DEI statements can activate stereotype threat: evidence from a field experiment

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Abstract

We explore how DEI statements impact college students. We randomly assign 3,825 incoming freshmen to receive emails that include or exclude a DEI statement. We find that the DEI statement reduces student interest in academic resources by 50%, with greater declines for men than women. 12 weeks later, Black and Hispanic students report greater rates of worry regarding stereotypes, but not White and Asian students. Finally, transcript data indicate that the DEI statements reduce GPAs for men. Potential mechanisms include greater disengagement in university resources among men. Our results suggest that organizations should empirically test DEI statements before implementing them.

Keywords: diversity, stereotype threat, social identity, peer effects
JEL Classifications: I23, I24, J15, J16

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I. INTRODUCTION

Recent years have witnessed explosive growth in diversity, equity, and inclusion (DEI) statements (Bain, 2021), which pronounce commitment to support underrepresented groups, to improve their sense of belonging, and to shape their identities as full participants in the organization (Stringfellow, 2020; Verlinden, n.d.). For example, 95% of U.S. R1 institutions have publicly issued such statements (Ellsworth et al., 2022). These stated commitments may be especially important for women and racial minorities, whose physical attributes and lived experiences may separate them from their peers. Low sense of belonging creates a vicious cycle, in that low representation of one social group may discourage others of that group, reinforcing underrepresentation. If DEI statements improve sense of belonging, they could help break this cycle by assuring minorities that their presence is valued.

Field experiments show that short interventions to improve sense of belonging can be powerful enough to improve educational progression, GPA, physical health, and career success ten years later among racial minorities (Walton et al., 2023; Walton and Cohen, 2011; Brady et al., 2020; Yeager et al., 2016; Binning et al., 2020; Murphy et al., 2020). Their success is attributed to their ability to change how students approach the challenges of college life, which underrepresented students are more likely to interpret as reflective of fixed, negative traits associated with their group (Brady et al., 2020). The interventions aimed to provide mental tools to re-interpret these challenges as universal to all students, and as temporary setbacks that fade.

However, these interventions differ from DEI statements. First, they focus on mental tools to re-interpret challenges. Second, they require that participants actively reflect to self-generate these mental tools. It is unclear whether DEI statements, which do not incorporate either feature, will achieve the same benefits. Rather, there is a risk that it may activate students' awareness of

in- and out-group differences without providing the tools to interpret them. Prior work in economics has shown that DEI statements can improve minority job application rates (Flory et al., 2021), but this invites the concern that minorities may exit these organizations at greater rates if organizations fail to deliver on the commitments to inclusion implied by these statements (McKay and Avery, 2005).

Indeed, laboratory studies on DEI statements yield mixed findings. Some find that DEI statements which recognize differences improved attitudes for marginalized groups more than those that emphasize similarities (Wilton et al., 2014; Celeste et al., 2019; Good et al., 2020). Others find that rhetoric around gaps and disparities heighten in- versus out-group perceptions (Quinn, 2020; Flores, 2007; Gutierrez, 2008), creating a "wedge to separate subgroups" (Charness and Chen, 2010). For individuals who did not previously question their place, it can name concerns about belonging into existence. By implying that the boundaries of identity exist along gender and race categories, DEI statements risk activating stereotype threat (Steele, 1997; Steele and Aronson, 1995; Steele et al., 2002). Prior lab experiments show that overt emphasis of gender gaps raised women's perceived stereotype threat, lowered their sense of belonging, and increased their general negative affect (Murphy et al., 2007; Pietri et al., 2019; Cowgill et al., 2021). Other experimental work shows that DEI statements could foster feelings of exclusion among non-minoritized students (Plaut et al., 2011; Dover et al., 2016).

In partnership with a large state university ("University"), we design and implement a field experiment to measure how DEI statements impact incoming first-year undergraduates. Our goal was to use DEI statements to improve sense of belonging among college entrants. Adolescents are a key population, since they are actively forming beliefs about the world and their role in it. In our context, our subjects have just entered a new, challenging environment with 40,000 new peers,

where they must navigate their identities on their own, away from their families for the first time. Many students at University come from homogeneous communities, making college their first opportunity to interact with classmates with different race and ethnicity groups. University communications signal to students how someone of their social group would be viewed in this new community. These communications may shape first impressions regarding institutional support, appropriate fields of study, occupations that they would "belong" in, and social interactions with others.

One week before the 2022-2023 academic year (August 2022), we sent emails which offered a free information session on succeeding in college to a random third of the incoming freshmen class (N=3,825). We randomized whether the emails included a DEI statement. We find that any DEI statement depressed interest in the information sessions by 50%, relative to a control email that contained no DEI statement. While there was no gender difference in interest in these academic resources at baseline, receiving any DEI statement generated significantly steeper declines in academic interest among men than women.

We then investigate whether the decline in academic interest indicates that the DEI statements had a "chilling" effect. We administered a survey three months after the intervention (November 2022), which asked students about attitudes regarding college. We first document that at baseline, worries regarding stereotypes are almost twice as large for women as for men, almost twice as large for Black and Hispanic students than White students, and over four times as large for Asian students than White students. The DEI statements narrowed some gaps while widening others. In particular, the DEI statements appeared to raise worries for men but not women, narrowing the gender gap. Worries rise in the treatment group for Black, and Hispanic students but not for White or Asian students. The DEI statements thus widened Black-White and Hispanic-

White gaps while narrowing Asian-White gaps. The results by race suggest that stereotype threat drives the rise in worry, since different social perceptions regarding academic ability may explain why the results for Black and Hispanic students differ from Asian students. Our results align with models of social identity, which predict that the same social cue may engender different responses based on how it interacts with different social identities (Lung, 2023).

Finally, we obtain student record data for our survey respondents. These data include all courses enrolled, dropped, or withdrawn, as well as course-level final grades at the end of the term (December 2022, 15 weeks after the intervention). In the control group, men and women had similar GPAs. However, the DEI statements appeared to lower GPA for men and raise them for women. The decline in GPA for men is consistent with the rise in their worries about stereotypes and their sharp decline in interest in the academic information sessions. In exploring further mechanisms driving these results, we find some evidence that the DEI statements made men less likely to drop advanced courses but made women more likely to drop STEM courses. We find greater confidence in own academic abilities for women, which aligns with their overall GPA growth. We also find that the DEI statements lowered perceived access to social support, mental health help, and other institutional support for men, which may contribute to the decline in their academic performance.

We make contributions to three literatures. The first is the broad social science literature on diversity, equity, and inclusion. Society currently applauds organizations for DEI *efforts* (see Stringfellow, 2020; Verlinden, n.d.), prioritizing intention above results. Some even encourage the adoption of DEI statements as a branding strategy (Doeing, 2019). We document the first field evidence that these efforts can create long-lasting harm to the very populations they aim to support: in our context, youth entering college and forming social identities in a new environment. This

evidence is consistent with prior work showing negative short-term impacts on attitudes, mostly in lab settings using hypothetical scenarios (Wilton et al., 2014; Pietri et al., 2019; Cowgill et al., 2021; Georgeac and Rattan, 2023; Bowman Williams, 2022). Our conclusion is not that DEI statements are categorically harmful, but that caution and testing are necessary before they are adopted as enthusiastically as they have been. Careful empirical testing is critical if DEI efforts are to harness the promise of prior field interventions that improved sense of belonging (Walton et al., 2023; Walton and Cohen, 2011; Brady et al., 2020; Binning et al., 2020; Kizilcec and Saltarelli, 2019).

Second, our results inform economic models of social identity (Akerlof and Kranton, 2000; Benabou and Tirole, 2011; 2016) and psychological models of stereotype threat (Steele and Aronson, 1995; Steele, 1997; Steele et al., 1999, 2002). We find that DEI statements function as social cues that heighten students' awareness of their race and gender group. Although these social cues are limited in predicting *individual* outcomes, they influenced different groups in systematic ways consistent with the predictions of Lung (2023). Our results are consistent with stereotype threat along both race and gender lines, similar to lab evidence on risk and time preferences from Benjamin et al. (2010). The DEI statements raised worries regarding stereotypes for Black and Hispanic students, but lowered worries regarding classmate interactions for Asian students. There is some evidence that they made women more likely to drop STEM courses in their first semester, which aligns with the ``escalating commitment" model of Benabou and Tirole (2011).[1]

Third, we contribute to the economics of discrimination, especially in the educational context (Reuben, Sapienza, and Zingales, 2014; Moss-Racusin et al., 2012). Only recently have

[1]Benabou and Tirole (2011) argue that certain groups may over-invest in a pursuit if they derive utility from identifying with it. Our setting would predict the opposite: women could invest less in STEM fields if social cues lead them to question their belonging in these fields.

economists formalized models for systemic discrimination (Bohren et al., 2021; Buzard et al., 2023), which explain how inequity in one domain (e.g., high school quality) permeates into other domains (e.g., college preparation or academic interest), creating systemwide gaps in characteristics unrelated to group identity. Our paper shows that merely acknowledging differences may chill underrepresented groups, which could help explain why systemic discrimination is so difficult to eradicate. Prior work shows that underrepresented groups often respond to social identity or stereotype threats by disassociating from the domain in which the threat operates (e.g., STEM fields, the college classroom), re-entrenching their underrepresentation (Aronson et al., 2002; Spencer et al., 2015). The subtle nuances behind DEI messaging therefore have multiplicative effects. These nuances could make the difference between empowering or discouraging persecuted groups.

II. DATA AND EXPERIMENT

2.1 Email Intervention

We began by obtaining a random sample of a third of the freshman undergraduate class at our partner institution (N=3,825). This sample includes only U.S. citizens or permanent residents of freshmen standing whose immediate prior educational institution was a high school. We emailed them an invitation to an information session on academic success, held for one hour over Zoom. We sent these emails prior to the start of classes, when incoming freshmen may be especially interested in selecting courses and developing study strategies.

A quarter of this sample received the email with no DEI statement. Three-quarters received the email with a DEI statement. These emails differ from the "generic" email in only the following three sentences.

> "Students' academic experiences may differ by gender identity/race and ethnicity/gender identity, race, and ethnicity. MSU is committed to understanding these differences to ensure that Spartans from all backgrounds reach their full potential. You will have the opportunity to discuss these differences during the online session."

This diversity statement is informed by prior work which found that statements which recognized differences improved attitudes and achievement for women and minority students, while statements which emphasized similarity had insignificant or negative outcomes (Wilton et al., 2015; Celeste et al., 2019; Good et al., 2020).

Between the three DEI statements, the emails differ by at most four words. The "gender" email only mentions differences by gender identity; the "race" email mentions only differences by race and ethnicity; and the "intersection" email mentions differences by gender identity, race, and ethnicity. Appendix Table A.1 reports no significant differences across conditions based on the covariates available in the intervention sample.[2] To preserve power, we pool them and focus on examining the impact of receiving any DEI statement. The control group is therefore students who received no DEI statement (N=305). The treatment group consists of students who received any DEI statement (N=821).

The link to register for the academic success information session follows the DEI statement. We observe whether students click on the link and how far they progress in the registration process. Clicking on the link is our immediate measure of whether the DEI statement affected student interest in academic resources ("academic interest"). Note that our goal is not to explore the effect of the information session itself, since students select in to participate and since each session's content can vary depending on the participants.

[2] Due to FERPA protections, we could only obtain information on gender and college of matriculation for students in the intervention sample.

2.2 Survey Responses

In November 2022, we conducted a follow-up survey. The survey, conducted 15 weeks after the intervention, captured the longer-term impacts of our intervention on student attitudes. How could long-term impacts arise from a short email months earlier? Since students had just arrived on campus, the DEI statements could have made a lasting impression on them, cementing the idea that they would be classified in terms of their race and gender within their new environment. Another possibility is that the DEI statements did not directly make a lasting impression, but elicited short-term changes in behavior that had multiplicative effects over the course of the term. We timed the emails to occur prior to the beginning of classes, so that they would be fresh in students' minds when they selected courses and chose who to interact with in the first weeks of class. Decisions in one week influence decisions in the next week; this form of inertia could cause a short intervention to snowball into sustained changes 15 weeks later.

To examine how race and gender influenced students' sense of belonging in the academic domain, we adapt measures of stereotype threat validated by Picho and Brown (2011). Our main question asks students whether they worried that their academic performance was used to confirm or disprove a stereotype. In addition, we ask students whether they worried that their classmates or professors interacted with them differently because of their background. The survey appendix elaborates on these and other questions.

We paid students $20 to complete the follow-up survey. Of the 3,825 students in the intervention sample, 1,135 (30%) completed the follow-up survey. We consider whether attrition impacts causal inference following Ghanem et al. (2022), who formalize the assumptions necessary to interpret the difference in treatment and control means as the average treatment effect

(ATE). We fail to reject the null of distributional equivalence between the covariates in the treatment and the control group conditional on response status, a necessary condition to interpret the difference in means as an ATE for respondents (ATE-R, Appendix Table A.2 column 1). We conclude that our results can be interpreted as the ATE among respondents. However, there is some evidence that STEM majors were differentially likely to respond to the survey based on treatment status, which compromises our ability to interpret the difference in means as an ATE for the entire intervention sample (ATE-P, Appendix Table A.2 column 2). We therefore inverse weight by the probability of completing the survey. The results do not significantly differ from specifications where we do not use inverse weights.

2.3 Administrative Student Record Data

At the end of the Fall 2022 semester, we obtained student record data of all freshmen University. Due to IRB restrictions to protect subject privacy, we can only trace the academic outcomes of the 1,135 survey respondents who completed the survey and consented to release their identifying information and student records. For all other students, the information was deidentified and not linkable to experimental condition.

The data contain information about biological sex, race, SAT/ACT scores, major declaration upon matriculation, major declaration by the end of the Fall 2022 semester, course enrollment, and course grade. We focus on academic performance, as measured by grade point average (GPA). The data also contain information for all courses ever enrolled, including dropped and withdrawn courses. This allows us to explore whether the GPA effects are driven by changes in course selection.

III. METHODOLOGY

Our experimental design and primary outcomes of interest are pre-registered at the American Economic Association Registry (Chuan and Johnson, 2023). In Section IV, we only report on outcomes that were described in our pre-registration protocol.

Our immediate measure of academic interest is whether students click to register for the academic success session. The registration link is embedded in the same email as the DEI statement. This email was sent to our full sample of 3,825 students, which was a randomly selected third of the entire undergraduate freshman class. Students did not choose to receive the email, and the email's subject heading was the same for all students. It was therefore impossible for treatment condition to influence the likelihood of opening the email. For this intervention sample, we only have access to gender and major upon matriculation. Our regression specification is

$$y_i = \alpha_0 + \alpha_1 DEI_i + \alpha_2 female_i + \alpha_3 DEI_i female_i + \alpha_4 X_i + u_i \quad (1)$$

where $female_i$ equals 0 for male students and 1 for female students, DEI_i equals 0 if student i received the generic email and 1 if student i received any DEI email. The matrix X_i consists of dummies representing the college of matriculation within the university.

For survey and student record data, our sample consists of the 1,135 survey respondents who consented to release their course information for research purposes. We run the following specification

$$\begin{aligned} y_i = \alpha_0 + \alpha_1 DEI_i + \alpha_2 female_i + \alpha_3 race_i + \alpha_4 DEI_i female_i \\ +\alpha_5 DEI_i race_i + \alpha_6 female_i race_i + \alpha_7 DEI_i female_i race_i + \alpha_8 X_i + \epsilon_i \end{aligned} \quad (2)$$

where $race_i$ is a matrix of race dummies for Black, Hispanic, and Asian students, with White students as the omitted group. In our preferred specification, the matrix of controls X_i includes citizenship, disability status, first-generation college status. In additional regressions, we add

controls for math placement score, SAT/ACT score, employment status, on/off-campus residence, and membership in student organizations

IV. RESULTS

4.1 Main Results

Our main result table, Table 1, displays predicted probabilities after a regression controlling for the *X* matrices described above. Odd-numbered columns show predicted outcomes for those who received the "Generic" email, which did not contain a DEI statement. Even-numbered columns show predicted outcomes for treated students, who received one of three DEI statements. Column (1) displays our immediate measure of academic interest: whether students clicked on the link regarding the free academic session to help them excel in college. At baseline, 10% demonstrated interest, and this propensity is similar by gender. However, Column (2) shows that if the email contained a diversity statement, academic interest lowered to 4% for men ($p<0.00005$) and 7% for women ($p<0.01$), creating a significant 3% gender gap in the treatment group ($p<0.00005$). It is possible that the DEI statements chilled students, lowering their interest in the information session. However, the lower click rate among treated students could have simply occurred because the treatment emails were longer.

We therefore see if other outcomes changed in ways that are consistent with a decline in interest. We next examine worries regarding stereotypes based on the survey administered in November 2022, which allows us to assess whether the DEI statements generate persistent impacts (see survey appendix for details). In the control group, women are almost twice as likely to express this worry as men (19% vs. 12%, difference significant at $p<0.0005$). Almost twice as many Black and Hispanic students express this worry compared to White students (18% compared to 12%),

although the differences are insignificant. A whopping 49% of all Asian students expressed this worry (significantly greater than among White students, $p<0.0005$).

We next compare treatment and control. Receiving the DEI statement appeared to more than double worries regarding stereotypes among Black students (from 18% to 45%, $p<0.005$) and raises worries by 10% for Hispanic students (from 18% to 28%, $p<0.05$). In contrast, we find no significant rise in worry for White and Asian students.

The differential effects for Asian compared to Black and Hispanic students suggest that beliefs regarding others' perceptions of race guide the response to the DEI statements. Stereotype threat can explain why diversity statements raised worries for Black and Hispanic students without impacting worries for White and Asian students. In Section 4.2, we explore students' expressed worries regarding interactions with classmates and professors, which provide further evidence of differential responses for Black and Hispanic students compared to Asian students. The results rule out alternative explanations such as reacting badly to being "singled out" (Cowgill et al., 2021; Brewer et al., 1991) or tokenized (Leibbrandt and List, 2018; Georgeac and Rattan, 2023; Bowman Williams, 2022), which would predict similar reactions for all minoritized groups.[3]

Lastly, we use administrative student record data collected at the end of the semester (December 2022) to examine whether the DEI statements impacted academic performance. It is not clear that we would find impacts on GPA, since students' academic abilities and study strategies are unlikely to be directly affected by one email received 15 weeks ago. But if the email affected students' interactions and perceptions of others in class, it could influence initial course selection,

[3] More formally, optimal distinctiveness theory predicts students to react negatively to the diversity statement if they feel that it unduly compartmentalizes identity into externally imposed social groups and fails to recognize an individual's uniqueness, or if it singles out individuals for their differences in unwelcome ways (Cowgill et al., 2021; Brewer et al., 1991). Feelings of tokenization occur when students suspect that their inclusion arises from their demographic characteristics rather than their academic merit (Leibbrandt and List, 2018; Georgeac and Rattan, 2023; Bowman Williams, 2022), which may undermine their trust in the university.

first-week study strategies, classmate interactions, and other behaviors that influence choices in subsequent weeks, shaping the trajectory of their first semester in college. Columns (5)-(6) of Table 1 report the findings.

The DEI statements exhibited differential impacts for men and women, but no effects by race. In the control group, men and women both have a 3.4 grade point average (GPA). However, men exposed to the DEI statement perform significantly worse than control ($p<0.05$) and end up with a 3.2 GPA, while women's GPA rises to 3.5 ($p<0.05$), leading to a gender gap of 0.3 in the treated group (gender gap significant at $p<0.0001$). We delve into the mechanisms behind the differential gender effects in Section 4.3.

4.2 Exploring the results on worry

Appendix Table A.3 reports effects on two other questions regarding worry: worries regarding differential treatment from classmates (columns 1-2) and professors (columns 3-4). In the control group, both types of worry are similar between men and women. However, worry substantially differs by race. While only 5% of White students report worries regarding classmates, students of color are six times as likely to express this worry (29-32% for Blacks and Hispanics, 38% for Asians, $p<0.05$). Only 4% of White students express worry regarding professors, compared to 10% among Black students ($p>0.10$), 13% among Hispanic students ($p<0.1$), and 21% among Asian students ($p<0.1$).

We next compare treatment and control. For both measures of worry, the DEI statements appear to widen the Black-White gap. While they raised worry for both White and Black students, the rise is twice as large for Black students as White students.[4] In contrast, the DEI statements narrowed the Asian-White gap by raising worries among White students ($p<0.05$ for both measures)

[4] However, note that the rise in worry among Black students is insignificant due to the small sample of Black survey respondents.

and lowering worries among Asian students ($p<0.05$ for worries regarding classmates, $p>0.10$ for worries regarding professors).

These alternate questions regarding worry provide further evidence that stereotype threat can explain the pattern of behaviors we have documented so far. Stereotypes regarding academic performance are favorable for Asians, and we find that the DEI statements significantly lowered worries regarding classmates and directionally lowered worries regarding professors. Stereotypes are less favorable for Black students, which might explain why worries rose directionally regarding classmate or professor interactions.

4.3 Exploring the gender difference in effects on GPA

Next, we investigate why GPA declined for men but rose for women. The DEI statements could have affected study strategies or course selection in ways that differ by gender. We start by exploring the effects in large classes, which provide sufficient statistical power to estimate reliable coefficients. Appendix Table A.4 panel a presents evidence that grade decline occurred in introductory freshmen classes – Writing 101, Psychology 101, and Social Science 215.[5] In the Psychology and Social Science courses, grades drop for men but not women ($p<0.05$), while in the Writing course, grades marginally decline for all students ($p<0.10$). We do not find these effects for other large introductory classes that tend to be more STEM-based, such as Math, Chemistry, or Economics (see Appendix Table A.4 panel b).

We next explore effects on course selection in Appendix Table A.5. The GPA decline among men and rise among women could occur if the DEI statements led men to select harder courses and women easier courses. However, this is unlikely to be the only explanation, since the grade declines for men are concentrated in introductory non-STEM courses, rather than higher-

[5]Writing 101 is a requirement for all freshmen. Psychology 101 and Social Science 215 are the first courses in their respective majors.

level or STEM courses. Appendix Table A.5 shows that relative to the control group, treated men are less likely to drop advanced 200-level courses and treated women are more likely to drop STEM courses (columns 1-2). Overall, however, this has no significant impact on students' overall portfolio of courses after the add/drop period ends (columns 3-6). We conclude that course selection can explain little of the overall GPA effects.

We then turn to more direct factors behind academic performance. Appendix Table A.6 shows that randomization to treatment significantly decreases the proportion of men who report knowing how to access social support, mental health support, and financial support by about 10 percentage points ($p<0.05$). The results are parallel to Yeager et al. (2016), who find rises in GPA among minority students and posit that the mechanism is greater engagement with the university, as shown by greater use of social support services, more close friends, more close mentors, and greater involvement in extracurricular groups. In our case, GPA declines, consonant with the decline in perceived access to the university's support resources. The results corroborate the decline in interest in the information session (Table 1, columns 1-2). Together, it suggests that the decline in GPA among men may stem more from lower perceived connection to the university community, rather than academic struggles. After all, the decline in GPA is driven by easier classes, not STEM or higher-level classes.

Lastly, we examine confidence in academic abilities. Consistent with the rise in women's GPA, we find that treated women are 10% more likely to report that they are prepared for their major relative to control women (Appendix Table A.7). The results are consistent with the idea that stereotype threat can improve performance in certain contexts, beyond that of individuals who were not exposed to the stereotype threat cues (Aronson et al., 1999; Marx et al., 2005). Furthermore, the results highlight heterogeneous results across domains: where women

experienced negative impacts in the social domain, as measured by worry regarding classmate interactions, they appeared to be more confident and successful in the academic domain.

V. CONCLUSION AND DISCUSSION

DEI statements have proliferated across U.S. organizations. On the one hand, they may help organizations promote inclusion of underrepresented groups. On the other hand, their popularity may also stem from the fact that they are easy, low-cost measures to improve the organization's public image (Doeing, 2019). What to DEI statements do, and for whom?

Prior field studies focusing on sense of belonging show that short online interventions can generate large, sustained impacts years later, indicating that small interventions can generate long-lasting effects. However, lab studies point to pitfalls of DEI statements if their language instills in- versus out-group perceptions. In some cases, explicit mentions of disparities led to increased feelings of stereotype threat (Murphy et al., 2007; Pietri et al., 2019; Cowgill et al., 2021). We administer a field experiment with 3,825 new college students at a large state university ("University"). In the short-term, we find that receiving the DEI statement led to large declines in interest, as measured by click rates on an academic information session. Eleven weeks later, we find increased rates of worry regarding stereotypes among Black and Hispanic students, but not White and Asian students. Finally, we find greater rates of worry regarding classmate interactions among White students, but declines in this worry among Asian students. This pattern of results suggest that the way in which the DEI statements raised worries relates to your beliefs about how others perceive your social group, given the difference in perceptions between Black and Hispanic students versus Asian students in the academic realm.

Finally, we find significant effects on GPA 15 weeks after our intervention. Relative to the control group, treated men exhibited significantly lower GPAs, while treated women exhibited

significantly higher GPAs. In exploring the mechanisms, we find little evidence that this change was due to changes in course selection – e.g., that the DEI statements led men to choose harder courses and women easier courses. Rather, our survey evidence suggests greater rates of disengagement from the university community among treated men, which aligns with the fact that the declines in GPA are driven by easier introductory classes, rather than STEM introductory classes or higher level classes. We find some evidence that treated women report more confidence in preparation for their major than control women, which is consistent with the rise in their GPA.

This study points to the importance of empirical testing before implementation. Organizations have enthusiastically adopted DEI statements in recent years, without due exploration of hidden pitfalls. Our position is not that DEI statements are categorically harmful, but that they should be empirically tested before being adopted as widely as they have been.

That said, there are many caveats with the current analysis. First, as with all field interventions like ours, subjects may differentially select into responding to the survey. We address potential selection into survey response using tests proposed by Ghanem et al. (2022) and use inverse propensity weights to adjust our results. However, it is possible that our results only represent effects for survey respondents, rather than the student population. We will conduct a second wave of survey collection in October 2023 with the sampling design of Dinardo et al. (2021) to further account for potential selection in response. Second, we do not yet have sufficient power to examine intersectional results. One primary goal of our experimental intervention is to examine race by gender effects, but small sample limitations currently preclude this. Again, a second wave of survey collection will address this current limitation.

Third, we only vary the information presented in DEI statements but do not vary how explicitly we emphasize disparities. If DEI statements risk activating stereotype threat, as our

current results suggest, we would expect less activation using statements that promote unity and inclusion rather than explicit recognition of differences. Relatedly, it is possible that our DEI statements generated negative effects in our particular population, where Black and Hispanic students only make up 6-7% of each freshmen class, since prior lab work has shown that emphasis of differences may generate negative affect among minorities that are severely underrepresented but positive affect among minorities that are represented in greater numbers (Apfelbaum et al., 2016). We leave testing these important considerations to future work.

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Table 1: **Main Outcomes**

	Academic Interest		Worry about stereotypes		GPA	
	Generic	Any DEI	Generic	Any DEI	Generic	Any DEI
	(1)	(2)	(3)	(4)	(5)	(6)
Male	0.0949	0.0381***	0.121	0.153	3.39	3.23**
	(0.0129)	(0.0059)	(0.0183)	(0.0223)	(0.0713)	(0.0499)
Female	0.102	0.0692***	0.187	0.204	3.40	3.52**
	(0.0124)	(0.00458)	(0.0258)	(0.0226)	(0.0402)	(0.0282)
p-value vs. Male	0.341	0.00002	0.0195	0.0535	0.418	3.7×10^{-7}
White			0.115	0.116	3.43	3.43
			(0.0241)	(0.0164)	(0.0430)	(0.0438)
Black			0.179	0.448***	3.14	2.88*
			(0.0682)	(0.0744)	(0.122)	(0.155)
p-value vs. White			0.190	0.000025	0.0161	0.00054
Hispanic			0.178	0.280**	3.46	3.30
			(0.0457)	(0.0260)	(0.119)	(0.0715)
p-value vs. White			0.113	2.3×10^{-7}	0.404	0.0566
Asian			0.487	0.472	3.20	3.36
			(0.0963)	(0.0870)	(0.160)	(0.0422)
p-value vs. White			0.00045	0.000076	0.0897	0.125

Academic interest is measured as the proportion of students who click on the invitation to the information session on excelling academically in college. Worry about stereotypes is measured as the proportion of students who chose "agree" or "somewhat agree" to the statement "I worry my class performance is used to confirm or disprove a stereotype." Predicted probabilities displayed after controlling for college of matriculation (columns 1-2) or citizenship, disability status, first-generation status, math placement score, SAT/ACT score, employment status, on/off-campus residence, and membership in organizations (columns 3-6). Stars denote significant difference relative to Generic Email. $^{*}p < 0.05,^{**}p < 0.01,^{***}p < 0.001$

Online Appendix - For Online Publication

A Additional Tables and Figures

Table A.1: **Balance Table**

	Summary Statistics					Correlation with Any DEI	
	Generic	Any DEI	Gender	Race	Gender and Race	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
female	0.524	0.528	0.529	0.528	0.527		
	(0.016)	(0.009)	(0.016)	(0.016)	(0.016)		
undeclared	0.033	0.034	0.034	0.035	0.034	1.000	0.779
	(0.006)	(0.003)	(0.006)	(0.006)	(0.006)	(1.193)	(0.653)
agriculture and natural science	0.062	0.063	0.064	0.062	0.064	0.942	1.035
	(0.008)	(0.005)	(0.008)	(0.008)	(0.008)	(0.341)	(0.295)
arts and letters	0.031	0.030	0.031	0.027	0.030	0.833	0.764
	(0.006)	(0.003)	(0.006)	(0.005)	(0.006)	(1.003)	(0.639)
communication arts and sciences	0.055	0.057	0.057	0.056	0.058	1.067	0.750
	(0.007)	(0.004)	(0.008)	(0.007)	(0.008)	(1.262)	(0.612)
education	0.060	0.060	0.059	0.062	0.061	1.017	0.737
	(0.008)	(0.004)	(0.008)	(0.008)	(0.008)	(1.203)	(0.599)
engineering	0.151	0.148	0.147	0.148	0.149	1.002	0.918
	(0.012)	(0.007)	(0.011)	(0.012)	(0.012)	(0.302)	(0.268)
music	0.007	0.007	0.008	0.007	0.005	0.933	0.750
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(1.182)	(0.852)
natural science	0.128	0.126	0.123	0.128	0.128	0.992	0.956
	(0.011)	(0.006)	(0.011)	(0.011)	(0.011)	(0.324)	(0.235)
nursing	0.045	0.044	0.044	0.043	0.044	0.963	0.943
	(0.007)	(0.004)	(0.007)	(0.007)	(0.007)	(0.531)	(0.265)
social science	0.126	0.125	0.125	0.124	0.125	0.975	0.741
	(0.011)	(0.006)	(0.011)	(0.011)	(0.011)	(1.140)	(0.593)
veterinary medicine	0.016	0.016	0.017	0.017	0.016	1.360	0.969
	(0.004)	(0.002)	(0.004)	(0.004)	(0.004)	(1.141)	(0.369)
business	0.207	0.209	0.209	0.209	0.209	1.005	0.750
	(0.013)	(0.008)	(0.013)	(0.013)	(0.013)	(1.166)	(0.601)
honors political science	0.026	0.025	0.025	0.025	0.025	0.889	0.750
	(0.005)	(0.003)	(0.005)	(0.005)	(0.005)	(1.084)	(0.631)
honors science	0.050	0.051	0.051	0.052	0.050	1.000	1.000
	(0.007)	(0.004)	(0.007)	(0.007)	(0.007)	(.)	(.)
residential college in arts and humanities	0.003	0.004	0.004	0.004	0.003	1.000	1.000
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(.)	(.)
Observations	305	821	281	250	276	1810	2015
Joint Chi2 Statistic						0.717	0.410
Joint Chi2 p-value						1.000	1.000

Columns 1-5 show summary statistics across email conditions, where "Any DEI" combines the gender, race, and race and gender emails. Columns 6-7 show exponentiated coefficients of regression of treatment on covariates. For columns 1-5, stars denote significant difference from "generic" email. For columns 6-7, stars denote significant correlation with receiving any DEI email. $^{*}p < 0.05,^{**}p < 0.01,^{***}p < 0.001$

Table A.2: Attrition tests: p-values (Ghanem et al., 2022)

	(1)	(2)
STEM major	0.687	0.040
STEM college	0.993	0.441
undeclared	0.787	0.685
agriculture and natural resources	0.897	0.968
arts and letters	0.974	0.614
communication arts and sciences	0.889	0.783
education	0.930	0.967
engineering	0.987	0.893
music	0.686	0.86
natural science	0.859	0.673
nursing	0.766	0.921
social science	0.970	0.968
veterinary medicine	0.905	0.955
business	0.961	0.545
honors political science	0.982	0.954
honors science	0.848	0.724
residential in arts and humanities	0.429	0.686
Observations	3825	3825

Test of sharp testable restrictions from Proposition 2 of Ghanem et al. (2022), where the randomization is stratified by gender. Column (1) tests the assumption of equivalent covariate distributions in treatment and control groups conditional on response status. If this assumption is satisfied, differences between treatment and control identify the average treatment effect for respondents. Column (2) tests whether covariates are independent of response status conditional on treatment. This test would determine whether the difference between treatment and control among respondents would identify the average treatment effect for the intervention sample.

Table A.3: **Additional questions regarding worry**

	Worry about classmates		Worry about professors	
	Generic	Any DEI	Generic	Any DEI
	(1)	(2)	(3)	(4)
All	0.0112	0.136	0.0633	0.0822*
	(0.0130)	(0.0152)	(0.0102)	(0.00889)
Male	0.103	0.123	0.0482	0.0894*
	(0.0191)	(0.025)	(0.0191)	(0.0177)
Female	0.118	0.144*	0.0718	0.0753
	(0.0141)	(0.0120)	(0.0151)	(0.0117)
p-value vs. male	0.255	0.255	0.166	0.254
White	0.0480	0.0997***	0.0351	0.0629**
	(0.0141)	(0.0152)	(0.0076)	(0.0103)
Black	0.316	0.407	0.0978	0.180
	(0.0860)	(0.0585)	(0.0665)	(0.0658)
p-value vs. White	0.0026	1.7×10^{-6}	0.180	0.042
Hispanic	0.293	0.254	0.134	0.162
	(0.111)	(0.0582)	(0.0599)	(0.0547)
p-value vs. White	0.0207	0.0062	0.0599	0.040
Asian	0.378	0.143**	0.205	0.117
	(0.0862)	(0.0508)	(0.0987)	(0.0409)
p-value vs. White	0.00045	0.208	0.0501	0.102

"Worry about classmates" indicates the proportion of students who responded "agree" or "somewhat agree" to the statement "I worry that my classmates interact with me differently because of my identity/background." "Worry about professors" indicates the proportion of students who responded "agree" or "somewhat agree" to the statement "I worry that my professors interact with me differently because of my identity/background." Predicted probabilities after controlling for citizenship, disability status, first-generation status, math placement score, SAT/ACT score, employment status, on/off-campus residence, and membership in organizations. Stars denote significant difference relative to Generic Email. $^{*}p < 0.05, ^{**}p < 0.01, ^{***}p < 0.001$

Table A.4: **Changes in course grades**

A: Large courses that exhibit grade decline

	Writing 101		Psychology 101		Social Science 215	
	(1)	(2)	(3)	(4)	(5)	(6)
Any DEI	-0.129*	-0.217	-0.145	-0.650**	-0.00630	-0.479***
	(0.0753)	(0.146)	(0.124)	(0.280)	(0.152)	(0.178)
Female		0.0961		-0.693		-0.348
		(0.115)		(0.197)		(0.230)
Female		0.115		0.621**		0.766***
× Any DEI		(0.168)		(0.314)		(0.279)
Observations	418	418	185	185	167	167
Control Mean	3.625	3.625	3.411	3.411	3.388	3.388
Control SE	0.040	0.040	0.063	0.063	0.062	0.062

B: Large courses that do not exhibit grade decline

	Math 103		Chemistry 141		Economics 2015	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.0708	-0.201	0.105	-0.109	0.291*	0.361*
	(0.144)	(0.240)	(0.171)	(0.279)	(0.151)	(0.203)
Female		-0.0866		-0.266		-0.0294
		(0.242)		(0.300)		(0.258)
Female		0.383		0.310		-0.132
× Treatment		(0.304)		(0.349)		(0.285)
Observations	329	329	288	288	162	162
Control Mean	2.731	2.731	3.019	3.019	3.196	3.196
Control SE	0.064	0.064	0.070	0.070	0.063	0.063

Notes: Standard errors clustered by student. Regressions control for citizenship, disability status, and first generation status. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

Table A.5: **Changes in course choice**

	% 200-level courses dropped	% STEM courses dropped	% 100-level courses	% 200-level courses	% STEM courses	Classmates' Avg Math Placement Score
	(1)	(2)	(3)	(4)	(5)	(6)
Any DEI	-0.0213*	-0.0129	-0.0124	0.0119	-0.0118	0.00381
	(0.0110)	(0.0142)	(0.0203)	(0.0197)	(0.0234)	(0.0785)
Female	-0.00880	-0.0270*	0.00422	-0.00822	-0.0224	-0.0246
	(0.0167)	(0.0153)	(0.0386)	(0.0386)	(0.0401)	(0.111)
Female	0.0198	0.0287*	0.0153	-0.0159	0.0258	0.513
× Any DEI	(0.0121)	(0.0142)	(0.0243)	(0.0238)	(0.0258)	(0.148)
Observations	1109	1109	1109	1109	1109	990
Control Mean	0.182	0.210	0.566	0.429	0.539	12.364
Control SE	0.007	0.008	0.012	0.012	0.011	0.068

Notes: Standard errors clustered by student. $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

Table A.6: **"I know where to receive..."**

	Social support		Mental health support		Financial support		Academic assistance	
	Generic	Any DEI	Generic	Any DEI	Generic	Any DEI	Generic	Any DEI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male	0.733	0.619***	0.756	0.679**	0.802	0.709***	0.866	0.849
	(0.0396)	(0.0230)	(0.0329)	(0.0301)	(0.0187)	(0.0268)	(0.0255)	(0.0228)
Female	0.672	0.661	0.811	0.783	0.765	0.697	0.876	0.891
	(0.0436)	(0.0147)	(0.0223)	(0.0168)	(0.0410)	(0.0181)	(0.0253)	(0.0130)
p-value of gender difference	0.151	0.0140	0.0839	0.00039	0.211	0.356	0.391	0.044

Notes: Predicted probabilities. P-values of difference by gender in last row. Stars denote significant difference between treatment and control. Stars denote significant difference relative to Generic Email. $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

Table A.7: **"I am prepared for my major."**

	All respondents		Respondents who took PSY101 or ISS215	
	Generic	Any DEI	Generic	Any DEI
	(1)	(2)	(3)	(4)
Male	0.757	0.796	0.759	0.792
	(0.0422)	(0.0247)	(0.0418)	(0.0469)
Female	0.742	0.842**	0.718	0.847*
	(0.0439)	(0.0242)	(0.0784)	(0.0247)
p-value of gender difference	0.403	0.089	0.321	0.149

Notes: Predicted probabilities. P-values of difference by gender in last row. Stars denote significant difference between treatment and control. Stars denote significant difference relative to Generic Email. $^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

B Follow-Up Survey

Background & Consent

What is your preferred e-mail address?

What is your age?

- ◯ Under 18
- ◯ 18 or older

Research Participant Information and Consent Form

You are being asked to participate in a research study about academic life at Michigan State University. Researchers are required to provide a consent form to convey that participation is voluntary. You should feel free to discuss and ask the researchers any questions you may have.

The consent form is available at the link below. Please indicate whether you consent to participate.
Major Choice - Consent Form

- ◯ Yes, I consent to participate.
- ◯ No, I do not wish to participate.

Electronic Signature: Please sign and date to indicate your willingness to participate and release your academic records to the research team.

First name

Middle name

Last name

MSU E-mail Address

Today's date

Research Participant Information and Assent Form

You are being asked to participate in a research study about academic life at Michigan State University. Because you are under 18, researchers are required to provide a parental permission form and a participant assent form to convey that participation is voluntary.

The assent form is available at the link below. Please indicate whether you assent to participate.
Major Choice - Assent Form

- ○ Yes, I assent to participate.
- ○ No, I do not wish to participate.

Electronic Signature: Please sign and date to indicate your willingness to participate and release your academic records to the research team.

First name	
Middle name	
Last name	
MSU E-mail Address	
Today's date	

Assent

Because you are under 18, parental permission is required to participate in this research study. We will send your parent/guardian a permission form via e-mail. Please let them know that you are interested in participating and ask them to complete the permission form that is in their e-mail inbox.

What is a good e-mail address to use to contact your parent/guardian?

If your parent/guardian does not have a working e-mail address, please list another form of contact.

Social Belonging

Do you know how to get the following resources at MSU?

	Yes	No
Academic assistance	○	○
Social support	○	○
Financial support	○	○
Mental health support	○	○

To what extent do you agree/disagree with the following statements regarding your feelings at MSU?

	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree
I worry that my CLASSMATES interact with me differently because of my identity/background	○	○	○	○	○
My gender is important in defining who I am	○	○	○	○	○
I worry that my PROFESSORS interact with me differently because of my identity/background	○	○	○	○	○
I fit in with the other students at MSU	○	○	○	○	○
I worry that my class performance is used as evidence to confirm or disprove a stereotype	○	○	○	○	○
It is important for me to find peers I identify with in my major	○	○	○	○	○
My race/ethnicity is important in defining who I am	○	○	○	○	○

At MSU, I have personally experienced some form of discrimination due to my identity. (Discrimination is verbal or non-verbal conduct that is discriminatory, harassing, threatening, intimidating, or hostile.)

- ○ Yes
- ○ Maybe
- ○ No

Majors

How likely are you to take more STEM classes beyond the university's requirement (i.e., as an elective or part of your major/minor)?
STEM classes are classes in science, technology, engineering, and math.

- ○ Extremely unlikely
- ○ Somewhat unlikely
- ○ Neither likely nor unlikely
- ○ Somewhat likely
- ○ Extremely likely

Please select "Yes"

- ○ Yes
- ○ No
- ○ Maybe

Have you already declared or identified your intended academic major(s)?

- ○ Yes: Please list
- ○ No

How do you feel about your (intended) academic major at MSU?

	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree
I fit in with other students in my major(s)	○	○	○	○	○

	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree
I will be more fulfilled in my chosen major(s) than if I study something else	○	○	○	○	○
My job prospects are better in my major(s) than elsewhere	○	○	○	○	○
I am academically prepared for the classes in my major(s)	○	○	○	○	○

STEM Classes

How many total classes did you take this semester?

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7

For each course you took this semester, write the code or name of the class. Then, rate your performance in each class.

	Excellent	Good	Fair	Bad	Terrible
Course 1: Please list the course code or name	○	○	○	○	○
Course 2: Please list the course code or name	○	○	○	○	○
Course 3: Please list the course code or name	○	○	○	○	○

	Excellent	Good	Fair	Bad	Terrible
Course 4: Please list the course code or name	○	○	○	○	○
Course 5: Please list the course code or name	○	○	○	○	○
Course 6: Please list the course code or name	○	○	○	○	○
Course 7: Please list the course code or name	○	○	○	○	○

Did you study or do assignments with other students in your classes this semester?

- ○ No, never
- ○ Yes, 1 or 2 times this semester
- ○ Yes, 3-5 times this semester
- ○ Yes, at least 6 times this semester

Did you take any STEM classes this semester?
STEM classes are classes in science, technology, engineering, and math.

- ○ Yes
- ○ No

To what extent do you agree/disagree with the following statements about STEM?

	Agree	Somewhat Agree	Neither Agree/Disagree	Somewhat Disagree	Disagree
Others will be more proud of me if I major in a STEM field	○	○	○	○	○
I am academically prepared for STEM classes	○	○	○	○	○
I will be more fulfilled in a STEM field	○	○	○	○	○
I studied with my STEM classmates	○	○	○	○	○

	Agree	Somewhat Agree	Neither Agree/Disagree	Somewhat Disagree	Disagree
My job prospects will be better if I major in a STEM field	○	○	○	○	○
I fit in with STEM students	○	○	○	○	○

To what extent do you agree/disagree with the following statements about STEM?

	Agree	Somewhat Agree	Neither Agree/Disagree	Somewhat Disagree	Disagree
Others will be more proud of me if I major in a STEM field	○	○	○	○	○
I am academically prepared for STEM classes	○	○	○	○	○
My job prospects will be better if I major in a STEM field	○	○	○	○	○
I will be more fulfilled in a STEM field	○	○	○	○	○
I fit in with STEM students	○	○	○	○	○
I would have studied with my STEM classmates	○	○	○	○	○

Social Network

Below, list up to 10 students from your classes this semester. Please list them in order of how frequently you are in contact with them.

For each student, select the option that best represents the frequency with which any contact occurs between the two of you.

Contact includes any form of in-person or remote communication (e.g., email, text, messaging apps).

Note: We will not be contacting these students.

	3+ times per week	1-2 times per week	2-3 times per month	About once per month	Less than once per month
Student Name 1: (first and last)	○	○	○	○	○
Student Name 2:	○	○	○	○	○
Student Name 3:	○	○	○	○	○
Student Name 4:	○	○	○	○	○
Student Name 5:	○	○	○	○	○
Student Name 6:	○	○	○	○	○
Student Name 7:	○	○	○	○	○
Student Name 8:	○	○	○	○	○
Student Name 9:	○	○	○	○	○
Student Name 10:	○	○	○	○	○

Student Info

Were you employed during this semester?

- ○
- ○ No
- ○ Yes

Where did you live this semester? [Select all that apply.]

- ☐ On-campus
- ☐ Off-campus, within half an hour's drive to campus
- ☐ Off-campus, commute at least half an hour to campus

Are you currently involved in any of the following organizations?

- [ ] MSU organization(s)
- [ ] Community (non-MSU) organization(s)

Are you willing to be interviewed about your experiences at MSU?

- ◯ Yes
- ◯ No

Do you have any comments or suggestions for improvement for this survey?

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