# Somewhere Over the Rainbow: Investigating presence, perceptions, and engagement with LGBTQ+ inclusion symbols in STEM departments in the UK and US

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lead to a significant improvement in model fit; therefore, the lower AIC and BIC of Model 1 indicate that the first model provides the best fit to the data.

In sum, the findings show that symbols are perceived more positively if the university climate is more inclusive for LGBTQ+ staff and students. Symbol perception did not seem to differ depending on respondentsôLGBTQ+ identity and career stage.

## Qualitative data

175 participants responded to one or multiple of the open-ended questions. Four qualitative themes were developed through the process of reflexive thematic analysis, representing recurring ideas in the dataset.

Many respondents expressed positive feelings towards LGBTQ+ inclusion symbols, suggesting that they can indicate that spaces are safe for LGBTQ+ staff and students.

(PhD student, LGBTQ+, UK)

(PhD student, LGBTQ+, USA)

Symbols could also make LGBTQ+ students and staff feel welcome, create a sense of community, and increase comfort by indicating acceptance, acknowledgement, and the presence of other LGBTQ+ people. Several respondents mentioned that seeing inclusion symbols had a demonstrable impact on their feelings of safety and inclusion.

(PhD student, LGBTQ+, UK)

The political climate was raised as central to inclusion, with respondents stating that this is a perilous time for LGBTQ+ people, and that discrimination is particularly strong for trans people in relation to governmental decision making and public discourses.

(Undergraduate student, LGBTQ+, USA)

While there was a sense that the US and UK were not very inclusive from some, a number of respondents suggested that the UK is relatively safe for LGBTQ+ people despite shortcomings.

(Research fellow/Postdoctoral researcher, LGBTQ+, UK)

At a more immediate level, some responses suggested that departmental climates could differ in their inclusiveness. Moreover, some suggested that the department-level climate was more inclusive than the overall university.

(PhD student, LGBTQ+, USA)

Similarly, echoing the quantitative findings, there was a recurring sense that universities could be more inclusive than their surrounding environments. This could suggest that universities are a particularly important place to target inclusion efforts as they may already be more inclusive than wider environments that can be otherwise hostile or challenging.

(PhD student, LGBTQ+, UK)

## Conclusion

The findings of Study 2 show that LGBTQ+ inclusion symbols can be relatively positively perceived within university departments, however these perceptions are more positive when embedded within more inclusive university-level environments for LGBTQ+ staff and students. These perceptions did not appear to differ by LGBTQ+ identity, career stage, or other relevant demographics. Qualitative data shed more light on the perception of these symbols, indicating that they can be used genuinely and perceived as welcoming, or used performatively and in an overarching way which can weaken their effectiveness as safety signals. Moreover, concrete actions towards inclusion are desired and needed, rather than symbol displays in isolation. Location-based differences, partly related to political climates, impact inclusion, but the potentially stronger inclusion climate within universities should encoura]τpus

motivation condition ( = 54.73, = 28.59); perceived sincerity is also higher in the internal motivation ( = 53.76, = 24.16) than external motivation condition ( = 40.49, = 32.09). There was no effect of organisational motivation on perceived safety, positivity, support for symbol display, external motivation, internal motivation, or behavioural intention to display symbols. Hypothesis 3 was only partly supported: there was an effect of internal organisational motivation on the perception of initiatives, but this was not observed for safety or many of the other outcomes. Hypothesis 4 and 5 were not supported as there was no significant impact of actions.

## Study 3b

While almost all participants (95.9%) passed the manipulation check requiring them to correctly select the name of the initiative, there were again indications of poor attention or comprehension, with 50% of participants in the external motivation condition incorrectly reporting that the initiative was values-motivated. Moreover, results of independent-samples t-tests suggested that there were not differences in realistic or symbolic threat ( ôs > .05) between the two groups, suggesting that the manipulation did not impact threat as intended. The data analysis presented below is computed on all participants who passed the name-based manipulation check ( = 162). This sample is sufficient to achieve statistical power for a medium effect size at 80% power, as indicated by G*Power 3.1.9.7. W ù.¿! ˆq à ˆq •2„ . 8E • ˆ x € ˆ x Žì-

The results showed no significant effect of organisational motivation, threat, or their interaction on the outcomes ( ôs > .05). Hypothesis 6 and 7 were therefore not supported.

## Study 3c

Almost all participants (97.1%) passed the manipulation check requiring them to correctly select the name of the initiative, and participants were generally able to imagine the scenario (only 8.8% rating their ability as 4/10 or less). The data analysis presented below is computed on all participants who passed the name-based manipulation check ( = 132). It should be noted that this sample is too small to achieve statistical power for a medium effect size at 80% power, as indicated by G*Power 3.1.9.7 which indicated a requirement for 153 participants. However, an independent-samples t-test suggested that there were not differences in self-efficacy ( > .05) between the two groups, suggesting that the manipulation did not impact self-efficacy as intended.

The results showed no significant effect of perspective-taking, self

suggest that organisational motivation may play a role in organisational trust and perceptions

LGBTQ+ individuals, and how to practice meaningful inclusion and allyship. A version of US ôSafe Zoneô training, where individuals receive LGBTQ+ awareness and allyship training before receiving a sticker indicating that they have received this training, may be one way to achieve this.

At all levels, with respect to horizon scanning, it is important to bear in mind the political climate and its impact on inclusion efforts. This is particularly relevant in the US with a recent Supreme Court ruling which is

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In a randomised order, participants were shown a description and image of some examples of rainbow flag symbolism, Pride events, and display of personal pronouns (see https://osf.io/zh6dg). They indicated whether they had seen these symbols used at a departmental-, university-, state/country-, and US/UK-level and completed ratings of these symbols in the context of their university department on slider scales from 0 to 10 representing Negative for LGBTQ+ inclusionï Positive for LGBTQ+ inclusion, Inauthentic about LGBTQ+ inclusionï Authentic about LGBTQ+ inclusion, Ineffective at creating LGBTQ+ inclusionï Effective at creating LGBTQ+ inclusion, Performativeï Sincere, and Nonthreateningï Threatening. If participants had not seen the symbol used at a departmental level, they were asked to complete these ratings based on how they would feel if these symbols were present.

Participants used slider scales to rate how inclusive their department, university, state/country, and the UK/USA are for LGBTQ+ people.

The Centrality subscale of Leach and colleaguesô(2008) in-group identification scale, adapted to pertain to LGBTQ+ or straight people, was used to measure the extent to which participantsôsexual orientation and gender identity were an important part of their identity.

Participants were invited to respond to three open-ended questions asking what they thought of these symbols and whether any others were used, whether anything impacted their rating of how inclusive these different environments were, and how inclusion symbols might signal inclusive environments for LGBTQ+ people in STEM.

While they are not analysed here, participants also rated the broader inclusion climate at each level and completed measures of stigma consciousness (LGBTQ+ participants only) and existential loneliness.

## Analysis

Independent-samples t-tests indicated that there were significant differences between perception ratings when symbols were present versus hypothetically rated for multiple ratings, therefore the subsequent analysis includes only ratings of present symbols.

A series of exploratory factor analyses with principal axis factoring and direct oblimin rotation were used to assess whether ratings of inclusion symbols (as positive, effective, authentic, sincere, and nonthreatening) could be combined into a mean index score and whether the three inclusion symbols could be combined into one score. For each test, Kaiser Meyer-Olkin measure values over 0.6 and significant Bartlettôs test of sphericity indicated that the data were suitable for factor analysis. All criteria described above suggested that mean scores for four ratings (positivity, effectiveness, authenticity, sincerity) for the rainbow, Pride, and pronoun symbols comprised a single factor with good reliability ( = .87) which explained 70.8% variance in the data. Therefore, a mean score of the three symbols was computed and is the outcome measure of the following modelling analysis.

Multilevel modelling using restricted maximum likelihood estimation was used to test the main hypotheses using R software (R Core Team, 2021). A complete cases approach (including = 221 participants) was used to allow model comparison; non-categorical predictors were grand-mean centered to address high Variance Inflation Factor for some variables. The first model included perception of LGBTQ+ inclusion climate at the institutional- and state/country-level as fixed effects. Departmental-level inclusion climate was not included given its high multicollinearity with institutional-level climate. US or UK

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