as.factor(race_ethn) +
##     as.factor(stud_stat) + as.factor(age_grp) + as.factor(pers_inc),
##     data = surveydata_final)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.57816 -0.32313 -0.01895  0.39758  1.56410

## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)        2.9662     0.4859    6.104 2.64e-08 ***
## as.factor(gsm)1    1.4824     1.2536    1.182  0.24016
## mean_policies     -0.1196     0.1366   -0.876  0.38353
## as.factor(race_ethn)2    0.0063    0.3128     0.020  0.98401
## as.factor(race_ethn)3   -0.0404    0.2233   -0.181  0.85667
## as.factor(race_ethn)4    0.3343    0.2524    1.325  0.18871
## as.factor(stud_stat)2   -0.1209    0.2257   -0.536  0.59332
## as.factor(age_grp)2     0.0555    0.1492    0.372  0.71064
## as.factor(age_grp)3     0.1673    0.2571    0.651  0.51684
## as.factor(pers_inc)2    0.2197    0.2225    0.987  0.32616
## as.factor(pers_inc)3    0.6110    0.2317    2.637  0.00987 **
## as.factor(pers_inc)4   -0.1207    0.2965   -0.407  0.68497
## as.factor(pers_inc)99   -0.0391    0.1705   -0.229  0.81926
## as.factor(gsm)1:mean_policies  -0.3934    0.4070   -0.967  0.33636
## ---
## Signif. codes:  < 0.001 *** 0.001 ** 0.01 * 0.05 . 0.1 1

## Residual standard error: 0.636 on 89 degrees of freedom
```
## Multiple R-squared: 0.1808, Adjusted R-squared: 0.06109
## F-statistic: 1.511 on 13 and 89 DF, p-value: 0.1292

`confint(intersgmpolmean)`

<table>
<thead>
<tr>
<th></th>
<th>2.5 %</th>
<th>97.5 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>2.0006368</td>
<td>3.9316872</td>
</tr>
<tr>
<td>as.factor(gsm)1</td>
<td>-1.0085336</td>
<td>3.9733615</td>
</tr>
<tr>
<td>mean_policies</td>
<td>-0.3911040</td>
<td>0.1518185</td>
</tr>
<tr>
<td>as.factor(race_ethn)2</td>
<td>-0.6152983</td>
<td>0.6278754</td>
</tr>
<tr>
<td>as.factor(race_ethn)3</td>
<td>-0.4840688</td>
<td>0.4031851</td>
</tr>
<tr>
<td>as.factor(race_ethn)4</td>
<td>-0.1671730</td>
<td>0.835985</td>
</tr>
<tr>
<td>as.factor(stud_stat)2</td>
<td>-0.5693434</td>
<td>0.3274472</td>
</tr>
<tr>
<td>as.factor(age_grp)2</td>
<td>-0.2409174</td>
<td>0.3519739</td>
</tr>
<tr>
<td>as.factor(age_grp)3</td>
<td>-0.3435315</td>
<td>0.6781890</td>
</tr>
<tr>
<td>as.factor(pers_inc)2</td>
<td>-0.2224631</td>
<td>0.6619104</td>
</tr>
<tr>
<td>as.factor(pers_inc)3</td>
<td>0.1505974</td>
<td>1.0714389</td>
</tr>
<tr>
<td>as.factor(pers_inc)4</td>
<td>-0.7099285</td>
<td>0.4685269</td>
</tr>
<tr>
<td>as.factor(pers_inc)99</td>
<td>-0.3779004</td>
<td>0.2997425</td>
</tr>
<tr>
<td>as.factor(gsm)1:mean_policies</td>
<td>1.2023016</td>
<td>0.4153525</td>
</tr>
</tbody>
</table>

### 4d. Exploratory Analyses using Table 4

Keeping everything constant except gsm status & mean_policies Showing how gsm status & mean policies impact stress

```r
def <- -c(gsm=1, mean_policies=5, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=2)
dlow <- -c(gsm=1, mean_policies=1, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=2)
dhighnonid3 <- -c(gsm=0, mean_policies=5, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=2)
dlownonid4 <- -c(gsm=0, mean_policies=1, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=2)
polpred <- as.data.frame(rbind(def, dlow, dhighnonid3, dlownonid4))
predict(intersgmpolmean, polpred, interval="prediction", level=0.95)
```

<table>
<thead>
<tr>
<th></th>
<th>fit</th>
<th>lwr</th>
<th>upr</th>
</tr>
</thead>
<tbody>
<tr>
<td>highgsmid1</td>
<td>2.117799</td>
<td>0.1156715</td>
<td>4.119927</td>
</tr>
<tr>
<td>lowgsmid2</td>
<td>4.170269</td>
<td>2.1067594</td>
<td>6.233778</td>
</tr>
<tr>
<td>highnonid3</td>
<td>2.602758</td>
<td>1.1929289</td>
<td>4.012588</td>
</tr>
<tr>
<td>lownonid4</td>
<td>3.081329</td>
<td>1.6039295</td>
<td>4.558729</td>
</tr>
</tbody>
</table>

### 4e. Figure 1

Keeping student status, age-group & personal income constant, organized from high to low Showing how gsm status, race/ethnicity & mean policy score impacts stress

```r
def1 <- -c(gsm=1, mean_policies=1, race_ethn=4, stud_stat=1, age_grp=2, pers_inc=2)
```
id2<-c(gsm=1, mean_policies=1, race_ethn=2, stud_stat=1, age_grp=2, pers_inc=2)
id3<-c(gsm=1, mean_policies=1, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=2)
id4<-c(gsm=0, mean_policies=1, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=3)
id5<-c(gsm=0, mean_policies=5, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=3)
id6<-c(gsm=1, mean_policies=5, race_ethn=4, stud_stat=1, age_grp=2, pers_inc=2)
id7<-c(gsm=1, mean_policies=5, race_ethn=2, stud_stat=1, age_grp=2, pers_inc=2)
id8<-c(gsm=1, mean_policies=5, race_ethn=3, stud_stat=1, age_grp=2, pers_inc=2)
pred2<-as.data.frame(rbind(id1, id2, id3, id4, id5, id6, id7, id8))
y<-as.data.frame(predict(intersgmpolmean, pred2, interval="prediction", level =0.95))
y<-data.frame(id=row.names(y), y)
p<-ggplot(data=y, aes(x=id, y=fit))
p+geom_point()+geom_errorbar(aes(ymin=lwr, ymax=upr))+ylim(0,7)+
 labs(title="Predicted Stress Scores by on SGM status and Policy Awareness Scores", x="Individuals", y="Perceived Stress Score")
5. Supplementary Tables & Figures

5a. Supplementary Table 1

Create Dichotomous Variables for the following policies where Agreement is indicated by a score $\geq 4$

- gen_hon - Professors use gendered honorifics
- disc_top - Discussed transgender topics in class
- prof_names - Professors ask student for names & pronouns
- gsm Aware - Aware of GSM students and their problems
- gsm_welc - BUSPH is a welcoming place for GSM students
- comf_trans - Comfort explaining meaning of transgender to students
- pol_aware - Awareness of institutional policies for GSM students
- health_safe - Health and safety of GSM students is priority at BUSPH
- rep_pub - TGNC representation in recruitment and publicity
- dir_bath - Able to give directions to gender-neutral bathrooms at BUSPH
- imp_bath - Importance of making gender-neutral bathrooms accessible
- sing_stall - Support for single-stall gender-neutral bathrooms
- multi_stall - Support for multi-stall gender-neutral bathrooms
- sign_change - Support changing signage from single-sex to gender-neutral

```r
surveydata_final$genhon2 <- ifelse(surveydata_final$gen_hon $geq 4, 1, 0)
surveydata_final$disc_top2 <- ifelse(surveydata_final$disc_top $geq 4, 1, 0)
surveydata_final$prof_names2 <- ifelse(surveydata_final$prof_names $geq 4, 1, 0)
surveydata_final$gsm Aware2 <- ifelse(surveydata_final$gsm Aware $geq 4, 1, 0)
surveydata_final$gsm_welc2 <- ifelse(surveydata_final$gsm_welc $geq 4, 1, 0)
surveydata_final$comf_trans2 <- ifelse(surveydata_final$comf_trans $geq 4, 1, 0)
surveydata_final$pol_aware2 <- ifelse(surveydata_final$pol_aware $geq 4, 1, 0)
surveydata_final$health_safe2 <- ifelse(surveydata_final$health_safe $geq 4, 1, 0)
surveydata_final$rep_pub2 <- ifelse(surveydata_final$rep_pub $geq 4, 1, 0)
surveydata_final$dir_bath2 <- ifelse(surveydata_final$dir_bath $geq 4, 1, 0)
surveydata_final$imp_bath2 <- ifelse(surveydata_final$imp_bath $geq 4, 1, 0)
surveydata_final$sign_change2 <- ifelse(surveydata_final$sign_change $geq 4, 1, 0)
surveydata_final$sing_stall2 <- ifelse(surveydata_final$sing_stall $geq 4, 1, 0)
surveydata_final$multi_stall2 <- ifelse(surveydata_final$multi_stall $geq 4, 1, 0)
```

Counts and Percentages for all students:

```r
surveydata_final $>% % summarise_at(c("genhon2", "disc_top2", "prof_names2", "gsm Aware2", "gsm_welc2", "comf_trans2", "pol_aware2", "health_safe2", "rep_pub2"), sum, na.rm=TRUE)
```
## dirbath2 impbath2 singstall2 multistall2 sign_change2
## 1 14 56 65 56 67

```r
surveydata_final %>% summarise_at(c("genhon2", "disctop2", "profnames2", "gsmaware2", "gsmwelc2", "comftrans2", "polaware2", "healthsafe2", "repub2"), mean, na.rm=TRUE)
```

```r
##     genhon2  disctop2 profnames2 gsmaware2  gsmwelc2 comftrans2  polaware2  healthsafe2  repub2
## 1 0.6893204 0.2621359  0.1650485 0.5242718  0.3495146  0.4705882 0.06862745

##   dirbath2 impbath2 singstall2 multistall2 sign_change2
## 1 0.1372549 0.5490196  0.6435644   0.5490196    0.6568627

Counts and Percentages for SGM students: By GSM Variable (1: GSM, 0: Non-GSM)

```r
surveydata_final %>% group_by(gsm) %>% summarise_at(c("genhon2", "disctop2", "profnames2", "gsmaware2", "gsmwelc2", "comftrans2", "polaware2", "healthsafe2", "repub2"), sum, na.rm=TRUE)
```

```r
## # A tibble: 2 x 10
##     gsm genhon2 disctop2 profnames2 gsmaware2 gsmwelc2 comftrans2  polaware2  healthsafe2  repub2
##   <dbl>   <dbl>    <dbl>      <dbl>     <dbl>    <dbl>      <dbl>      <dbl>     <dbl>     <dbl>
## 1    0.     60.      20.        13.       42.      33.        36.       0.5490196 0.6568627
## 2    1.     11.       7.         4.       12.       3.        12.       0.5490196 0.6568627

## # A tibble: 2 x 6
##     gsm dirbath2 impbath2 singstall2 multistall2 sign_change2
##   <dbl>    <dbl>    <dbl>      <dbl>       <dbl>        <dbl>
## 1    0.      13.      43.        51.         44.          53.

surveydata_final %>% group_by(gsm) %>% summarise_at(c("genhon2", "disctop2", "profnames2", "gsmaware2", "gsmwelc2", "comftrans2", "polaware2", "healthsafe2", "repub2"), mean, na.rm=TRUE)
```

```r
## # A tibble: 2 x 10
##     gsm genhon2 disctop2 profnames2 gsmaware2 gsmwelc2 comftrans2  polaware2  healthsafe2  repub2
##   <dbl>   <dbl>    <dbl>      <dbl>     <dbl>    <dbl>      <dbl>      <dbl>     <dbl>     <dbl>
## 1    0.   0.732    0.244      0.159     0.512    0.402      0.439
## 2    1.   0.524    0.333      0.190     0.571    0.143      0.600

## # A tibble: 2 x 6
##     gsm dirbath2 impbath2 singstall2 multistall2 sign_change2
##   <dbl>    <dbl>    <dbl>      <dbl>       <dbl>        <dbl>
## 1    0.      13.      43.        51.         44.          53.

surveydata_final %>% group_by(gsm) %>% summarise_at(c("dirbath2", "impbath2", "singstall2", "multistall2", "sign_change2"), mean, na.rm=TRUE)
```

```r
## # A tibble: 2 x 10
##     gsm genhon2 disctop2 profnames2 gsmaware2 gsmwelc2 comftrans2  polaware2  healthsafe2  repub2
##   <dbl>   <dbl>    <dbl>      <dbl>     <dbl>    <dbl>      <dbl>      <dbl>     <dbl>     <dbl>
## 1    0.   0.732    0.244      0.159     0.512    0.402      0.439
## 2    1.   0.524    0.333      0.190     0.571    0.143      0.600
```

---

Team EDDD (Group C)
DL, EA, NDD, SKP
5b. Supplementary Table 2

Perceived Stress Linear Regression

```r
model.gsmstress <- lm(mean_stress ~ as.factor(gsm) + as.factor(race_ethn) + as.factor(stud_stat) + as.factor(age_grp) + as.factor(pers_inc), data=surveydata_final)

summary(model.gsmstress)
```

```
## Call:
## lm(formula = mean_stress ~ as.factor(gsm) + as.factor(race_ethn) +
##     as.factor(stud_stat) + as.factor(age_grp) + as.factor(pers_inc),
##     data = surveydata_final)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.6356 -0.3684 -0.0280  0.4050  1.5911
##
## Coefficients: (results trimmed)
##                  Estimate Std. Error t value  Pr(>|t|)
## (Intercept)       2.5959     0.2193  11.839 < 2e-16 ***
## as.factor(gsm)1   0.3143     0.1597   1.968   0.0521 .
## as.factor(race_ethn)2 -0.0441    0.3127  -0.139  0.89542
## as.factor(race_ethn)3  0.3323    0.2229   1.492  0.13634
## as.factor(age_grp)2 -0.0183    0.2926  -0.062  0.95077
## as.factor(age_grp)3  0.0477     0.1485   0.321   0.7489
## as.factor(pers_inc)2  0.1897    0.2577   0.738  0.46247
## as.factor(pers_inc)3 -0.1440    0.2926  -0.492  0.62368
## as.factor(pers_inc)99  0.0336    0.1711   0.196  0.84492
##
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6383 on 91 degrees of freedom
## Multiple R-squared:  0.1564, Adjusted R-squared:  0.05442
## F-statistic: 1.534 on 11 and 91 DF,  p-value: 0.1331
```
```
confint(model.gsmstress)
##          2.5%     97.5%
## (Intercept) 2.160317923 3.0314123
## as.factor(gsm)1 -0.002966749 0.6315351
## as.factor(race_ethn)2 -0.579882596 0.6623152
## as.factor(race_ethn)3 -0.486786536 0.3985871
## as.factor(race_ethn)4 -0.169325813 0.8340009
## as.factor(stud_stat)2 -0.624438618 0.2597329
## as.factor(age_grp)2 -0.247276138 0.3426051
## as.factor(age_grp)3 -0.326722784 0.6971640
## as.factor(pers_inc)2 -0.252315236 0.6316989
## as.factor(pers_inc)3 0.149162755 1.0660544
## as.factor(pers_inc)4 -0.725274381 0.4371648
## as.factor(pers_inc)99 -0.373355866 0.3062426
```

5c. Code for Supplementary Figure 1.

Sample Size Calculations

```r
n_for_power<-function(p1,p2,z1,z2){
    sampsize2=(((z1+z2)^2)*2*((p1+p2)/2)*(1-((p1+p2)/2)))/((p1-p2)^2)
    return(sampsize2)
}

# oswalt & lederer
n_for_power(0.334, 0.116, 1.96, 0.84)
# [1] 57.53304

# sample size is 57

# pflum et al
n_for_power(0.26, 0.288, 1.96, 0.84)
# [1] 3978.48

# 3978
n_for_power(0.28, 0.288, 1.96, 0.84)
# [1] 49819.28

# 49819
n_for_power(0.30, 0.288, 1.96, 0.84)
# [1] 22601.41

# 22601
n_for_power(0.32, 0.288, 1.96, 0.84)
# [1] 3239.88
```
5d. Supplementary Figure 2

Boxplot of Perceived Stress by SGM Status

```r
library(ggplot2)
namesx<-c("Cisgender Non-LGBTQ", "SGM")
ggplot(surveydata_final, aes(x=as.factor(gsm), y=mean_stress))+geom_boxplot()+labs(title="Boxplot of Perceived Stress by SGM Status", x="SGM Status", y="Perceived Stress")+scale_x_discrete(labels=namesx)+ylim(1,5)
```

![Boxplot of Perceived Stress by SGM Status](image-url)
5e. Supplementary Figure 3

Boxplot of Policy Awareness by SGM Status

```r
library(ggplot2)
namesx<-c("Cisgender Non-LGBTQ", "SGM")
ggplot(surveydata_final, aes(x=as.factor(gsm), y=mean_policies))+geom_boxplot()+labs(title="Boxplot of Policy Awareness by SGM Status", x="SGM Status", y="Policy Awareness")+scale_x_discrete(labels=namesx)+ylim(1,5)
```

5f. Supplementary Figure 4

Boxplot of Satisfaction by SGM Status

```r
library(ggplot2)
namesx<-c("Cisgender Non-LGBTQ", "SGM")
ggplot(surveydata_final, aes(x=as.factor(gsm), y=mean_satisfied))+geom_boxplot()+labs(title="Boxplot of Satisfaction by SGM Status", x="SGM Status", y="Satisfaction")+scale_x_discrete(labels=namesx)+ylim(1,5)
```
Boxplot of Social Inclusion by SGM Status

library(ggplot2)
namesx<-c("Cisgender Non-LGBTQ", "SGM")

ggplot(surveydata_final, aes(x=as.factor(gsm), y=mean_inclusion))+geom_boxplot()+labs(title="Boxplot of Social Inclusion by SGM Status", x="SGM Status", y ="Social Inclusion")+scale_x_discrete(labels=namesx)+ylim(1,5)
5h. Supplementary Figure 6

Boxplot of Policy Change Support by SGM Status

```r
library(ggplot2)
namesx<-c("Cisgender Non-LGBTQ", "SGM")
ggplot(surveydata_final, aes(x=as.factor(gsm), y=mean_changes)) + geom_boxplot() + labs(title="Boxplot of Policy Change Support by SGM Status", x="SGM Status", y="Policy Change Support") + scale_x_discrete(labels=namesx) + ylim(1,5)
```
Boxplot of Policy Change Support by SGM Status

- Cisgender Non-LGBTQ
- SGM

Policy Change Support

SGM Status