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RESEARCH

Beliefs About Sexual Orientation and the Adoption of Inclusive Language

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Abstract

Through an online survey among Mexican college students, we document that heterosexual men's resistance to adopting inclusive language is correlated with their beliefs about being labeled LGBTQ + when using it. Then, we show that respondents miscalculate the probability of LGBTQ + identification conditional on language use. Finally, we find that informing heterosexual men of the probability of belonging to the LGBTQ + population conditional on using inclusive language computed through the Bayes Rule and from their own estimates of other probabilities leads to an increase in their willingness to adopt it.

Keywords Language · Stereotypes · Inclusion

JEL Classifications J16 · C92 · D83

Concerns among heterosexual men regarding being perceived as LGBTQ + have been argued to influence a range of their behaviors (Anderson 2010).[1] This paper examines whether these behaviors include the adoption of inclusive language (IL), which involves modifying language to eliminate gendered terms, often replacing gender-specific endings like "-o" or "-a" with neutral alternatives such as "-x" or "-e," particularly in Spanish-speaking contexts.

Using data from an online survey conducted among college students in Mexico City, we first document a strong association between the use of IL and LGBTQ + identification. We then show that resistance to its adoption is higher among heterosexual men and that it is significantly correlated with their beliefs about the likelihood that IL users are members of the LGBTQ + community. Moreover, our results show that respondents typically miscalculate the likelihood of someone being LGBTQ + conditional on their use of IL and that those whose estimate of this probability is higher are less likely to feel comfortable using IL themselves. Finally, we document an increase in the willingness to adopt IL among heterosexual male participants when they are informed about the implied conditional probability of belonging to the LGBTQ + population computed through the Bayes Rule given their answers to other questions in the survey.

The paper is related to different strands of the literature. First, it adds to a growing literature on how social-image concerns affect behaviors such as voting (Funk 2010; Gerber et al. 2008), educational investments (Bursztyn and Jensen 2015; Fryer and Torelli 2010), charitable giving (DellaVigna et al 2012), labor market investments (Bursztyn et al. 2017), effort in the workplace (Kosfeld and Neckermann 2011), consumption (Charles et al. 2009; Kaus 2013), and financial decisions (Bursztyn et al. 2014). We contribute to this literature by documenting how concerns about others' perceptions regarding an individual's sexual orientation or gender identity may affect their willingness to engage in inclusive practices.

Second, it adds to recent literature on misperceptions (Bursztyn and Yang 2022), gender stereotypes (Coffman 2014), how they are formed (Bordalo et al. 2016; 2022), and how they evolve (Coffman et al. 2023). Finally, it contributes to the literature that explores the potential interventions that can affect behavior through changing (or correcting) individuals' beliefs about what is perceived (by themselves or by others) given their behavior.[2]

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[1] The term "homohysteria" was coined by Anderson (2010) to describe this phenomenon.

[2] See Bursztyn and Yang (2022) for a review of this literature.

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A closely related study is Bursztyn et al. (2020), which experimentally informs men about the (higher than believed) fraction of other men who are in favor of women working outside the home and finds an increase in their willingness to sign up their wives for a job-seeking service.[3] This paper differs from Bursztyn et al. (2020) by not relying on recovering others' beliefs about a specific topic (or on providing information from other sources) but on the well-documented difficulties in calculating conditional probabilities and conditional means among the general population (El-Gamal and Grether 1995). We show that a simple intervention aimed at helping individuals infer others' characteristics given their actions (Esponda et al 2023) can cause changes in their perceptions and behaviors.

The remainder of the paper is presented as follows: In the next section, we describe the importance of inclusive language in the context analyzed. The following section describes the survey instrument and implementation. We then proceed to present the results and discuss their interpretation. The last section concludes.

Context: Inclusive Language in a Spanish-Speaking College Campus

Language has been documented to be correlated with gender norms. For instance, Jakiela and Ozier (2020), after measuring the degree of presence of grammatical gender in 4000 languages, document that it is associated with weaker legal support for gender equality. Moreover, recent evidence shows that avoiding gendered expressions in gendered-language contexts can impact perceptions and other outcomes. For instance, Cohen et al. (2023) show that introducing gender-neutral language in exams in Israel raised female performance in quantitative questions. Del Carpio and Fujiwara (2023) document that gender-neutral language in job ads increases interest and beliefs about the advertiser's culture of inclusion.

The promotion of the use of gender-neutral and/or IL as a tool for signaling and exercising inclusive practices has thus gained support in various contexts, particularly in educational settings (Brussino 2021). In the context of Mexico, the Office for Gender Equality at the National Autonomous University of Mexico (Universidad Nacional Autónoma de México, UNAM), the largest university in the country, provides and advertises resources for its faculty and students that encourage the use of inclusive language in their formal and informal communications,[4] arguing that its use promotes equity and combats sexist stereotypes.[5] The Languages Department at the Autonomous Technological Institute of Mexico (Instituto Tecnológico Autónomo de México, ITAM), where the survey exploited in this paper was implemented, offers workshops for helping faculty write their syllabi using IL.[6]

The use of inclusive language has gained popularity among ITAM's student population in recent years. To illustrate this, Fig. 1 shows the use of a common inclusive language term over time in ITAM's student-run newspaper. Focusing on articles published in the "Campus Life" section, we track occurrences of the word root "amig" (related to the word "friend") and measure how often the inclusive term "amigues" appears. The relative use of the inclusive version of this word increased dramatically from nearly non-existent in Fall 2019 to 51 percent in Spring 2023, at the time of our intervention. Although its use decreased dramatically in 2024, it is still a common term among students.

LGBTQ + and feminist student organizations at ITAM agree that the use of IL fosters inclusion, actively promotes its adoption, and uses it. In a workshop organized by the largest LGBTQ + student organization, three out of fifteen presentation slides explicitly invite community members to practice and use IL in their written and oral communications. In 2021, during a 2-day discussion series about the use and promotion of inclusive language in college,[7] organized by the Office for Student Affairs and the Language Department at ITAM, a student panelist stated, during their intervention, that "the use of inclusive language fosters empathy, allowing everyone to feel included by being addressed in an inclusive manner."[8]

However, some sectors of the population actively resist accepting its use (Vergoossen et al 2020). In the Latin American context, the city of Buenos Aires banned primary and secondary school teachers from using inclusive language in their classrooms in 2022.[9] More recently, the Argentinian president, Javier Milei, banned the use of inclusive language in official documents.[10] The Brazilian State of Rondônia tried passing similar bans. While, to our knowledge,

[3] In a closely related paper, Haaland and Roth (2023) inform individuals about the results from a correspondence study testing for differential treatment of job applicants by race (Bertrand & Mullainathan 2004) and explore resulting differences in donations to a pro-black civil rights organization and in self-reported views on pro-black policies.

[4] https://coordinaciongenero.unam.mx. Accesed on 18 Oct 2024.

[5] https://coordinaciongenero.unam.mx. Accessed on 18 Oct 2024.

[6] https://carle.itam.mx. Accessed on 18 Oct 2024.

[7] www.itam.mx. Accessed on 18 Oct 2024.

[8] This quote was taken from an AI transcription of the panel's recording (available online). Translated into English by the authors, after slight rephrasing for clarity.

[9] https://www.nytimes.com. Accessed on 18 Oct 2024.

[10] https://www.edition.cnn.com. Accessed on 18 Oct 2024.

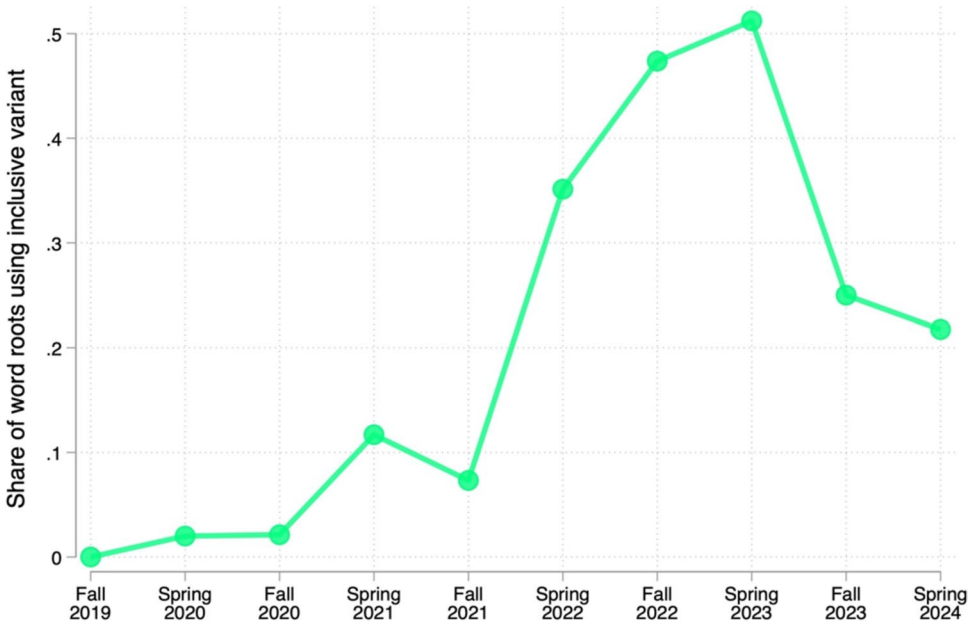

Fig. 1 Example of the prevalence of inclusive language term in a student newspaper. Notes: This graph illustrates the prevalence of inclusive language in ITAM's student newspaper. We calculate the proportion of times the inclusive term "amigues" (and other less common variants) is used by counting occurrences of the word root "amig" (which relates to the word "friend") and determining the share that uses inclusive language over time. Our analysis focuses on the "Campus Life" section of the newspaper, where students are more likely to use the word root associated with "friend"

no formal bans on IL have been proposed in any educational setting in Mexico, there is also some resistance.[11]

Within ITAM, for instance, the October 2017 issue of the student newspaper contains an opinion piece mocking its use.[12] The survey exploited in this paper allowed participants to share any additional thoughts or comments after completing it. One comment read: "In a world where someone dies of hunger every 5 s, it seems disrespectful to me that you give so much importance to the use of inclusive language."[13] In this paper, we document that resistance may partially be related to the people's fear of being perceived as LGBTQ+.

Survey Details and Experimental Design

We designed and conducted an online survey among the student community of ITAM. The survey was part of a set of student projects aimed at measuring the characteristics and opinions of ITAM's student population on various topics. The full survey instrument is available in the Appendix. It was conducted through April 24–30, 2023, as part of a week-long series of events promoted as "Economics Week."

Several actions were taken in order to recruit participants: posters with a QR code directing to the survey were posted throughout the campus; the QR code was distributed among students attending all of the 14 talks and events offered during the week; professors were encouraged to distribute the QR code among their students; students who participated in the survey's design were constantly on ITAM's central square inviting others to participate, sometimes offering them small gifts (cookies or donuts) if they showed the thank-you message at the end of the survey on their cellphones. Importantly, the thank you message included a link to a separate form (not traceable to individual survey responses) where participants could voluntarily share their names and contact info if willing to participate in a raffle that would randomly select five participants to receive a $50 Amazon gift card. From a population of approximately 3500 students, we obtained 623 complete responses.[14]

Table A1 in the Appendix compares the self-reported characteristics of survey participants with those shared with us by ITAM's administration. Perhaps unsurprisingly, on average, survey respondents differ from the overall student population in several dimensions. While the share of respondents who are female is close to the administration's records for the entire student population, survey participants are more likely to have studied high school outside of Mexico City, to be majoring in Economics, and to be enrolled in a dual degree. Also, survey participants' self-reported GPA is higher on average than the average for the full student population: 24 percent of those participating in the survey report a GPA higher than 9/10, compared to 13 percent according

[11] See, for instance: https://www.milenio.com. Accessed on 18 Oct 2024.

[12] http://www.blog.elsupuesto.com. Accessed on 18 Oct 2024.

[13] Translated into English by the authors, after slight rephrasing for clarity.

[14] Prior to its implementation, the survey was reviewed and approved by ITAM's IRB.

to official records. We recognize that our sample is not representative of ITAM's student body, or college students in the city (or the country). However, its experimental component (described below) allows us to claim that we can measure the causal impact of the intervention proposed.

The survey started by recovering respondents' socioeconomic characteristics, gender, and sexual orientation. Prior to the questions related to this study, it contained a short questionnaire on beliefs about drug use in the student population and about the income distribution in Mexico. Each of these sets of questions also contained an experimental component.

Regarding the questions relevant to this study, the survey asked respondents to provide estimations of the fraction of male ITAM students who identify as LGBTQ+, the fraction of LGBTQ+ male students who use inclusive language, and the fraction of non-LGBTQ+ male students who use inclusive language. Immediately after recovering this information, respondents were also asked to estimate the probability that a male ITAM student belongs to the LGBTQ+ community given that he uses inclusive language.

Given the questions included in the survey, in what follows, we define:

$\widehat{P}_i(LGBTQ)$ as participant i´s estimate of the fraction of male ITAM students who identify as LGBTQ+;

$\widehat{P}_i(IL|LGBTQ)$ as participant i´s estimate of the fraction of LGBTQ+ male students who use IL;

$\widehat{P}_i(IL|non-LGBTQ)$ as participant i´s estimate of the fraction of non-LGBTQ+ male students who use IL;

And $\widehat{P^d_i}(LGBTQ|IL)$ as participant i´s directly reported estimate of the probability that a male student identifies as LGBTQ+ conditional on using IL.

Note, however, that given $\widehat{P}_i(LGBTQ)$, $\widehat{P}_i(IL|LGBTQ)$, and $\widehat{P}_i(IL|non-LGBTQ)$, it is possible to compute an alternative measure of an individual i's estimate of the probability that a male student identifies as LGBTQ+ conditional on using inclusive language, through the Bayes Rule.

$$\widehat{P^b_i}(LGBTQ|IL) = \frac{\widehat{P}_i(IL|LGBTQ) * \widehat{P}_i(LGBTQ)}{\widehat{P}_i(IL)}$$

$$= \frac{\widehat{P}_i(IL|LGBTQ) * \widehat{P}_i(LGBTQ)}{\widehat{P}_i(LGBTQ) * \widehat{P}_i(IL|LGBTQ) + (1 - \widehat{P}_i(LGBTQ)) * \widehat{P}_i(IL|non-LGBTQ)}$$

Table 1 Control variables

Balance table. Full sample			
	Direct estimate	Bayes Rule estimate	Difference
LGBTQ+	0.168	0.169	0.001
	(0.375)	(0.375)	(0.030)
Under 20 years old	0.228	0.203	−0.025
	(0.420)	(0.403)	(0.033)
Aged 20–21	0.414	0.390	−0.025
	(0.493)	(0.489)	(0.039)
Aged 22 or older	0.357	0.407	0.050
	(0.480)	(0.492)	(0.039)
From CDMX	0.529	0.490	−0.039
	(0.500)	(0.501)	(0.040)
Private high school	0.931	0.903	−0.027
	(0.254)	(0.296)	(0.022)
Bilingual high school	0.754	0.669	−0.085**
	(0.431)	(0.471)	(0.036)
High school GPA higher than 9.5/10	0.360	0.352	−0.009
	(0.481)	(0.478)	(0.039)
Economics student	0.321	0.286	−0.035
	(0.468)	(0.453)	(0.037)
Observations	333	290	623

** Significant at the 5 percent level

Our experiment then exploits the fact that, from the survey questionnaire, we can obtain these two measures ($\widehat{P^d_i}(LGBTQ|IL)$ and $\widehat{P^b_i}(LGBTQ|IL)$) for each participant and that these measures are typically not equal.

More precisely, the experimental component of the survey consisted of randomizing the information provided within the questions requiring respondents to declare how comfortable they were using inclusive language. Specifically, the following two questions were randomized across participants:

1. According to your responses above, the probability of a male ITAM student belonging to the LGBTQ+ population given that he uses inclusive language is $\widehat{P^b_i}(LGBTQ|IL)$. On a scale from 1 to 5, how much do you disagree (1) or agree (5) with the following statements:
2. According to your response above, the probability of a male ITAM student belonging to the LGBTQ+ population given that he uses inclusive language is $\widehat{P^d_i}(LGBTQ|IL)$. On a scale from 1 to 5, how much do you disagree (1) or agree (5) with the following statements:

    I. You feel uncomfortable when people use inclusive language.

II. You feel uncomfortable using inclusive language when speaking.
III. You feel uncomfortable using inclusive language when writing.
IV. Inclusive language diminishes the seriousness of what one says.
V. Inclusive language is unprofessional.

One of the two versions of the survey question was assigned with equal probability to participants.

Table 1 reports descriptive statistics for participants assigned to each of the groups. Column 1 restricts the sample to respondents in group 1 (the group asked the question stating $\widehat{P_i^d}(LGBTQ|IL)$). Column 2 restricts it to respondents in group 2 (those asked the question containing their direct estimate, $\widehat{P_i^b}(LGBTQ|IL)$). Column 3 shows the difference in means between the two groups. More than half of the respondents in this group are under 22 years of age, the vast majority of them attended a private high school, and close to a third of them are majoring in Economics. There is only a small difference across groups in the fraction of students who attended a bilingual high school.

Appendix Tables A2 and A3 present balance tests separately for respondents who either report being female and/or identify as LGBTQ + and for those who report being male and do not identify as LGBTQ + (for the remainder of the paper, we will refer to this group as heterosexual men). As for the full sample, only small differences are observed between treatment groups for these two subsamples. In the results presented below, we include all variables listed in Table 1 as control variables.

Results

Figure 2 presents some motivating correlations. Figure 2A documents that students believe that LGBTQ + individuals are far more likely to use inclusive language than others.

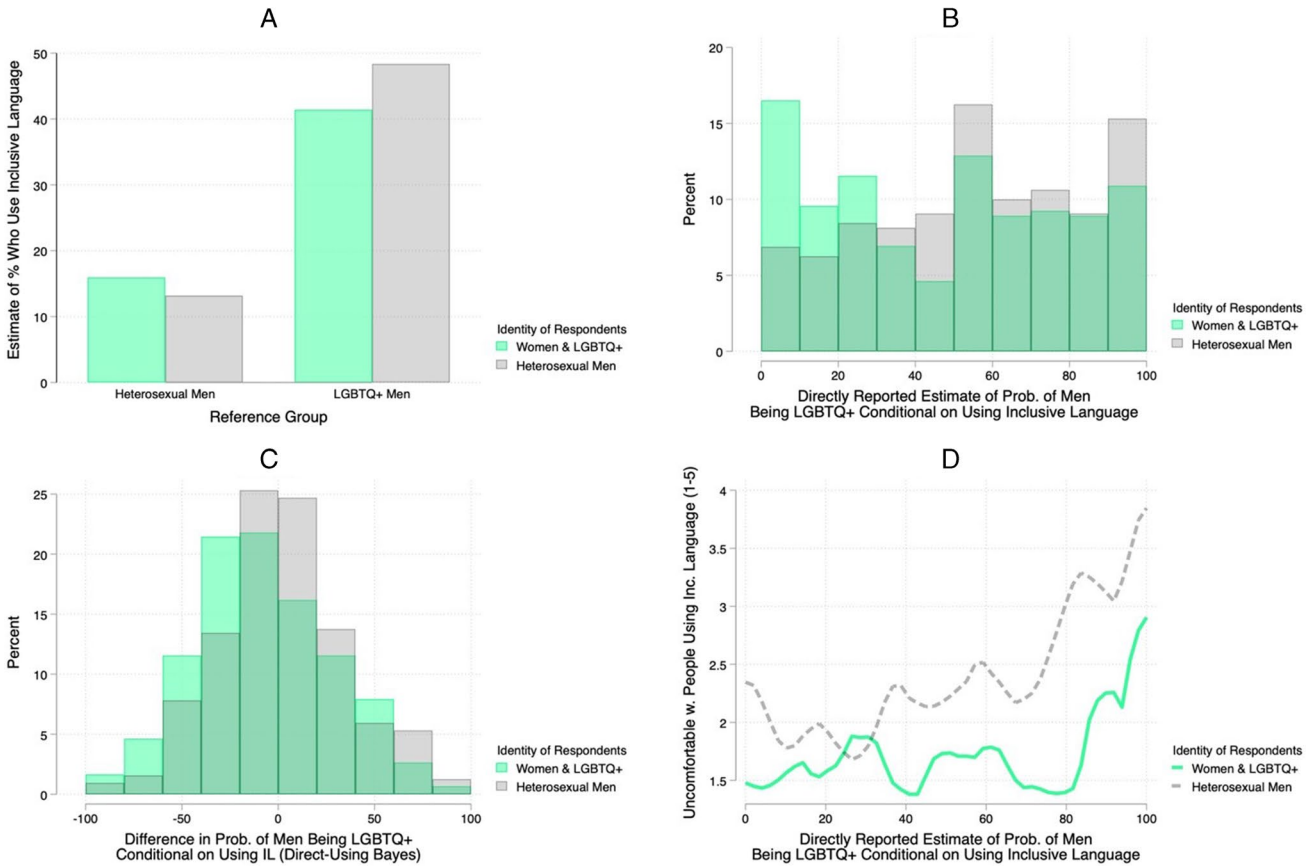

Fig. 2 Motivating correlations. **A** The respondents' mean estimate of the fraction of heterosexual and LGBTQ + men who use inclusive language. **B** The histogram of respondents' directly reported estimate of the conditional probability of a male student being LGBTQ + conditional on using inclusive language. **C** The difference between that same estimate and the one obtained for each respondent through Bayes' Rule. **D** Respondents' direct estimate of the conditional probability against their level of agreement (on a 1–5 scale) with the statement "I am uncomfortable using inclusive language." **A**–**D** split the sample into two groups: heterosexual women and LGBTQ + persons (group one) and heterosexual men (group two)

On average, female and LGBTQ + students estimate that 41 percent of LGBTQ + men use inclusive language, and that only 16 percent of non-LGBTQ + men do. The difference in the estimations is larger when we restrict the sample to heterosexual male participants (48 vs 13 percent, respectively).

Figure 2B, C illustrates how difficult it seems for our survey participants to precisely estimate the probability of someone being LGBTQ + conditional on using inclusive language. Figure 2B shows that the directly reported probability varies widely across individuals. Nineteen percent of respondents in the women and LGBTQ + sample estimate it to be lower than 20 percent, while 23 percent reported a number above 75 percent. On average, these same numbers are higher for heterosexual men.

Figure 2C plots the difference between the direct estimation of the probability of a male student being LGBTQ + conditional on using inclusive language, and that obtained through the Bayes Rule ($\widehat{P_i^d}(LGBTQ|IL) - \widehat{P_i^b}(LGBTQ|IL)$). While the mean of this difference is relatively close to zero, a large fraction of individuals (particularly heterosexual men) estimate a higher conditional probability when asked directly than the one obtained from their previous responses through the Bayes Rule.

Finally, Fig. 2D illustrates that respondents who directly estimate a higher probability of being LGBTQ + conditional on using inclusive language are also less comfortable using it and that this relationship is also stronger for heterosexual men.[15]

These facts thus motivate analyzing whether our treatment had an impact on respondents' self-reported willingness to use inclusive language, particularly among heterosexual men, as, on average, their direct estimate of the probability of a man being LGBTQ + conditional on using inclusive language ($\widehat{P_i^d}(LGBTQ|IL)$) is higher than the one obtained through Bayes Rule ($\widehat{P_i^b}(LGBTQ|IL)$).

To test this hypothesis, we run regressions of the following form:

$$Y_i = \alpha + \beta * Bayes_i + \sum_j \delta_j * X_i^j + \varepsilon_i \quad (1)$$

where Y_i is the score given to the five questions regarding respondents' level of comfort with using inclusive language.

$Bayes_i$ a dummy variable taking the value of one if respondents show the statement stating $\widehat{P_i^b}(LGBTQ|IL)$ as the probability of a male student being LGBTQ + conditional on using inclusive language (the one obtained through Bayes Rule) and zero when the stated probability was $\widehat{P_i^d}(LGBTQ|IL)$.

X_i^j are a set of j control variables (listed in Table 1),

And ε_i is an error term.

The coefficients of interest are then the $\widehat{\beta}$ s, which measure the difference in the outcome for respondents who were shown the statement using $\widehat{P_i^b}(LGBTQ|IL)$ as the probability of a male student being LGBTQ + conditional on using inclusive language with respect to those shown the statement using $\widehat{P_i^d}(LGBTQ|IL)$.

The results of this exercise are presented in Table 2. In all columns, the dependent variable is normalized given its mean and variance within our sample (reported in Appendix Table A4). Panel A shows results for heterosexual women and LGBTQ + persons, and Panel B for the sample of heterosexual men. In both panels, columns 1 through 5 present the results of regressing the score to each of the questions asked regarding the use of inclusive language against a dummy variable taking the value of one for individuals given statement 2 (through Ordinary Least Squares) including no other control variables. Column 6 uses the average of all five responses as the dependent variable. In the Supplementary Materials, we present the histogram of responses to each of the five questions by treatment arm and for each sample.

Throughout specifications, results point in the same direction: for heterosexual female and LGBTQ + respondents, no statistically significant differences are found (panel A), when provided with the probability of a man being part of the LGBTQ + population given he uses inclusive language calculated through Bayes Rule. However, according to panel B, when the sample is restricted to heterosexual men, the differences are larger in magnitude and significantly different from zero. With relatively modest effects, a simple intervention such as the one evaluated in this paper has the potential to increase individuals' willingness to adopt inclusive practices.

In the Appendix, we report results of the same specification including dummy variables indicating the treatment groups to which respondents were assigned in the previous experimental components of the survey as additional controls. Results remain qualitatively unchanged.

Discussion

The results presented in this paper should be interpreted with caution as they lack external validity, they only measure self-reported intended actions, the experimental questions are not incentive-compatible, and we lack the statistical power to explore the mechanisms for the relationships found.

A particular caveat regarding the present study is that the survey was designed only to measure stated intentions. A large literature has argued that, particularly when referring to sensitive topics, survey responses may suffer from social

[15] Appendix Table A4 shows that individuals who report being socially conservative, economically liberal, who identify as religious, and those who do not consider themselves feminists generally report higher resistance to the adoption of IL.

Table 2 Results of the exercises

Outcome:	(1) Uncomfortable with people using IL	(2) Uncomfortable speaking IL	(3) Uncomfortable writing in IL	(4) IL Diminishes seriousness of what is said	(5) IL is unprofessional	(6) Mean of all responses
Panel A: heterosexual women and LGBTQ + persons						
Given estimate obtained through Bayes Rule (= 1)	0.0459	0.149	0.109	0.0958	0.134	0.123
	[0.0865]	[0.0997]	[0.0999]	[0.0970]	[0.0980]	[0.0958]
Constant	−0.676***	−0.932***	−0.801***	−0.956***	−0.923***	−0.978***
	[0.189]	[0.218]	[0.218]	[0.212]	[0.214]	[0.209]
Observations	303	303	303	303	303	303
R-squared	0.118	0.096	0.087	0.127	0.100	0.123
Panel B: heterosexual men						
Given estimate obtained through Bayes Rule (= 1)	−0.231*	−0.166	−0.210*	−0.242**	−0.173	−0.231**
	[0.118]	[0.108]	[0.109]	[0.108]	[0.108]	[0.104]
Constant	−0.147	−0.268	−0.0635	−0.246	−0.0135	−0.167
	[0.285]	[0.259]	[0.263]	[0.261]	[0.260]	[0.251]
Observations	320	320	320	320	320	320
R-squared	0.148	0.113	0.090	0.175	0.123	0.168

This table reports the estimated coefficients from running specification (1). Column 1 uses respondents' answers to the question asking for their level of agreement (on a 1–5 scale) with the statement "I am uncomfortable with people using inclusive language." Column 2 with the statement "I am uncomfortable speaking using inclusive language." Column 3 with "I am uncomfortable writing in inclusive language." Column 4 with "Inclusive language diminishes the seriousness of what I said." Column 5 with "Inclusive language is unprofessional." Column 6 uses the average of respondents' responses to the previous five questions as the dependent variable. In all columns, the dependent variable is normalized given its mean and variance within our sample. Panel A restricts the sample to heterosexual women and LGBTQ + persons. Panel B restricts the sample to and heterosexual men. All regressions include all the variables listed in Table 1 and respondents direct estimate of the conditional probability of a man being LGBTQ + conditional on using inclusive language as controls

*Significant at the 10 percent level, **significant at the 5 percent level, ***significant at the 1 percent level

desirability bias. LGBTQ identification and anti-LGBTQ sentiment are not the exception (Ham et al. 2024; Gutierrez & Rubli 2024; Coffman et al. 2017). Future studies can explore whether it is possible to implement incentive-compatible instruments for belief elicitation and when privacy concerns are important (Danz et al. 2022). Additionally, they could extend the analysis of the experiment's impacts by finding ways to track and measure participants' actions in the real world, which would ideally allow not only to map intentions into actions but also explore whether the impact of interventions such as the one proposed here is short- or long-lived (Bursztyn et al. 2017).

Finally, while our results indicate a statistically significant difference in the resistance to IL among heterosexual men in the treatment group, Appendix Table A6 illustrates that we are likely underpowered to identify heterogeneous effects within subsamples. While the point estimates for the coefficients of interest are larger for heterosexual men who report they would not be comfortable with others inferring them being LGBTQ + from the way they speak (Panel B), we cannot reject (statistically) that they are the same as the estimates for the sample of heterosexual men who report they would not be bothered (Panel A).

Conclusion

Despite all the stated caveats, we argue that fostering inclusive practices is a difficult task and that the experiment presented here can inform the design, implementation, and evaluation of future policies aimed at increasing adoption.

Detractors of inclusive practices claim that the efforts at imposing cultural norms are futile and invasive. In this paper, we document a potential intervention to foster the adoption of inclusive practices by helping individuals be consistent with their own beliefs when calculating conditional probabilities. As such, interventions like the one evaluated in this paper could be less likely to be opposed by

the general population and have important, while modest, effects on behavior.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s41996-025-00167-5.

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Author Contribution MT and EG both discussed the idea, designed and implemented the survey, analyzed the data, and contributed to writing the main manuscript.

Data Availability All the data and replication packages will be made available upon request.

Declarations

Ethics Approval The survey exploited in this paper was approved by ITAM's IRB.

Competing interests The authors declare no competing interests.

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