A FRAMEWORK FOR THE DESIGN OF GENDER INCLUSIVE ACTIVITIES

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How can statistics educators ensure curricula promote gender inclusivity? We believe efforts to promote inclusivity should be informed by the desires, thoughts, and opinions of historically excluded individuals and by how they desire to be included. We present a framework for designing gender inclusive activities for statistics classes. We recruited individuals with historically excluded gender identities to complete a semi-structured interview. Transcripts were analyzed using a grounded theory and open coding approach. Our findings suggest that to our participants, it is important to stress the variability of lived experiences and gender identities, use datasets that both include all individuals and inclusively measure gender identities, promote an understanding of the similarity across all humans and be careful to avoid exacerbating perceived differences across different gender identities, and to use inclusive pedagogies and classroom norms. This framework can inform the development of gender inclusive curricula and resources for statistics educators and classrooms.

INTRODUCTION

In the United States, there are an estimated 1.6 million individuals who identify as transgender (Herman et al., 2022). In Brasil, an estimated 3 million individuals identify as non-binary or as transgender (Spizzirri et al., 2021). Approximately 400,000 individuals living in Zhōngguó [China] are reported to identify as transgender (Xie et al., 2021). These estimates are almost assuredly underestimates, and many countries' governments do not collect any information on individuals' gender identities at all. While gender is a socio-cultural construct whose meaning varies across the world, it is clear that there are individuals worldwide who identify in ways that are not fully reflected by a dichotomization of gender identity and an equating of gender identity with biological sex.

One opportunity to promote gender inclusivity lies within our curricula. However, in the United States, statistics textbooks and curricula almost exclusively feature heterosexual cisgender individuals and do so in unequal and problematically stereotypical gender roles and contexts (Parise, 2021). Thus, any student who identifies as other than a cisgender man or woman entering a typical classroom will likely find their identity excluded from the curriculum. Furthermore, since making comparisons using binary variables is almost ubiquitous in introductory statistics courses (e.g., comparisons of means, comparisons of proportions), curricula often lean on the use of a dichotomous gender binary when making comparisons (e.g., Diez et al., 2022, Exercise 6.19; Lock et al., 2021, Table 7.43).

We find this situation unacceptable. We value inclusivity for all individuals in all environments, including our statistics classrooms. This leads us to our guiding question: How can we as statisticians and statistics educators ensure *all* individuals are included in our practice and pedagogy?

BACKGROUND

We are not the first to call attention to the critical gap between this value and current practices and pedagogies (e.g., Witner, 2021). Research, resources, and recommendations for promoting inclusivity in the classroom have been promulgated in academic circles, including statistics education. Books such as *Data Feminism* (D'Ignazio & Klein, 2020) and *Inclusive Teaching* (Hogan & Sathy, 2022) have recently been featured at conferences and reading clubs in our field. There is a plethora of research focused on teachers' beliefs about and experiences with inclusive pedagogies (e.g., Cótan et al., 2021; Márquez & Melero-Aguilar, 2022; Somma & Bennett, 2020). Additionally, there is substantial research examining and describing the experiences of individuals with regards to gender inclusive pedagogies (e.g., Ferfolja & Ullman, 2021). Most relatedly, instructors are beginning to develop and test gender inclusive content in STEM classrooms (e.g., Richard et al., 2022).

We believe that the central role that context plays in statistics both provides a unique opportunity to promote gender inclusivity and requires unique considerations for implementing gender inclusive pedagogies in the statistics classroom. Inclusive practices such as those recommended by Hogan and

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Sathy (2022) are excellent recommendations for any classroom and should be a part of the statistics classroom as well. Critically selecting and evaluating datasets as recommended by D'Ignazio and Klein (2020) are excellent recommendations for the selection of contexts and should equally be a part of the statistics classroom.

While the statistics education community discusses ways to foster and promote gender inclusivity, the experiences of gender non-conforming and transgender students in statistics courses are critically understudied and are underrepresented in such conversations (Ataide Pinheiro, 2022). We believe that any effort to promote inclusivity for all individuals should be informed by the desires, thoughts, and opinions of those individuals who have been historically excluded (such as gender non-conforming and transgender individuals), specifically in how *they* would like to be included.

Study purpose

The purpose of this study is to place the voices of individuals with historically excluded and suppressed gender identities (i.e., gender non-conforming and transgender individuals) at the forefront of the design of gender inclusive pedagogies for statistics classrooms. In this paper, we discuss the development of a framework for designing gender inclusive activities for statistics classes based on interviews with individuals with historically excluded gender identities.

METHODS

The research questions that this study aimed to answer were: (1) What does gender inclusivity in the classroom mean to individuals who identify as gender non-conforming or transgender?; (2) How would those individuals like to see gender represented in datasets used in statistics classrooms?; and, (3) How would those individuals like to see these datasets used in statistics classrooms?

Participants

To answer these research questions, we intentionally recruited participants who identified either as gender non-conforming or as transgender (as well as non-binary and non-cisgender). Anyone who felt that the stereotypical dichotomy of "man" or "woman" did not accurately describe their gender identity was eligible to participate. Participants were recruited through emails sent to relevant campus student groups, as well as through snowball sampling methods. Furthermore, individuals who had recently taken a statistics class at the undergraduate or graduate level were prioritized in the recruitment of this study.

Materials and procedures

Eligible participants volunteering for the study were then invited to participate in an interview lasting approximately 45 minutes to one hour. The interviews were semi-structured and designed to ascertain participants' thoughts on the role that datasets and activities in statistics courses can serve to foster gender inclusivity, in a manner aligned with the study's research questions. For example, several prompts probed participants' thoughts about when they might feel included in a statistics classroom and when they might not feel included, based on various factors such as the choice of datasets or interactions with classmates and instructors. Interviews were conducted remotely with one of the researchers (i.e., the first author).

Analysis plan

All interviews were audio recorded and transcribed with the consent of the participants. We analyzed all transcripts utilizing a grounded theory and open coding approach (Glaser & Strauss, 1967). Transcripts were analyzed and coded with the QDA Miner software application. One member of the research team first coded the artifacts to produce an initial codebook (DeCuir-Gunby et al., 2011; see Table 1). Then, we reviewed the codebook and codes to theorize answers to our research questions, and examined any other patterns and themes that emerged from the data. To ensure the credibility of the results, these initial theories were then member-checked with the interviewees, who were provided an opportunity to comment, edit, or revise the initial theories. The results presented in this paper are in the form of expository and are preliminary analyses as the project is currently ongoing.

This study was reviewed and approved by the Institutional Review Board at St. Norbert College (IRB# 23-01-31).

Table 1. Researchers' initial codebook based on transcripts from participants' interviews

Theme	Child code	Example transcript excerpt
Course learning objective	perceived importance	"I think the most important thing to really make your students understand as an instructor is that these are people. This data set cannot physically hold every aspect of a person."
	measurement	"Where is the data coming from? And what does it represent? And are we doing that faithfully? And maybe that framing is something that should be touched upon."
inclusivity definition	inclusivity	"Inclusivity just in general in a classroom is just understanding that not everyone has the same experience."
how to bring it up	accepting differences	"take the understanding that not everyone is the same"
	seeing similarities	"It's important to strive to try to see similarities. Like it's easy to see the differences, ... try to see the similarities in places where maybe people aren't looking or where they perceive differences."
	one-on-one conversation	"I've had a few friends who, like I kind of had to explain it to one of my friends, because she has not had much experience."
	classroom norms	"just a general statement about pronouns, or even just somebody using pronouns correctly really helps."
	class activities	"Okay, here are variables, you know. You have gender that's categorized between male, female and like other. Or then, like you go through all of your variables to explain to the class kind of what you're looking for."
	feeling called out	"I would have lot more of that activity just because it's not directly like calling out transgender students."
	group work	"I was actually sitting next to a friend who knew my gender identity, and I had worked closely with. So, for that class, at least like Peer-to-peer was not really an issue for me, because of just the fact that I did have a friend in the class who already knew my identity and understood and accepted my identity."
gender contexts	hidden presence	"It was always there, even if it wasn't explicitly in a dataset. One dataset we used was about pregnant people. There was gender in the dataset, because it was assumed that all of the participants in the dataset were assigned female at birth."
	perception of exclusion	"Unfortunately, it's all we have to work with, because we don't have inclusive datasets."
	inclusive data	"To give students an explicit experience is nice, not necessary, but it is nice, and I think it really makes students of the entire LGBTQ community feel included."
gender definition	non-binary	"Non-binary is seen as king of overarching, like anyone who doesn't fit in the gender binary. But a lot of people don't explicitly identify like that."
	other option	"Personally, I would definitely rather be called 'other' than have to choose one or the other [man/woman]."

write-in	"I think write-in options are important when we're looking at gender, especially if you're trying to accurately represent a large population."
gender fluid	"I have friends who are different things like, maybe identify with more of a specific gender or sexuality. But outside of the LGBTQ community they don't tell people that they identify as that specific thing. They tell people more general terms, because it's more understandable."

PRELIMINARY RESULTS

To our participants, inclusivity is not about highlighting different groups or sub-sections of humanity, but rather it is about including all humans in a discussion about any one thing, accepting the great diversity of experience, acknowledging differences, and seeking similarities.

This means that the best way to incorporate gender inclusive activities into the statistics classroom is to utilize datasets that (1) have measured gender in an inclusive manner (i.e., not simply 'man/woman', but perhaps a write-in option or multiple select response options with several categories), and (2) including individuals from all gender identities in datasets used in classrooms.

Furthermore, the focus of the activity should be on highlighting the complexity and diversity of human existence, rather than on specific gender identities. Specifically, there should be a focus on the diversity of gender identity, but only as part of the larger narrative about the variability across all individuals and characteristics, and the impossibility of a dataset to capture human complexity of existence regardless of which attribute is being discussed.

What does gender inclusivity in the classroom mean to the participants?

To our participants, gender inclusivity, as well as inclusivity in general in a classroom, is an understanding that not everyone has the same lived experiences. It is an understanding that others might not relate to specific single experiences you have had or that you might be able to relate to. It is making an effort to relate to others and understand their lived experiences as much as one can.

Specifically, it requires understanding that just because someone does not fit into pre-specified categories such as man or woman does not mean that their gender is 'wrong'. It cannot be wrong. It is who they are. Because gender is a continuum, for these individuals, it is hard to tell what to pick sometimes when responding to surveys. For example, if you do not identify with a single gender, do you pick "man" or "woman" or "neither"? Oftentimes, individuals are forced to put down a gender with which they do not identify. Inclusivity means exposing students to and having them appreciate the experience of not knowing which option to pick with regards to gender identity, and the ramifications this has for any statistical analyses based on this data.

How did participants want to see gender represented in datasets used in statistics classrooms?

To our participants, it was important to avoid using datasets with explicit male/female binaries, especially since "male" and "female" are not gender identities, they are sexes assigned at birth. Similarly, it is important to avoid hidden gender contexts, such as datasets about pregnancies. In such datasets, gender may not be an explicit variable in the dataset, but it is often implied and assumed that all individuals identify as women – this is not necessarily the case. Finally, if you have to use data with few or no gender non-conforming individuals, understand and emphasize that such datasets are unfortunately all that we often have access to, because a valid and reliable measure of gender identity is often not measured as part of data collection, and that these limited datasets are explicitly exclusive.

When using datasets with gender as a variable, do not filter the dataset to focus only on some people, such as only including transgender individuals in a dataset. Rather, include everyone, and as many diverse gender identities as possible, including cisgender identities. To our participants, including everyone in a dataset and analysis is how one achieves gender inclusivity.

Additionally, these datasets should be used in a way that does not place an artificial spotlight on gender non-conforming identities. Gender non-conforming identities should not be seen as something that is being examined for this dataset alone. Inclusive thinking with relation to gender identities is

something that should be promoted across all analyses and datasets. This is especially important when gender is represented as a binary in a dataset, and in such cases, all students should learn to interrogate the aspects of individuals' identities and characteristics that are missing from the dataset, and thus will also be missing from the analyses and results generated from that dataset, due to this unreliable measure.

How did participants want to see datasets used in statistics classrooms?

To our participants, activities should show all students that it is important to consider every individual's gender identity beyond the binary. For example, an activity could have a dataset where the correlation between some factor and biological sex is totally different than the correlation between the factor and gender identity. The activity should show that it matters whether you use someone's biological sex versus their gender identity.

However, comparing individuals across gender identities, such as comparing cisgender men to transgender men, may have the negative effect of highlighting differences between people. Instead, these comparisons should only be made in order to develop an appreciation for the diversity of lived experiences while simultaneously showing similarities. Such comparisons may be a way for students to get to better understand individuals with whom they may not interact (or interact less frequently). Similarly, it is important to have some examples where gender is not a significant factor in a model, which serves to emphasize similarities across individuals' gender identity.

Additionally, and perhaps most importantly, do not call out a student. This also extends to not calling out anyone being represented in a dataset. Students may also feel called out in activities that focus on comparisons between different gender identities, or vicariously called out if a focus is placed on a specific observation from the dataset. Avoid tokenization by using activities based on and including many different gender identities.

CONCLUSION

As statistics educators promote gender inclusivity, it is imperative that the voices of historically excluded individuals frame our actions. In this study, we interviewed individuals with gender non-conforming and transgender identities for their advice on the role that statistics classrooms, datasets, and activities can play in promoting gender inclusivity. From this data, we have generated a framework that can support the subsequent development of such activities. To our participants, it is important to:

1. Stress the variability of lived experiences across all persons and address the conundrum of having to respond to a biographical survey in a way that does not reflect who you are.
2. Use datasets that include all individuals with as many gender identities as possible, including cisgender men and women. Ensure that thinking about gender diversity is not something unique to a single dataset used in your class.
3. Be careful not to exacerbate perceived differences when comparing individuals across gender identities. Instead, promote an understanding of the similarity across all humans.
4. Use inclusive pedagogies such as those advocated by D'Ignazio and Klein (2020) or Hogan and Sathy (2022). Stress the importance of correctly addressing an individual, and the importance of validly and reliably measuring gender. Emphasize that observations in a dataset are people and stress the impossibility of a dataset to capture anyone's identity in its full complexity.

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