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The Gender Identity Scale: Adapting the Gender Unicorn to Measure Gender Identity

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The Gender Unicorn is a popular infographic used to educate people about gender diversity. We adapt the Gender Unicorn for use as a measure of gender identity—the Gender Identity Scale (GIS)—in which participants report level of identification with each of three genders: female/woman/girl, male/man/boy, and other gender(s). We administer the GIS to a sample of 269 self-identified trans and gender diverse adults and use a latent class analysis of responses to identify seven gender classes. We find these classes to be consistent with participants' own designations of gender. These results support the utility of the GIS as a measure of gender that can be used with a gender diverse population.

Public Significance Statement
We adapt the Gender Unicorn to create a measure of gender—the Gender Identity Scale (GIS)—in which participants are asked to report their level of identification with each of three genders: female/woman/girl, male/man/boy, other gender(s). We demonstrate that responses to the GIS are consistent with trans and gender diverse people's own designations of gender.

Keywords: Gender Unicorn, transgender, gender diversity, gender identity, demographics

Gender identity is an individual's internal sense of being a woman/female, a man/male, and/or a nonbinary gender (GLAAD, 2015; Johnson, Greaves, & Repta, 2009; Pinn, 2003). It is considered to be an important facet of a person's identity (Wood & Eagly, 2009), one that does not necessarily correspond to the sex they are assigned at birth (which is usually based on genital appearance; Tate, Ledbetter, & Youssef, 2013).

Despite the complexity of gender as a construct and the diversity of gender identities present in the population, many researchers continue to measure their participants' gender in a manner that conflates gender with sex by using a single self-report item that offer participants a choice of female and male (Tate et al., 2013; Treharne, 2011; Westbrook & Saperstein, 2015). Participants whose gender identity does not conform to the woman/man binary may find themselves excluded from such research or their gender misrepresented and/or constrained to inappropriate gender categories (Treharne, 2011). This could potentially underestimate the effects of gender and gender diversity (Westbrook & Saperstein, 2015).

Measuring Gender in Inclusive Ways

Gender, rather than *sex*, is the correct term and construct to use when referring to social groupings of people (American Psychological Association, 2010). Unnecessary uncertainty is created when the terms used are associated with sex, but gender is supposedly the topic of discussion (Muehlenhard & Peterson, 2011; Runnels, Tudiver, Doull, & Boscoe, 2014). For example, *female* and *male* are often associated with sex and therefore *woman* and *man* are the preferred terms to use when assessing gender (Ansara & Hegarty, 2014; Tate et al., 2013). Correct use of language is therefore extremely important.

The importance of language continues to apply in the use of gendered language to describe groups of people. Using gendered language to identify people in ways that they do not identify themselves is considered misgendering (Ansara & Hegarty, 2012, 2014). *Misgendering* is a sexist practice that delegitimizes people's own designation of gender (Ansara & Hegarty, 2014). Forcing people to endorse a binary option for gender, and consequently describing them with those labels, may therefore constitute a form of discriminatory practice through the potential misgendering of participants who do not identify with the gender binary.

One attempt to be more inclusive when measuring gender is to add an option for transgender. This single category fails to recognize the multitude of genders within it that may contribute to differences in research outcomes (Budge et al., 2013; Harrison, Grant, & Herman, 2012). It also fails to recognize those who do not identify as transgender but as women or men, neither, or with some other term (Ansara & Hegarty, 2014). Attempts to address this by adding a fourth option of "do not identify as female, male, or transgender" (The GenIUSS Group, 2014) may still be problematic as people may identify with both transgender and woman or man (Ansara & Hegarty, 2014).

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Another option is to expand the selection of gender categories and allowing participants to endorse any categories that apply to them (Grant et al., 2011; Tate et al., 2013; The GenIUSS Group, 2014). However, this approach requires researchers to make assumptions about the terms used to describe categories and is complicated by terms varying between cultural groups and evolving over time (Brown, 2016). Terms that were prevalent in the recent past, such as "transgendered" (Serano, 2007), have faded from use and may even be considered offensive by some within the trans and gender diverse community (GLAAD, 2015). Difficulties with the nonspecificity of some terms, such as *transgender* or *genderqueer*, remain. Researchers also assume that each participant uses endorsed terms in the same way. This also raises questions about the meaning of multiple endorsements—both at a conceptual level and from an inferential statistics point of view.

Allowing participants to describe their identity in their own words overcomes some of these challenges and ensures, most importantly, that researchers do not misgender respondents (Ansara & Hegarty, 2014). However, this approach is susceptible to the idiosyncratic and changing use of descriptors and forces researchers to make ad hoc groupings of participants if they wish to conduct quantitative analyses on responses (Hyde et al., 2014; Riggs, Power, & von Doussa, 2016). A list of idiosyncratic descriptors may also make it difficult to assess the diversity and representativeness of a sample, which therefore defeats the purpose of collecting that information (Connelly, 2013).

From the Gingerbread Person to the Gender Unicorn

In the present article, we investigate the possibility that infographics used to educate about gender diversity may serve as the basis for measuring gender in a manner that is inclusive, not reliant on particular linguistic descriptors, and suitable for use with the trans and gender diverse people. A strength of using these infographics is their history of development and adoption by the trans and gender diverse community ("Gingerbread Person," 2011; Lawson, 2011; Pan & Moore, 2014). The trans and gender diverse community places importance on being involved in the discourse and conceptualization of their gender identity (Pan & Moore, 2014). This is exemplified through the creation of the Gender Unicorn to reclaim discourse and conceptualization from someone who was not part of the trans and gender diverse community (Pan & Moore, 2014). The most respectful way of measuring gender would therefore be to use materials that the trans and gender diverse community as a group has reviewed and accepted as the best way to conceptualize their gender diversity.

Early infographics distributed through social media ("Gingerbread Person," 2011; Lawson, 2011) drew upon earlier academic work (Diamond, 2002) to bring attention to the distinction between the constructs of *sex*, *gender*, *sexual orientation*, and *gender expression*. Lawson's (2011) Gingerbread Person further represented each construct as a continuum. Each construct was represented by a line anchored by *male* and *female* (or *masculine/feminine* in the case of gender expression) with the centers of each line labeled *intersex* for sex, *genderqueer* for gender, *bisexual* for orientation, and *androgynous* for gender expression.

The Genderbread Person (Killerman, 2012a) continued this structure with several changes. The sex and gender constructs were relabeled *biological sex* and *gender identity*, with the gender identity line now anchored by *woman* and *man,* with *genderqueer* at the midpoint. The Genderbread Person was updated shortly afterward (Killerman, 2012b) with each construct now represented by two lines rather than one. Gender identity used two lines each anchored by *nongendered* on the left and *woman-ness* and *man-ness* on the right (with no label between these anchors). This allowed people to use the *woman/man* labels independently without being constrained to a gender-binary response. For example, someone who identified as *bigender* could mark both lines in gender identity highly and someone who did not identify with any gender could mark both lines at zero (left). This was unclear in the previous version where the middle of the scale might be applicable to both, or people who did not identify with any gender might feel excluded. Similarly, two lines anchored *agender* and *feminine/masculine* represented gender expression, two lines anchored *asex* and *female-ness/male-ness* represented biological sex, and two lines anchored *nobody* and *women/females/femininity/men/males/masculinity* represented sexual orientation (now labeled *sexual attraction*).

The importance of correct and inclusive language motivated the creation of the Gender Unicorn to address limitations in the revised Genderbread Person (Pan & Moore, 2014). Pan and Moore (2014) argued that *nongendered* is neither the only term nor the preferred term (*agender*) that can anchor each of the gender identity scales. They therefore removed the use of labels to anchor any of the scales. Furthermore, they criticized Killerman (2012b) for incorrectly using *agender* to anchor gender expression. Pan and Moore also argued that "biological sex" was ambiguous and harmful to trans people, suggesting that sex assigned at birth was more accurate. They dismissed the term *asex* based on it not being a real word and meaningless given that everyone has some sex characteristics prescribed to them. They also added a third scale to gender as some cultures have genders outside of the male/female binary.

The Gender Unicorn (copies of which are accessible at http://www.transstudent.org/gender/) consists of five constructs: gender identity, gender expression, sex assigned at birth, physically attracted to, and emotionally attracted to. Sex assigned at birth is the only construct that is categorical with three options: female, male, and other/intersex. The other four constructs are continuous with three dimensions each. Each dimension has a nil value at one end and an unlabeled maximum value at the other, with no explicit anchors provided. Gender identity has the dimensions female/woman/girl, male/man/boy, and other gender(s). Gender expression has the dimensions feminine, masculine, and other. Physically attracted to and emotionally attracted to both have the dimensions women, men, and other gender(s).

Adapting the Gender Unicorn for Use as a Measurement Tool

In summary, the Gender Unicorn represents not only a departure from the traditional cis-binary conceptualization of gender, it calls into question the adequacy of describing gender along a continuum anchored by *woman* and *man*, and the adequacy of only having two dimensions to measure gender. It also provides the basis for representing gender in ways that are not overly dependent on linguistic gender descriptors.

However, although the Gender Unicorn has been used successfully as a teaching resource (Solotke, Sitkin, Schwartz, & Encandela, 2017) its use in research to measure gender requires further psychometric validation. Therefore, in the present study we conducted an evaluation of the Gender Unicorn as a measure of gender in which respondents use sliding scales to indicate their level of identification with female/woman/girl, male/man/boy, and other gender(s). We named the scale used in this study the Gender Identity Scale (GIS) as the scale incorporated only the gender-identity component of the Gender Unicorn. Although the Gender Unicorn consists of five constructs, only two—gender identity and sex assigned at birth—were included in the GIS. Physical and emotional attraction are concepts related to sexuality rather than gender (American Psychological Association, 2015; Pan & Moore, 2014), and thus we did not include them in the GIS. We also did not include gender expression because, although gender expression may be a way of communicating gender, it is not necessarily reflective of a person's gender identity (American Psychological Association, 2015; Westbrook & Saperstein, 2015).

We focused on validating the GIS with trans and gender diverse people because, as noted in the literature review, this population presents researchers with the greatest challenge in terms of measuring gender and are the most vulnerable to misgendering in current research (Ansara & Hegarty, 2012, 2014). We analyzed their pattern of responding to the GIS via latent class analysis (LCA) to reveal underlying gender identity classes. We expected that some participants will identify with the gender binary and therefore the LCA will identify classes of participants that highly identify with only one of female/woman/girl or male/man/boy. If people do identify with genders outside of the binary (Pan & Moore, 2014), then the LCA should also identify a class of participants that highly identify with only other gender(s). The GIS has, however, separate dimensions of gender identity so that those dimensions may vary independently. This suggests that the LCA should also identify classes of participants that identify with different combinations of those dimensions, which includes not identifying with any gender at all.

We then examined the way that participants linguistically describe their gender within each of the classes identified by the LCA. We did this to determine if the identified classes had a meaning that was consistent with participants' own designations of gender. There are commonly accepted definitions for many labels (e.g., Barker & Richards, 2015; "Gender Identities," 2015; TransGender Victoria, 2013), but some definitions can be broad. We expected that labels with a currently clear definition (e.g., *woman* or *man*) would consistently appear in a single class. However, umbrella labels such as *genderqueer* or *nonbinary* can cover many different types of identities including, but not limited to, masculine, feminine, neutral, or bigender (TransGender Victoria, 2013). We therefore did not expect umbrella labels to appear exclusively within one class.

We analyzed patterns of responding to the GIS from trans and gender diverse participants via a LCA to test the following hypotheses:

> *H1:* Three gender classes will correspond to participants who identify with only one of the three dimensions in the GIS—female/woman/girl, male/man/boy, or other gender(s).

> *H2:* One gender class will consist of participants who do not identify with any of the dimensions of the GIS.

> *H3:* A gender class or classes will include participants who identify with a combination of dimensions of the GIS.

> *H4:* Participants who describe their gender using "binary" labels, such as "*woman* or *man*" will identify predominantly with the corresponding GIS dimension (i.e., female/woman/girl, or male/man/boy respectively) and appear together in respective LCA gender classes.

> *H5:* Participants who describe their gender using "umbrella" labels, such as *genderqueer* or *transgender*, will not identify exclusively with a single GIS dimension and will appear across multiple LCA gender classes.

Method

Participants

The 269 participants were aged between 18 and 79 years (M = 39.40, SD = 14.45), although 17 participants did not provide age data. The country of birth for the participants were: Australia (n = 121), United States (n = 84), United Kingdom (n = 26), Canada (n = 12), New Zealand (n = 9), Germany (n = 3), two each from Ireland and Turkey, one each from China, Colombia, Iran, Japan, Luxemburg, Spain, Trinidad and Tobago, and three participants who did not provide that information. In terms of sex assigned at birth, 150 (56.1%) participants reported being assigned female at birth (AFAB), 113 (42.7%) reported being assigned male at birth (AMAB), and 3 (1.1%) reported being intersex/other. This was a more even AFAB:AMAB ratio (1.3:1) than reported by previous studies (typically from 2:1, Hyde et al., 2014, to 3:1, Couch et al., 2007; Ho & Mussap, 2017).

Measures

The GIS created for this study was adapted from the gender identity and sex assigned at birth components of the Gender Unicorn (Pan & Moore, 2014). The GIS measured gender identity by asking "To what extent do you identify with the following genders?" and used the three dimensions of female/woman/girl, male/man/boy, and other gender(s). The scales in the Gender Unicorn are not labeled or anchored and are represented as a continuous line (see Appendix). We anchored each scale in the GIS with labels to provide guidance for the direction of response from *Not at all* to *Very strongly* and points were also numerically labeled (0, 10 . . . 90, 100) so that responses would more likely be interval-level data (Davies, 2008). We implemented the scales using sliders to convey the concept of continuity from the Gender Unicorn. The sliders were constrained to only allow input on the labeled points. The scales were therefore 11-point scales, which allow respondents enough options to perceive that they are able to express themselves adequately without decreasing test–retest reliability (Preston & Colman, 2000). A response was compulsory for each scale which means there was no missing data in the dataset.

Participants were also asked "How would you usually describe your gender?" and a text field was provided for responses. The GIS asks for sex assigned at birth using the three mutually exclusive categories of female, male, and other/intersex.

Procedure

The Deakin University Human Research Ethics Committee approved this study. Participants for this study were recruited via posts in online support forums, social media, and websites. Examples included Gender Diversity Australia and Association of Transgender Professionals support forums, and Gender Queer Australia website. We placed physical notices in the clubrooms of university lesbian, gay, bisexual, transgender, and intersex clubs and associations, and encouraged peer referral to the study. The study was advertised as being open to adults (18 years of age or older) who self-identified as trans or gender diverse. Advertisements directed participants to an online survey that they could complete after reading the plain language statement, providing consent, and confirming that they were over the age of 18 years and identify as trans or gender diverse. Age and gender identity were thus the only inclusion criteria. We did not offer an honorarium to participants.

Analytic Design

We used R (Version 3.2.5; R Core Team, 2016) with packages psych (Version 1.6.12; Revelle, 2016) and *mclust* (Version 5.2; Fraley, Raftery, Murphy, & Scrucca, 2012) to conduct an LCA of participant responses in order to derive classes based on similar patterns of responding. LCA does not make assumptions concerning the nature of observed variables that are inputted into the model (it is nonparametric), requiring only independence of observations between classes (Oberski, 2016). Tein, Coxe, and Cham (2013) noted that the minimum sample size requirements for LCAs is understudied and the risk of underpowered studies is that the number of classes extracted is less than the true number of classes in the data. The Bayesian information criterion (BIC) was therefore used for potential solutions to determine the number of classes to extract.

We tested H1, H2, and H3 in terms of whether or not the predicted gender classes appeared in the results of the LCA. For example, according to H1 the LCA should identify classes of "binary" participants (i.e., participants who identify exclusively with the "female/woman/girl" or "male/man/boy" dimensions of the GIS). Failure to do so, particularly given previous research documenting the prevalence of these binary gender identities in the trans and gender diverse community (Riggs & Due, 2013), would result in the rejection of H1 and force us to reconsider the GIS and/or or methodolgy. Similarly, a failure to identify participants who do not identify with any GIS dimensions (H2) or with a combination of several dimensions (H3), would result in the rejection of these hypotheses. Such an outcome would be at odds with our current understanding of gender diversity (Pan & Moore, 2014; Riggs & Due, 2013).

We tested H4 and H5 by assigning participants to the following groups based on their response to the open-ended question that asked them to describe their gender in their own words:

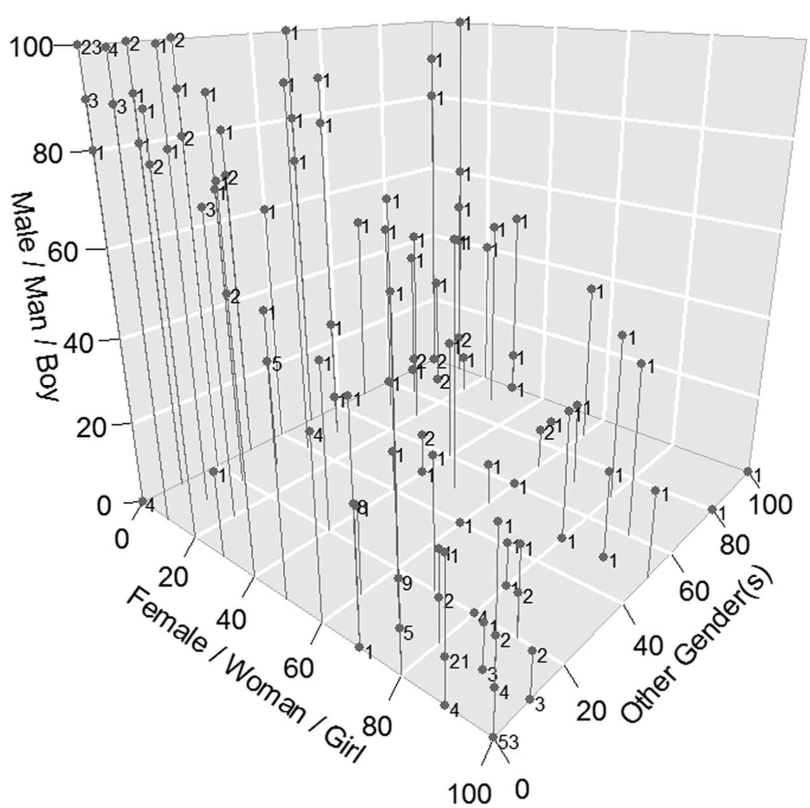

Figure 1. Self-reported gender identity of participants plotted in 3-dimensional space with each axis representing one of the gender dimensions. Numbers represent how many people identify with the gender represented by that point.

1. "Binary" labels such as *male*, *man*, *guy*, or *boy*.
2. "Binary" labels such as *female, woman,* or *girl*.
3. Nonbinary but relatively specific labels such as *trans-femme*, *transmasc*, *agender*, or *neutrois* (Gender Spectrum, n.d.; gqid, 2015).
4. Umbrella terms such as *genderqueer, transgender, non-binary* (Gender Spectrum, n.d.; gqid, 2015), or statements that gave no clear indication of gender such as "I don't."

We then individually compared the prevalence of Groups 1 and 2 across the classes identified by the LCA using a chi-square test. We used a Fisher's exact test if the chi-square assumption was violated, such as when any of the frequencies were less than five. A nonsignificant result for either of these two groups would suggest that the usage of the "binary" label is not dependent upon

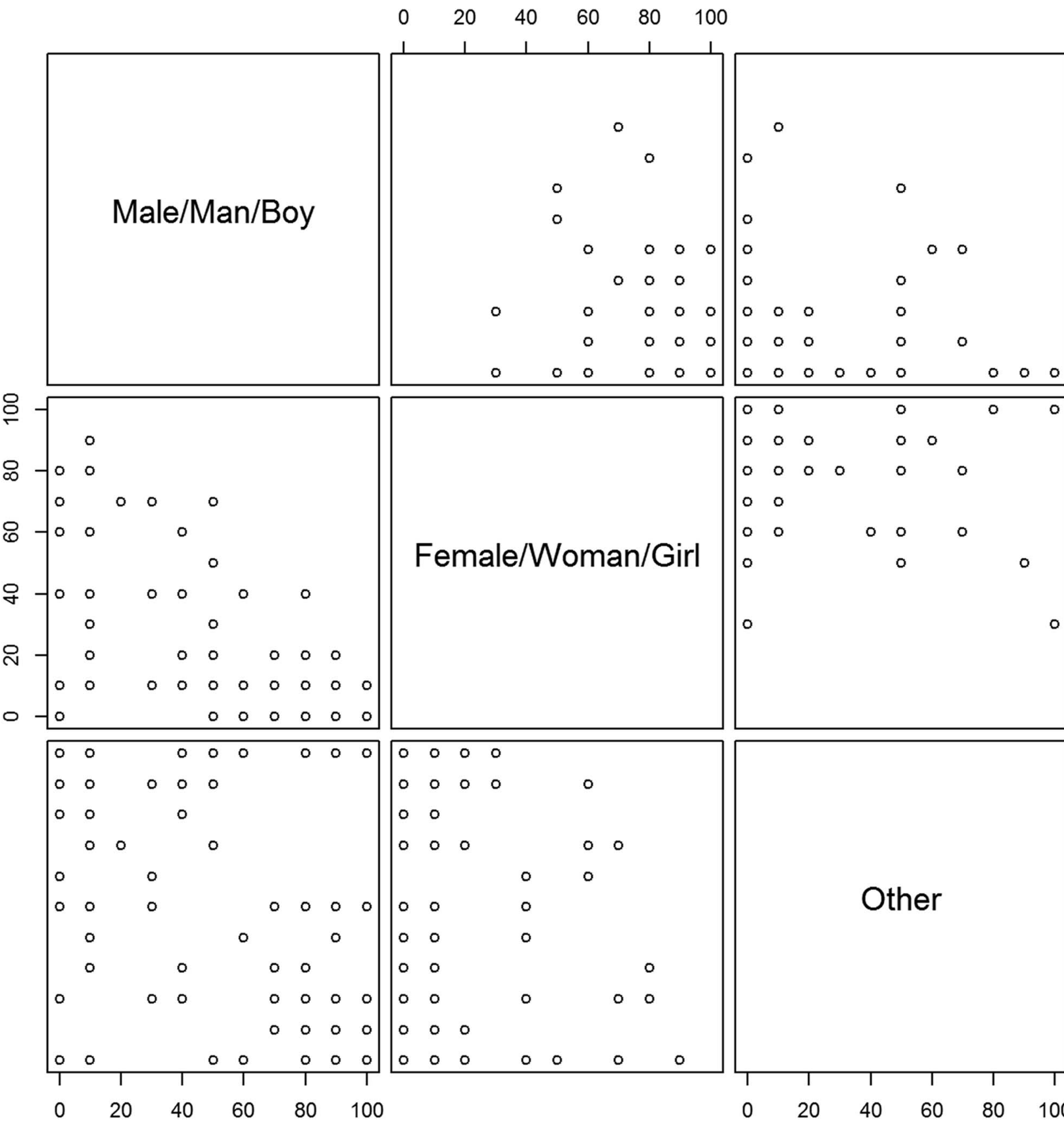

Figure 2. Plots of gender identity by sex assigned at birth. Upper diagonal is for people who were assigned male at birth. Lower diagonal is for people who were assigned female at birth.

the genders identified by the GIS. We would therefore reject H4. We would also reject H4 if the odds ratio for the usage of these binary labels were not in favor of the relevant binary classes identified by the LCA.

We tested H5 using a binomial test to determine if the proportion of participants using umbrella terms was greater than zero in more than one of the classes identified by the LCA. If this were not the case, then these umbrella labels would have a more precise meaning than predicted and we would reject the hypothesis.

If participants responded with more than one gender label, we assigned them to the first group according to the order of the four groups listed above. For example, if a participant responded "genderqueer man," then the use of the *man* label meant we assigned them to Group 1. This strategy was had the advantage of increasing the frequency of "binary" labels appearing in all the nonbinary classes identified by the LCA, therefore making the chi-square test less likely to pass. It simultaneously reduced the frequency of umbrella labels, therefore making the binomial test more difficult. This provided us with greater confidence that any significant results were not due to confirmatory bias. Of course, in carrying out this strategy we did not wish to imply that resultant group assignment was representative of their gender or should supersede their own original designation of gender in any way.

We then conducted a qualitative analysis of the label used by each participant from Group 3. We compared their label with known definitions (Gender Spectrum, n.d.; gqid, 2015) and commented on the match between current definitions, the classification by the LCA, and the response to the GIS. This analysis is not part of a specific hypothesis, but it provides us with rich qualitative data regarding how responses to the GIS relate to current usage of gender labels.

Results

Responses to the GIS are plotted as a three-dimensional scatterplot with each axis of the plot corresponding to a subscale within the GIS (see Figure 1). Note that because of overlapping responses each data point is numbered to indicate how many participants correspond to that point. Visual inspection of Figure 1 indicates that while each subscale was fully used across participants (i.e., responses to each ranged from 0 to 100) combinations of gender dimensions (that presumably corresponded to a participant's gender identity) were asymmetrical, with no participants identifying very strongly with all three genders. The most common responses were to identify totally and exclusively with one dimension of the gender "binary": female/woman/girl (n = 52) or male/man/boy (n = 22). However, many participants clearly identified with a nonbinary gender, including participants who identified with no gender at all and might be categorized as agender, and those who had a strong sense of gender but one that could not be located in the "female-male" plane.

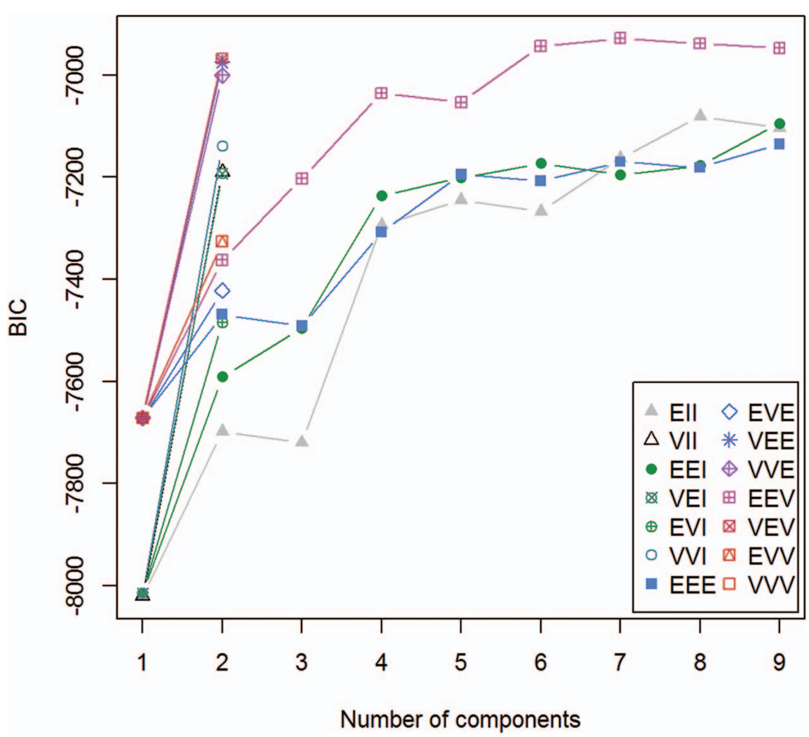

Figure 3. Bayesian information criterion (BIC) for mclust models versus the number of classes extracted for the latent class analysis. Each line and symbol represent a different parameterization of the covariance matrix, where each letter describes the volume, shape, and orientation of the covariance structure. I = identity matrix; E = equal; V = variable. Parameterizations ending with II therefore have spherical distributions, those ending with EI or VI have diagonal distributions, and those ending with E or V have ellipsoidal distributions. See the online article for the color version of this figure.

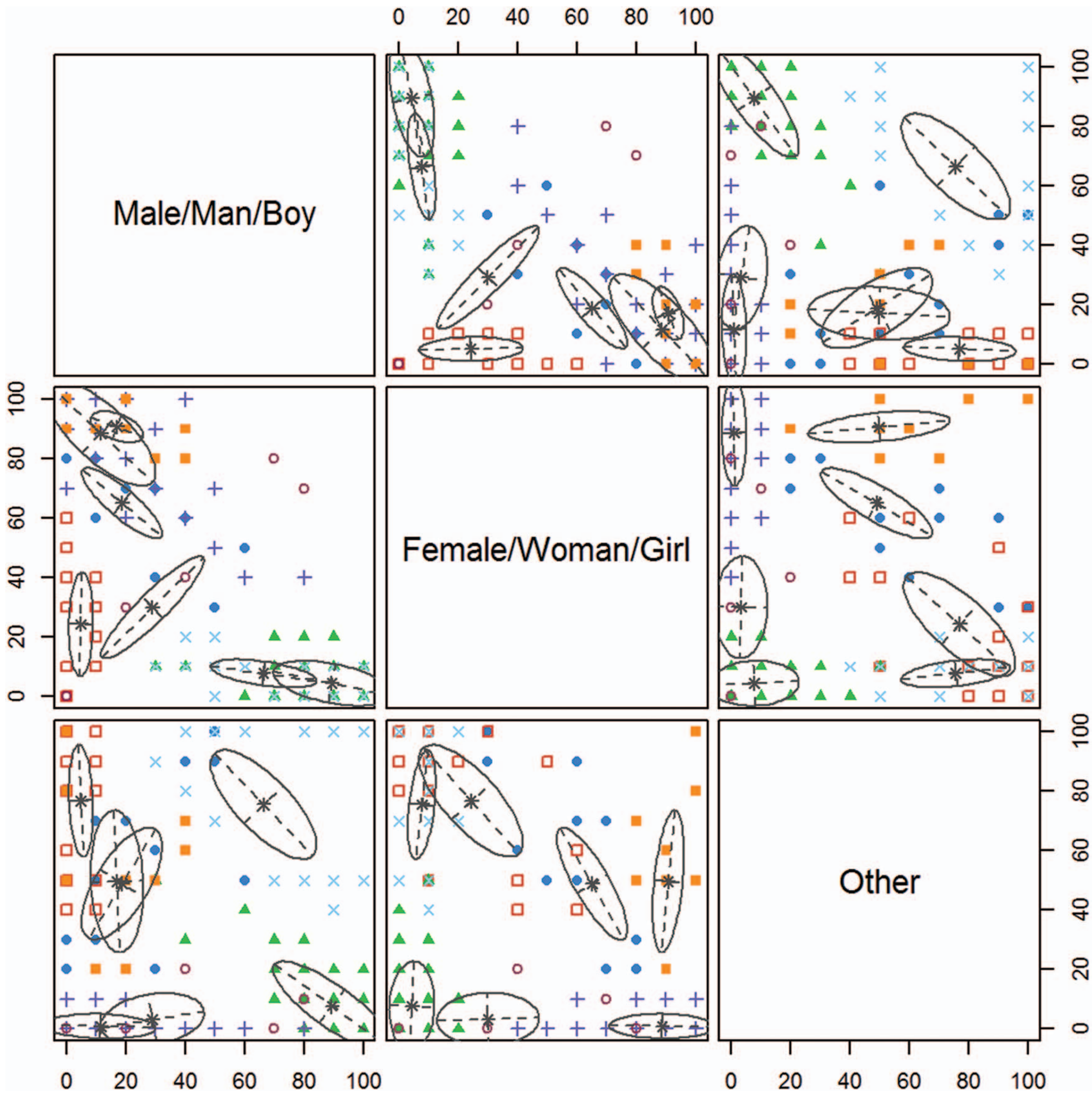

Figure 4. Classifications from latent class analysis with covariances of components superimposed. See the online article for the color version of this figure.

Responses were separated out and plotted according to sex assigned at birth and, as shown in Figure 2, the identities of AMAB participants appear to cluster toward a binary female/woman/girl identity. AFAB participants appear to have a greater range of gender identities with more participants identifying moderately or highly with a gender that aligns with their sex assigned at birth or with other. There were 30% more AMAB participants than AFAB participants, but more than twice as many participants identified as a binary female/woman/girl gender compared to a binary male/man/boy gender.

An LCA was then used to identify classes of participants on the basis of their pattern of responding to the three gender identity questions contained in the GIS. Figure 3 shows that the best model according to the Bayesian information criterion (BIC) is a seven-class solution with covariances that have equal volume, equal shape, and varying orientation. Figure 4 shows the classification for each response point. Groups were numbered as shown in Table 1 with descriptive labels based on the scale means for each classification as shown in Figure 5.

The names of the classes identified by the LCA in Table 1 are descriptive of the GIS dimensions with which participants in that class tended to identify. It is important to note that not everyone in each class described their gender using the name of that class. Therefore, the names are not representative of the genders in that class and it would misgendering to say, for example, that the GIS_man class was a group of men. It would be more accurate to say that the GIS_man class was a group of participants who tended to highly identify with the male/man/boy dimension of the GIS and low with all the other dimensions.

The GIS_woman, GIS_man, and GIS_other classes appear to be made up of participants who identify highly with only a single GIS dimension. The GIS_(woman) + (other), GIS_woman +

Table 1
Descriptive Classifications With Total Number of Assigned-Female-at-Birth (AFAB), Assigned-Male-at-Birth (AMAB), and Intersex Participants

Class	*n* AFAB	*n* AMAB	*n* intersex	*n* total
1. (+) GIS_woman	7	126	2	135
2. (▲) GIS_man	58	0	1	59
3. (□) GIS_other	18	3	0	21
4. (●) GIS_(woman) + (other)	9	8	0	17
5. (x) GIS_man + other	18	0	0	18
6. (■) GIS_woman + (other)	0	11	0	11
7. (○) GIS_none	5	3	0	8

Note. GIS = Gender Identity Scale. Symbols correspond to the classes in Figure 3.

(other), and GIS_man + other categories appear to be made of participants who identify with a combination of dimensions. The GIS_none category appears to be made up of participants who have a very low identification with all the dimensions, although the standard error for the male/man/boy dimension is notably large for that class.

We assigned participants to groups based on their textual response for the description of their gender, as detailed in the analytic design. The resultant contingency table (see Table 2) allowed us to combine columns to create further contingency tables to compare how many participants used a man-type label versus how many did not, and how many participants used a woman-type label versus how many did not. A full list of the labels that participants used (see Figure 6) shows that more participants used nonbinary or umbrella labels than accounted for in the contingency table. Their use of another term meant that we allocated them to one of the binary groups to maintain independence between groups.

Table 2 shows that four classes had no participants use a man-type label and only one participant in the GIS_none class used a man-type label. A generalization of the Fisher's exact test with all the classes showed that the proportion of participants using the man-type label significantly differed by class ($p < .001$). A Fisher's exact test comparing the GIS_man and GIS_none class showed that participants in the GIS_man class were significantly more likely to use the man-type label ($p < .001$, odds ratio [*OR*] = 42.88). A chi-square test with Yates' continuity correction comparing the GIS_man and GIS_man + (other) class showed that participants in the GIS_man class were significantly more likely to use the man-type label, $\chi^2(1, N = 75) = 13.64$, $p < .001$, *OR* = 9.63.

Table 2 shows that four classes had no participants use a woman-type label and only four participants in the GIS_(woman) + (other) class used a woman-type label. A generalization of the Fisher's exact test with all the classes showed that the proportion of participants using the woman-type label significantly differed by class ($p < .001$). A Fisher's exact test comparing the GIS_woman and GIS_(woman) + (other) class showed that participants in the GIS_woman class were significantly more likely to use the woman-type label ($p < .001$, *OR* = 11.77). A chi-square test with Yates' continuity correction comparing the GIS_woman and GIS_woman + (other) class showed that the proportion of participants using a woman-type label did not significantly differ according to class, $\chi^2(1, N = 145) < 0.01$, $p = .96$, *OR* = 1.36.

An investigation into the usage of labels by participants in the GIS_woman + (other) class found that only two participants used woman-type labels without any modifiers and, out of those two, only one participant used a woman-type label ("female") as their sole description of gender. All the other seven participants used a trans or transgender qualification such as "transgender woman," and one participant described their gender as "woman or trans woman."

To test if the proportion of participants using umbrella terms was significantly greater than zero, we used an expected proportion of .001 for the binomial tests as the tests cannot fail with a true value of zero. The results of the binomial tests (see Table 3) showed that, in all but the GIS_man class, the proportion of participants using umbrella terms was significantly greater than .001.

Participants used nonbinary but specific labels (see Table 4) in ways that were consistent with current definitions (gqid, 2015; Micah, 2016; ShineSA, 2017). One participant in the GIS_woman class identified as a lesbian, which is a sexual orientation rather than a gender identity. It does have implications regarding gender, however, which are consistent with their responses to the GIS. The LCA potentially misclassified three participants in the GIS_woman class, who identified as bigender or nonbinary transmasculine, as their identification with the female/woman/girl dimension appears to be low compared to other participants in that class. Their gender descriptions are consistent with their responses to the GIS but reflect an identity that is different to *woman* (gqid, 2015). The LCA also potentially misclassified two participants in the GIS_man class who identified as agender. Their identification with the male/man/boy dimensions appeared to be low compared to other participants in that class. Their gender descriptions are also consistent with their responses to the GIS but reflect an identity that is different to *man* (gqid, 2015).

Discussion

The results confirmed that the gender identity dimensions of the Gender Unicorn can be operationalized in the form of a GIS and used to measure gender in a trans and gender diverse population. Analyses of patterns of responses to the GIS revealed seven gender classes. There were classes in which there was high identification with only of one each of the three dimensions. There were also classes corresponding to identification with more than one dimension—combinations with the dimension for other gender(s) in particular. This suggests that the other gender(s) dimension is important and that ignoring this dimension would lead to incorrect conclusions about participants' genders.

There was also a class corresponding to low identification with all of the gender dimensions. This suggests that some participants would not be able to record their gender correctly using older systems that represent man and woman as opposites on a single continuum. The genders of some participants therefore do vary independently on the different dimensions. The multidimensional system of measuring gender therefore appears to be useful.

Unsurprisingly, participants used binary labels of gender clearly that were consistent with their responses to the GIS. The meaning of the *trans-* prefix or the *transgender* label was less clear. For the

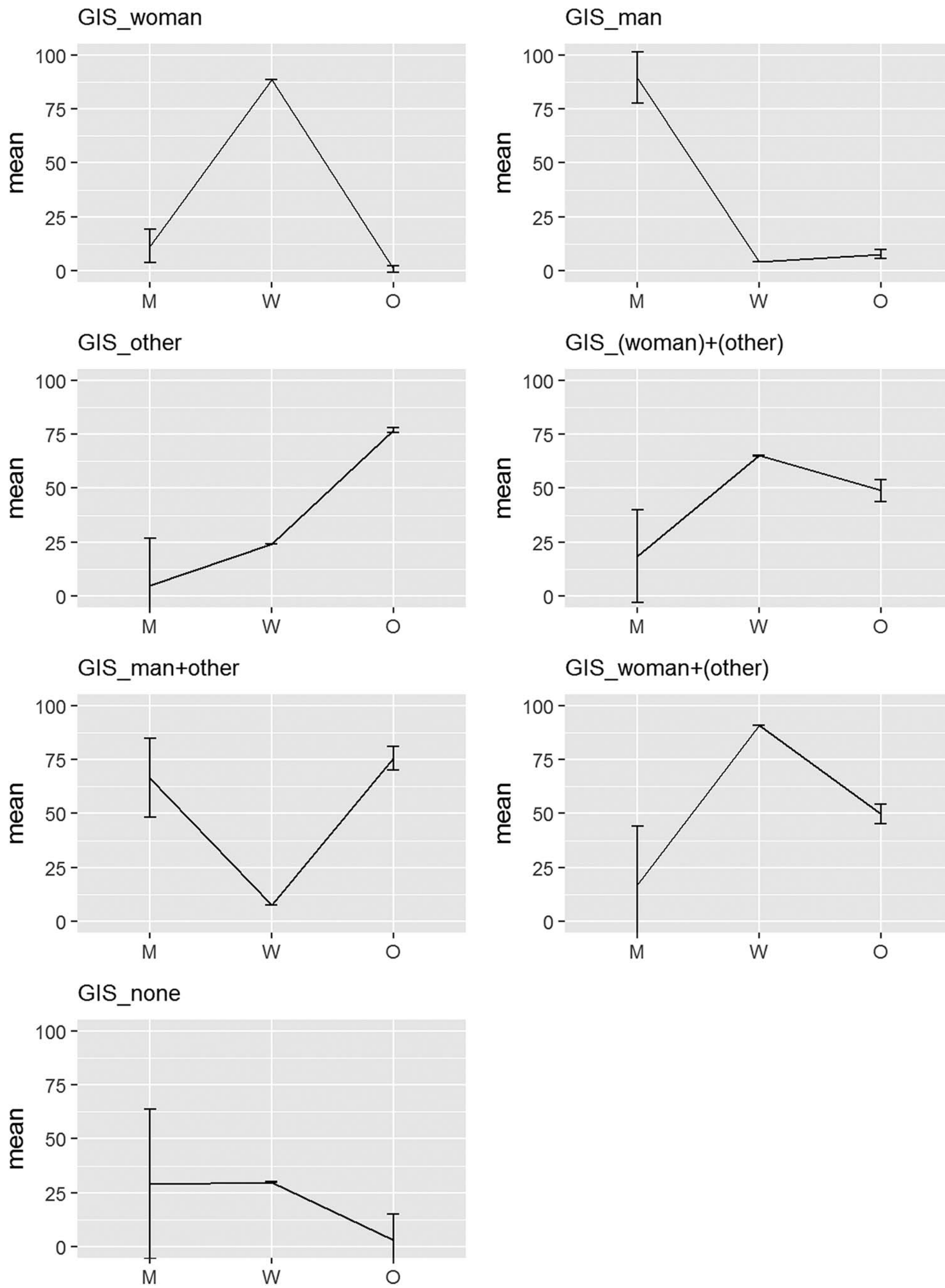

Figure 5. Plots of mean Gender Identity Scale (GIS) dimension scores for each category identified by the latent class analysis. Error bars are for the standard error of the mean. For each plot, M = male/man/boy dimension; W = female/woman/girl dimension; O = other gender(s) dimension.

test of binary label usage, we prioritized the "binary" labels to create the test groups. The GIS_woman + (other) class showed, however, that the *trans-* prefix or the *transgender* label could be an important part of their identity (Levitt & Ippolito, 2014), which may be explicitly different to being only a man or woman. The use of these labels in the GIS_man and GIS_woman class alternatively shows that participants may use these labels in recognition of their history and/or experiences rather than their identity being any different to a man or woman (Levitt & Ippolito, 2014). Participants therefore used the same labels for different purposes and with different implications. These labels are therefore difficult to interpret without additional information but the responses to the GIS helps to clarify those meanings.

Usage of other nonumbrella labels appeared to be consistent with responses to the GIS. Usage of these terms occurred even within the GIS_man and GIS_woman class. This demonstrates the continuous nature and lack of boundaries between genders as people's identities move away from the gender binary. People may

Table 2
Contingency Table of Participants With Rows Categorized by the Latent Class Analysis Identified Classes and Columns Categorized by Assigned Group Based on the Terms in the Label Used by Participant to Describe Their Gender Identity

Class	Man	Woman	Umbrella	Specific
GIS_woman	0	105	14	15
GIS_man	49	0	7	1
GIS_other	0	0	6	15
GIS_(woman) + (other)	0	4	4	9
GIS_man + (other)	7	0	3	8
GIS_woman + (other)	0	8	1	2
GIS_none	1	0	4	3

Note. GIS = Gender Identity Scale. Column labels are not indicative of the participant's own designations of gender and are only for the analysis of language as described in the text.

still have a leaning toward one side of the binary without totally relating to it and may use terms such demi-boy and demi-girl (Barker & Richards, 2015) or transmasculine and transfeminine (ShineSA, 2017) to describe these identities. These genders represent people who do not identify completely with a binary gender (gqid, 2015). There is otherwise no hard line or definition that a person crosses where they must identify as a man or woman versus demi- or trans-. This reinforces the difficulty of classifications via labels and the importance of not using the LCA class names as designations of gender. This also reinforces the usefulness of the GIS in clarifying the meaning of labels.

Similarly, people who have a neutral gender may identify as neutrois or neutral (Micah, 2016), but there is overlap where people could identify as neutrois versus demi-. The overlap means that people may use different labels but respond in the same way to the GIS, or they may use the same label but respond differently to the GIS. Manual groupings based on these labels may therefore be erroneous and the GIS can again provide clarity.

Participants used umbrella terms across most of the classes. This highlights the difficulty of grouping participants based on umbrella terms such as *transgender* or *genderqueer*. The GIS (and the LCA) is able to distinguish between different types of genderqueer and nonbinary genders. The GIS therefore respects the great diversity of gender identities, but still maintains clarity without forcing participants to utilize language with which they may not be comfortable.

Inconsistent use of gender terminology was particularly evident with participants who did not identify with any gender at all. *Agender* is potentially an ambiguous term as it may also mean a neutral gender rather than an absence of gender (Micah, 2016) but some community groups do define it solely as having no gender (ShineSA, 2017). An identity of agender boy would appear to be contradictory using the latter definition, yet it would be reasonable under the former definition—even if it still does not provide a clear idea of exactly how someone identifies. The GIS provides the ability to categorize participants independently of label definitions. Even though language evolves over time and individuals create new labels to identify with (Brown, 2016), the GIS would still allow consistent reporting, classification, and identification of the diversity and similarities in gender identities captured.

The GIS also provides a meaningful way to identify gender when participants are unable or unwilling to provide linguistic descriptions. Several participants provided responses that would not be possible to classify based on the written descriptions alone. The results suggest that it would be erroneous to believe that not providing a specific label is indicative of similar gender identities. If gender was a grouping variable, without the GIS researchers may improperly allocate these participants or exclude their valuable input from the research.

Our ability to identify gender classes from GIS responses may provide future researchers with the ability to explore where boundaries between genders currently lie and how they may change with time and across cultures (West & Zimmermn, 1987). A large study may be useful in providing guidance for potential "cut-offs" between groups. This would allow groups to have common boundaries between different studies, which would enable easier comparison and validation of research. Researchers would therefore not need to conduct their own classification analyses, which are data driven and which may result in different groups that are dependent upon the sample. That is not to imply that researchers could not conduct an LCA on their own data, for example, however they would need to acknowledge the limitations of doing so.

Of course, researchers must consider the implications of assigning participants to groups that may be incongruent with their self-designated label, (e.g., placing someone who identifies as a man into a group in which all the other members identify as genderqueer). It is important to recognize the context and limitations of the classification and to remember that self-designated identities are not invalid—they are only inadequate for the purpose of group comparisons. Researchers therefore need to be careful not to misgender participants by naming groups with labels that misgender their members, (e.g., "the masculine genderqueer group"). It is for this reason that we labeled the classes in this study more descriptively rather than using specific gender identities. We reinforce that the names of the classes are not the gender of the participants within that class but are representative of their responses to the GIS.

The purpose for collection and classification is another important consideration. If the aim is descriptive demographic information, then classification may not be necessary—a 3D plot may be sufficient in illustrating the range of genders present and their relative representation. Similarly, if the self-designated label is important then classification according to the GIS may also be unnecessary. For example, if a study were to explore how participants with different identities experience stigma differently, researchers would need to identify whether the focus is on the communicative use and consequences of the labels themselves or whether gender identity, and potentially gender expression, according to the GIS is more appropriate.

Limitations/Considerations

The formatting of the survey may have contributed to a misinterpretation of the independence of the gender dimensions. We numbered the dimensions from 0 to 100 to help reinforce that it was a continuous construct, rather than categorical. We intended for the numbers to reinforce the labels, which ranged from 0 (*not at all*) and 100 (*very strongly*). Participants may have interpreted these as overall percentages however, and therefore adjusted their overall identity such that all their responses added up to 100. This may introduce ambiguity for some responses. Participants who

GIS_man

Male / man / guy (31)	Trans guy/man/male (14)
FTM (7)	Transmasculine (5)
Non-binary (4)	Agender (4)
Trans / transgender (3)	Masculine (2)
Demiboy (1)	Genderqueer (1)
Demiflux (1)	Queer (1)

… of/with trans experience (3)

"Male with transsexual history" (1)

GIS_woman

Female / woman (71)	Trans/transgender woman/female/girl (29)
Transgender / trans (7)	
MTF (3)	Fluid / Genderfluid (3)
Genderqueer (3)	Bigender (3)
Mostly female (2)	Crossdressing (2)
Non-binary (2)	Female and trans (1)
Feminine (1)	Transsexual (1)
Diverse (1)	Trans guy (1)
Neutral (1)	Transmasculine (1)
In transition (1)	Complicated (1)
Two spirited (1)	Androgynous (1)
FTM (1)	Confused (1)
FAAB (1)	Mixed (1)

"Woman who is trans" (1)

"Woman of transsexual experience" (1)

"Gender is how you relate the world to emotional self" (1)

"Born in the wrong body" (1)

"Gender is a true sense of one's heart mind body and soul" (1)

"An array of emotions" (1)

GIS_other

Genderqueer (8)	Non-binary (9)
Femme (2)	Genderfluid (2)
Trans (2)	Queer (2)
Genderless (2)	Neuter / Neutrois (2)
Genderflux (1)	Demigender (1)
Demiflux (1)	Agender (1)
Demigirl (1)	

GIS_(woman)+(other)

Genderqueer (4)	Genderfluid (3)
Transgender / Trans (3)	Non-binary (3)
Female (3)	Femme (2)
Transfeminine (2)	Feminine (1)
Transwoman (1)	Demigirl (1)
Agender (1)	

"I dont (sic) like talking about gender in general" (1)

"From early childhood i (sic) have identified as a snail as they are intersex by nature" (1)

GIS_man+(other)

Genderqueer (5)	Non-binary (5)
Male / man (2)	Trans man/boy (2)
Trans masculine (3)	Non-binary boy/boi (1)
Transsexual male (1)	

GIS_woman+(other)

Trans/transgender woman/female (7)	Female/Woman (2)
	Transfemme (1)
Demisexual (1)	Genderfluid (1)
Genderqueer (1)	"A bit of both" (1)
Androgynous (1)	"I don't" (1)

GIS_none

Agender (4)	Genderqueer (2)
Non-binary (2)	Genderfluid (1)
Null gender (1)	Male (1)

Figure 6. Summary of terms that participants used to describe their gender and grouped according to latent class analysis class. Participants may have used more than one term each.

have the same gender may respond differently to the GIS based on differences in their belief that the scores need to sum to 100.

If participants view gender as having a fixed quantity (of 100%), then they may also misinterpret the other gender(s) dimension. For example, examining the response of "genderqueer/neutrois/agender" where the participant has responded 0 to male/man/boy, 10 to female/woman/girl, and 90 to other gender(s), there are two possible explanations or reasons for that response. The first is that the participant interprets *neutrois* and *agender* to mean a neutral gender that exists outside of the traditional binary, and they identify highly with that gender. An alternative is that the participant identifies as almost genderless and they identify highly with being genderless. This is a misinterpretation of the other gender(s) dimension as a filler category, but this dimension represents a gender that exists outside of the male/female spectrum.

The creators of the Gender Unicorn did not intend these limitations, as evidenced by an example they provide where multiple dimensions are marked highly. The dimensions on the original infographic are not numbered nor anchored with labels. We added numbers and anchors in line with best practice for

Table 3
Results of a Binomial Test to Determine if the Proportion of Umbrella Term Usage is Greater Than .001 for Each Class

Class	*n* true	*n* trials	Proportion	*p* value
GIS_woman	15	134	.11	<.001
GIS_man	1	57	.02	.06
GIS_other	15	21	.71	<.001
GIS_(woman) + (other)	9	17	.53	<.001
GIS_man + (other)	8	18	.44	<.001
GIS_woman + (other)	1	11	.09	.01
GIS_none	3	8	.38	<.001

Note. GIS = Gender Identity Scale. A "true" for the binomial test is someone who only used an umbrella term. People who used an umbrella term in combination with a specific term (e.g. genderqueer woman) were not counted as "true."

psychological instruments (Preston & Colman, 2000). Our use of these particular numbers, however, may be confounding. It would be advisable, in the future, to utilize a straightforward numbering scheme with a different number of points, such as 0 to 8, so that the implication of summing to 100% is not present. It may also be useful to explicitly state that participants may identify highly on more than one dimension, or very low on all the dimensions. A short explanation of the other gender(s) dimension may also be helpful in reducing confusion.

The method for querying gender may have been confusing and a potential confound for participants who identify as genderfluid. The query did not specify a timeframe and our implementation of each dimension accepted only a single response. Future versions of the scale should therefore specify a time point, such as "right now." Future research could also explore the change and diversity of genderfluid identities by allowing participants to designate a range that they identify with.

Another limitation of this study is that we only tested the GIS on participants who self-identified as trans or gender diverse. The definition of cisgender suggests that cisgender people have total and full identification with only the gender that they were assigned at birth (ACON, 2017). There is some evidence, however, that gender variance exists among the (statistically) "normative" population (Joel, Tarrasch, Berman, Mukamel, & Ziv, 2014), which calls into question the meaning of the GIS scores if a cisgender person and a trans or gender diverse person both report the same scores.

A potential explanation might be that their gender identity is the same but that the difference with self-identification is due to preferences with labels, knowledge of terminology, readiness to self-identify, or a lack of exploration of their own gender identity. Nonbinary people may, for example identify as cisgender (M. J. Barker & Richards, 2015) and some people, who might arguably have a trans or gender diverse identity, may struggle with being "trans enough" (Langer, 2011). This poses a philosophical question about the definition of cisgender, transgender, or gender diverse, and the relationship between respect for self-determination and research categorisation. It also further reinforces the difficulties of working with labels.

Limitations in the study by Joel et al. (2014) might mean that the findings of diversity in "normative" individuals were inflated. First, their demographic measure enquired about sex rather than sex assigned at birth. Sex can be interpreted differently by trans or gender diverse people and is not necessarily equivalent to sex assigned at birth (Conron, Landers, Reisner, & Sell, 2014), which means that some trans or gender diverse participants may not have been accounted for. More importantly however, they used gender to define the "normative" sample, where normative were the

Table 4
Responses to Gender Identity Scale (GIS) and Descriptions of Gender for Participants Who Used Nonbinary But Relatively Specific Labels for Descriptions of Their Gender

Man	Woman	Other	Description
			GIS_woman
0	100	0	Transgender lesbian
50	50	0	Bigender
30	90	0	Feminine (tomboyish)
20	80	0	Two spirited
80	40	0	Nonbinary transmasculine
20	80	0	Gender fluid, mostly female but residual maleness
10	90	0	Mostly female
0	70	0	Androgynous
50	50	0	Bigender
30	70	0	Crossdressing
0	100	0	Elegantly feminine
20	80	0	Mostly female
40	60	0	Crossdressing
			GIS_man
40	10	30	Agender
80	20	0	Transmasculine
70	20	10	Transmasculine
90	0	20	Masculine
30	10	50	Demiflux or agender
80	0	10	Transmasculine
100	10	0	Transmasculine
			GIS_other
0	0	80	Genderless or agender
10	10	100	Neuter
0	60	40	Nonbinary demigender femme
0	10	90	Genderqueer/neutrois/agender
10	10	80	Genderqueer/genderless
0	60	60	Demigirl
			GIS_(woman) + (other)
10	60	50	Transfeminine, genderqueer
10	80	30	Nobinary femme
60	50	50	Some days I feel a lot more feminine than other days
10	60	70	Agender/genderfluid/demigirl
			GIS_man + (other)
80	0	100	Transmasculine
50	0	70	Transmasculine nonbinary
50	10	70	Neutral
			GIS_woman + (other)
30	80	50	A bit of both
40	80	70	Transfemme
			GIS_none
0	0	0	Nope! (Agender/null gender)
0	0	0	Agender
0	0	0	Agender
0	0	0	Agender, nonbinary

Note. Man = male/man/boy dimension; Woman = the female/woman/girl dimension; Other = other gender(s) dimension; GIS = Gender Identity Scale. Participants Are Grouped by the Assigned Class from the latent class analysis.

participants who identified as man or woman and not as transgender or other. Many people who might be conceptualized as trans or gender diverse do not self-identify in that way and only identify as man or woman (Ansara & Hegarty, 2014), which was also reflected in the terminology used by participants in this present research of the GIS. Reliance on that self-identification may also have included many trans or gender diverse participants, which would increase the diversity in the "normative" sample. They also operationalised gender identity as a frequency of how often someone thought of themself as a particular gender. Frequency and intensity are different components in affect (Schimmack & Diener, 1997), so frequency in thinking about ones gender may be different (albeit related) to enquiring about level of identity. Having provided evidence for validity of the GIS within the TGD population, future research could therefore replicate the study by Joel et al. while addressing some of the limitations. Importantly, the GIS allows gender to be conceptualized in a way that acknowledges diversity as requested by Joel et al.

Conclusion

The results of our study highlight the potential of the GIS as a measure of gender identity that allows researchers to collect gender identity information from participants in a manner that is not reliant on labels and that does not misgender them. Researchers can present the diversity and range of gender identities of participants without needing to summarize lists of self-designated labels. There is also the potential to use the GIS in classifying participants for quantitative research, but further research would need to be conducted if a standard set of classifications were desired. However, there was also evidence that the numerical anchors of the scale used in this study and the interpretation of the "other gender(s) scale" introduces potential confounds, but these could be addressed with some straightforward changes in subsequent iterations of the GIS.

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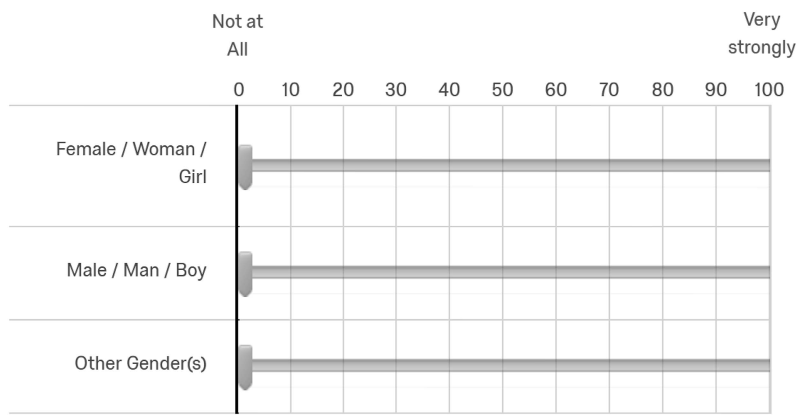
Appendix

The Gender Identity Scale

To what extent do you identify with each of the following genders?



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