

Diversity in the Mycological Society of America

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Increased awareness of systematic biases across the Sciences, Technology, Engineering and Mathematics (STEM) has fueled calls for action across scientific disciplines. In a recent analysis of gender equality within the MSA, Branco and Vellinga found evidence of gender bias within our society, both in serving officers and awards (*Inoculum*, Vol. 66, Issue 5, 2015). In their report, the authors found that female MSA members are particularly underrepresented in MSA leadership positions, and since the inception of the society in 1932, less than 15% of the MSA presidents have been women. Gender bias was also discovered in the non-student awards where, at the extreme, only five female members have received the Distinguished Mycologist award compared to the 55 male awardees. Encouragingly, gender bias was not detected among student members or within the student awards. At the time of the Branco and Vellinga report, there was no information on other aspects of diversity (e.g. race, age, professional status) within the MSA as membership demographic information had never before been collected. Following the publication of this report, an ad-hoc Diversity and Inclusion Committee formed at the 2015 MSA meeting in Edmonton, Alberta with the goal of identifying and implementing specific actions to counteract biases pertaining to diversity within our society. That led the way to the newly formed MSA Diversity and Inclusion Committee with the purpose of fostering diverse and inclusive participation in all of the MSA activities. This committee is made up of male and female MSA members, international, and Lesbian/Gay/Bi/Trans/Questioning (LGBTQ) mycologists from across academic rank, including graduate students, postdocs, and professors.

Since its inception in August 2015, the Diversity and Inclusion Committee has developed a set of best practices recommendations for committee activities that will be incorporated into the MSA Manual of Operations, created an anti-harassment policy for MSA meetings and

functions, organized a professional development career mixer at the 2016 MSA meeting for students and postdocs, and developed and implemented a membership diversity survey to better understand the demographic make up of our society. As Branco and Vellinga discovered in research for their *Inoculum* article, the MSA had never collected demographic information on the membership so it was impossible to assess diversity and how the demographic make up might have changed over time within our society.

To better understand the demographic make up of MSA the first membership assessment was conducted from December 2015 through January 2016. In an anonymous online survey, MSA members were asked to provide responses to questions in the following categories: gender, age group, professional status, race, ethnicity, citizenship, sexual orientation, disability, family status, and annual income (see Methods below for more details). Each question included a 'choose not to answer' option so members were free to answer (or not answer) any number of questions on the survey (<https://www.surveymonkey.com/r/MHBS922>). Fillable text boxes were also included so members could generate their own responses or elaborate on their response to each question. Results of the 2015-2016 MSA membership survey were presented in a poster session at the 2016 MSA meeting in Berkeley, CA and we provide a summary of the results below. In addition, we include recommendations to address bias within our society and suggestions on how to improve recruitment and retention of a diversity of scientists within the MSA.

Gender balance

In 2015, there were 904 people with active membership in MSA (568 male, 298 female, and 38 unknown) and 37% of MSA members participated in the survey (n = 332; Fig. 1). Results revealed that although gender ratios tended to be fairly balanced among students, gender bias became more pronounced in the more academically advanced categories (Fig. 2). Gender distribution was similar among different academic career stages; graduate students (44 % male, 55% female, 2% transgender), faculty members (56% male, 44% female), and government employees (53% male and 47% female). However, examining the results by age, we found that women made up less than 20% of the over 60 age group, and noted that this may affect the number of women nominated for distinguished scientist awards. Women made up the majority of postdoctoral members (62%) and men made up the majority (82%) of Emeritus faculty and 68% of "Other professional status" members (i.e. not government or academic jobs).

Survey respondents by gender and professional status

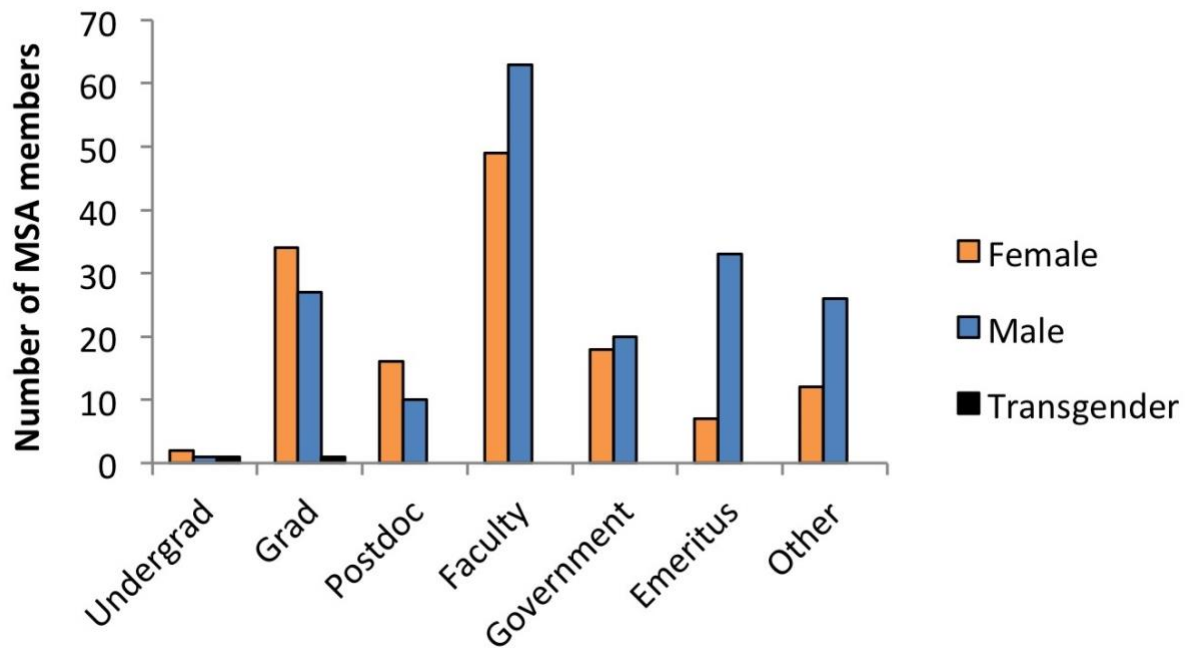


Fig. 1. In 2015, there were 904 people with active membership in the MSA. 37% of MSA members participated in the survey (n = 332). Results shown are survey respondents by gender (male, female, or transgender) and professional status (undergraduate student, graduate student, postdoc, faculty, government employee, Emeritus faculty, or other/not affiliated with government or academia).

Proportion of female, male, or transgender MSA members in each professional level

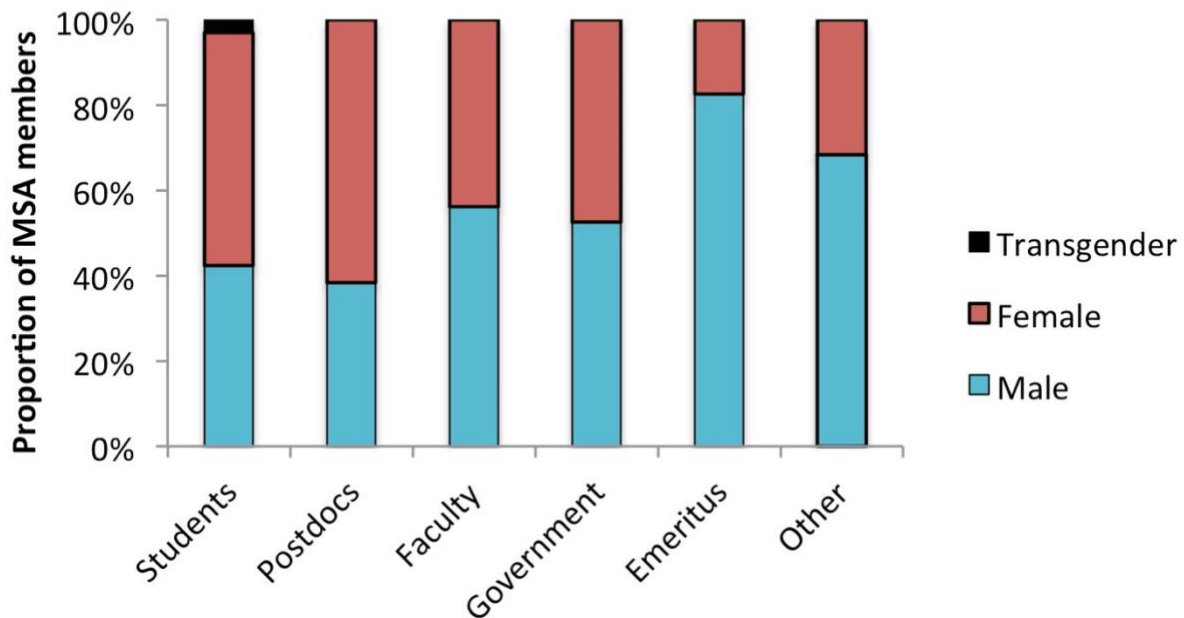


Fig. 2. There was greater gender equality among students and postdocs but more males than females in the more academically advanced categories.

Age distribution and professional status

Membership within the MSA ranged from undergraduates to Emeritus faculty (Fig. 3). The 31-40 age group had the highest number of MSA members and was comprised mostly of grad students, postdocs, and faculty members. Membership declined in the 41-50 age group, which may reflect the transition from postdoctoral to faculty positions (approx. 75% of members in the 41-50 age group were faculty members). On average, only 15% of postdocs in the sciences find a tenure track faculty position within 6 years of earning a PhD (Cyranoski et al, 2011). The shift from 62% female membership in the postdoctoral status to 44% in faculty member category may reflect gender bias at the faculty hiring level, the limited number of faculty jobs available compared to postdoctoral positions, or the differing demographic structure of these age groups. Increased opportunities for postdocs and graduate students within the MSA, including speaking invitations and awards may help to make members from underrepresented groups more competitive during the faculty hiring process. The gender gap among MSA members increased after age 50 and was largest in the 61-70 age group where women made up only 16% of the membership.

Overall, faculty made up the highest number of members and there appear to be very few undergraduate students in the MSA (only 4 undergraduates participated in the survey).

Having low undergraduate participation in MSA is problematic if we hope to continue to grow our society and provide training to a diversity of upcoming scientists. There are a number of ways to increase participation of undergraduates within the MSA including providing mentoring opportunities where established mycologists are paired with undergraduate or graduate students at MSA meetings. Because the survey also revealed that more than 60% of the students in the MSA make less than \$24,000 per year and 96% of students make less than \$50,000 per year, perhaps the MSA could consider offering a small number of registration fee waivers for undergraduates, graduate students, or postdocs, to encourage participation by younger, lower income groups in MSA meetings.

Age distribution of MSA members

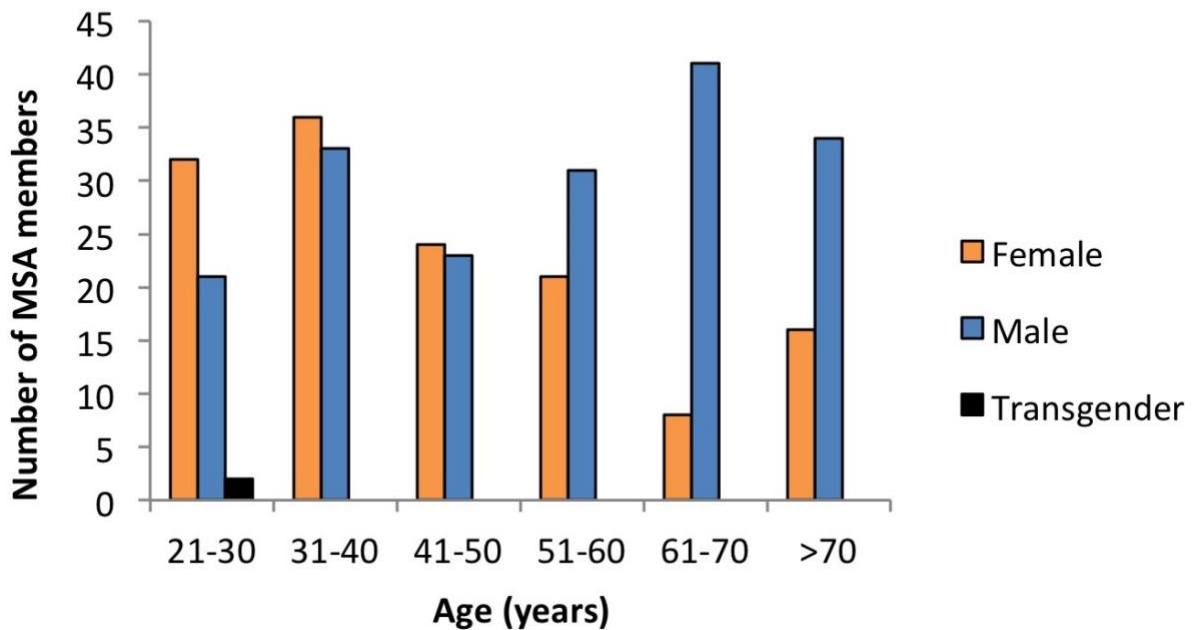


Fig. 3. Most MSA members were in the 31-40 age group and the gender distribution was fairly equal until around age 50. The gender gap increased after age 50 and was largest in the 61-70 age group, which had only 16% female members. The gender disparity in this group may impact the number of men and women nominated for distinguished scientist awards.

Race, citizenship, and language

The overwhelmingly majority of MSA members are white (85%), with female minorities particularly underrepresented (Fig. 4). This was consistent across all professional levels and reflects patterns observed in the STEM fields. According to a 2010 survey, underrepresented minorities earned 16.4 % of the undergraduate degrees in the sciences

(<http://www.browndailyherald.com/2013/10/30/minority-groups-underrepresented-stem-fields/>)

Interestingly, 31% of MSA members are non-US citizens and come from more than 15 different countries including Australia, Belgium, Brazil, Canada, England, France, Germany, Greece, Israel, Italy, Japan, Mexico, Norway, and Peru. There are 26 native languages spoken among MSA members and 41% of members reported having English as their second language.

Sexual orientation

Over 10% of MSA members identify as lesbian, gay, trans, bi-sexual, or questioning and represent membership in every professional level. This is substantially higher than the number of LGBTQ members in STEM related federal agencies (2.7%), for example. One way that the MSA could support LGBTQ members could be to coordinate with Out in STEM (OSTEM; <https://www.ostem.org/>) to organize networking events and/or professional development activities at MSA meetings. Many universities have their own OSTEM chapters (<https://www.ostem.org/chapters>) and MSA members who are already active in OSTEM could be encouraged to help organize events at MSA meetings by local organizers or program chairs.

Disability

Disabilities in the form of hearing, mobility, visual, physiological, speech, learning, and/or memory were identified among 13% of MSA members (Fig. 5). This stresses the importance of ensuring that accessibility challenges are taken into consideration when organizing MSA meetings. Over 7% of members reported having a hearing disability, so increasing the number of microphones provided to speakers or increasing the volume of microphones used in presentation rooms could be beneficial to these members. As 2% of MSA members reported having mobility challenges, mobility constraints should be taken into consideration when choosing a venue for MSA meetings. Having the majority of presentation rooms or poster sessions in venues with steep staircases or a limited number of elevators, for example, should be avoided if possible. Most of the people who had one or more disabilities were faculty or Emeritus faculty members. Considering that this group makes up 50% of MSA membership, we should make sure that meetings are welcoming and comfortable for everyone to attend.

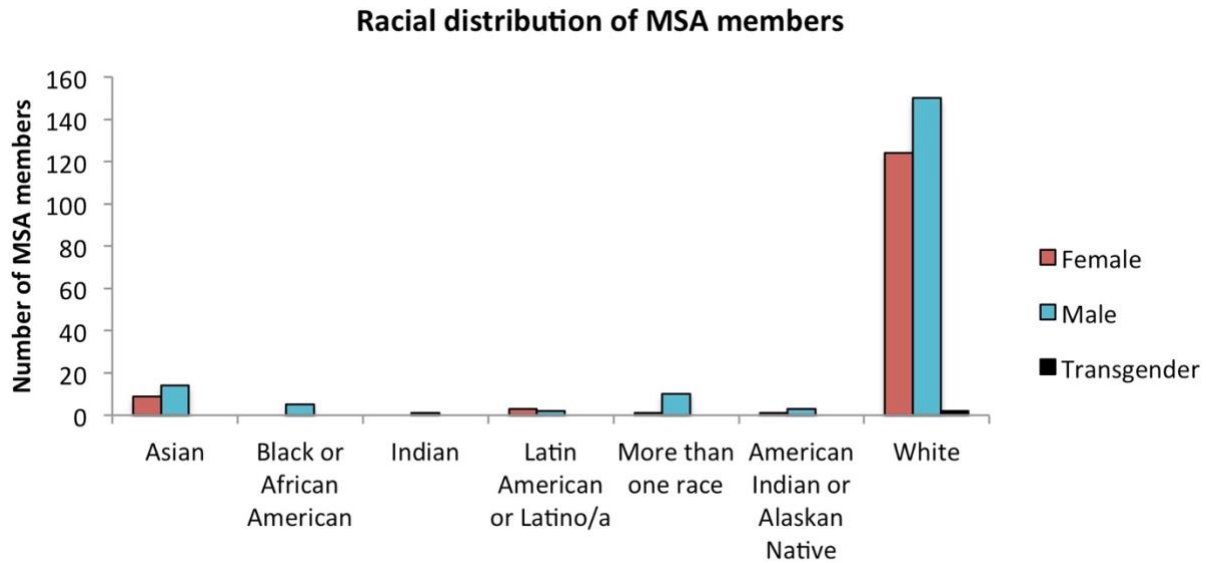


Fig. 4. The vast majority of MSA members are white and this was consistent across all professional levels (data not shown).

Family status

Half of all MSA members are parents and over 75% of these parents have children that are 12 years old or younger. According to the survey, 16% of members said that they would benefit from having childcare available at MSA meetings. If providing childcare at meetings is not an option (e.g. due to insurance or liability issues), providing a list of local childcare providers or facilities on the MSA website prior to the meeting may make it more accessible for parents with young children to attend. MSA could also consider providing financial support for attendees with family related expenses. This could be done in the form of a reduced registration fee and/or small grants to pay for the cost of childcare during MSA meetings.

Annual income

This survey revealed that over 35% of MSA members earn less than \$50,000 per year and most of the members in this income bracket are students and postdocs (96% of students, 68% of postdocs, and 12% of faculty members earn less than \$50,000 per year; Fig. 6). Considering that the costs associated with registration fees, traveling, and lodging for MSA meetings may be upwards of \$1,500 per person, this may represent a substantial burden for many MSA members.

Number of MSA members with altered-ability

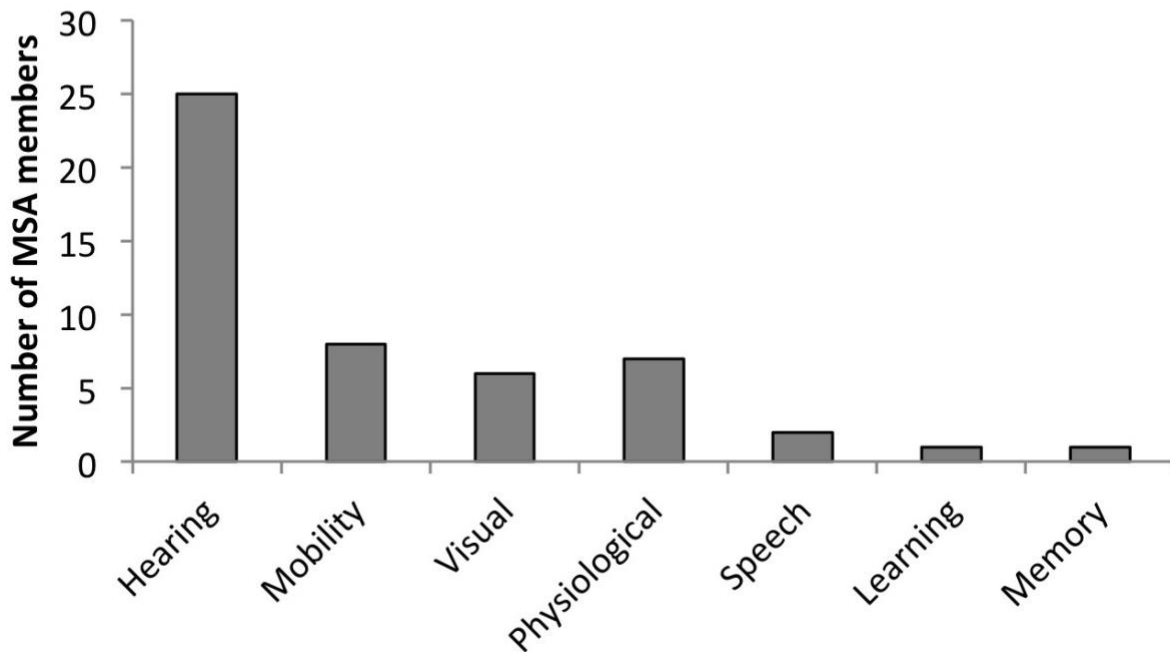


Fig. 5. 13% of MSA members identify as having a disability and some members indicated having more than one impairment.

Annual income of MSA members

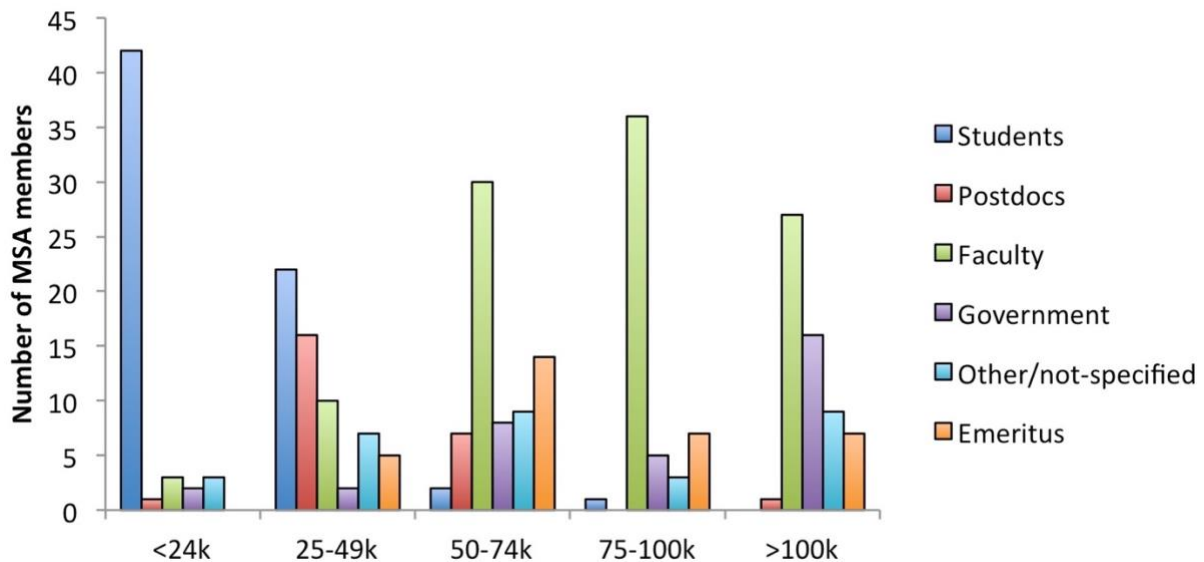


Fig. 6. 35% of MSA members earn less than \$50,000 per year and most of the members in this income bracket are students and postdocs.

Summary and future directions

Overall the response to the survey was positive, with over 330 MSA members participating. Results show areas of relative high diversity within the MSA (e.g. international membership, LGBTQ members) but also highlight areas that could be improved. For instance, although gender ratios tended to be fairly balanced among students, gender bias became more pronounced in the more academically advanced categories, especially among scientists in the over 61 age group. An emphasis on providing awards and professional development opportunities to a greater diversity of early career scientists could be critical for MSA members applying for faculty jobs or going up for tenure. MSA members who are successful professionally will be more likely to maintain active membership in the society, and moving forward, could help to improve gender equality among older and more academically advanced categories. MSA has a substantial number of LGBTQ members and may thus benefit from reaching out to members of Out in STEM to coordinate mixers and professional development workshops at MSA meetings. Although MSA is made up of members from at least 15 different countries, there is still low racial diversity within our society. This reflects larger patterns in STEM but also suggests that we could do more to recruit and retain members from underrepresented groups. Providing opportunities for mentoring at meetings, offering a limited number of significantly reduced (or free) meeting registration fees to first time meeting attendees, and becoming more involved in education and outreach activities in public schools are just some of the ways that could MSA could reach out to underrepresented students.

Because only specific actions to counteract diversity biases can make MSA more inclusive, the MSA Diversity and Inclusion Committee recently developed a set of best practices that will be incorporated into the MSA [Manual of Operations](#). Among these best practices, we suggested that when identifying potential speakers to invite for MSA meetings, committees should strive for balance among disciplines, and diversity in gender, race, and ethnicity.

If you have not taken the 2016-2017 diversity survey, please do here: <https://www.surveymonkey.com/r/MHBS922>. We encourage MSA members to take the survey every year so that we can track changes in the MSA membership over time. If you would like to be involved in the MSA Diversity and Inclusion Committee, please email co-chairs Tanya Cheeke (tcheeke@indiana.edu) or Don Natvig (dnavig@gmail.com) for more information.

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References

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Methods

In the anonymous online survey, MSA members were asked to provide responses in the following categories:

- **Gender** (male, female, transgender)
- **Age group** (21-30, 31-40, 41-50, 51-60, 61-70, > 70)
- **Professional Status** (undergraduate, graduate student, postdoc, faculty, government, Emeritus, or other)
- **Race and Ethnicity**
- **Language**
- **Citizenship**
- **Sexual orientation** (lesbian, gay, trans, bi, or questioning; LGTBQ)
- **Disability** (hearing, mobility, visual, physiological, speech, learning, memory)
- **Family status** (parent, married or partnered, children/no children, age range of children)
- **Annual income** (\$24,000 or less, \$25,000-\$49,000, \$50,000-74,000, \$75,000-\$100,000, or >\$100,000)

Every question included a 'choose not to answer' option so members were free to answer or not answer any number of questions on the survey. Fillable boxes were also included for members to generate their own responses or elaborate on their response for each question. These categories were originally based on the demographic information collected by the National Science Foundation and other categories were added by the MSA Diversity and Inclusion Committee to better inform us of additional metrics that could influence MSA member participation, leadership, and awards. For instance, information on annual income may allow us to determine whether the costs associated with attending MSA meetings are prohibitive for some members and/or if there are particular groups of members who would preferentially benefit from travel awards or reduced meeting costs. Information on family status (e.g. partnerships and/or children) can be used to evaluate the need for childcare at MSA meetings. Single parents, for example, might benefit substantially if childcare were provided at MSA meetings. Information on gender, race, age, sexual orientation, and citizenship status can help identify areas where MSA could improve recruitment and retention of members who are often underrepresented in the STEM fields. These data can also be used to determine whether MSA members selected for awards and/or leadership positions reflect the diversity of membership within the society.