



**Division for Planetary Sciences**

of the **AMERICAN ASTRONOMICAL SOCIETY**



# **2020 Survey of the Planetary Science Workforce**

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**AIP | Statistics**

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## Project Overview

The goal of this survey was to learn about the demographics, educational background, and employment experience of the planetary science workforce, particularly members of the Division for Planetary Sciences (DPS).

The survey was sent to 4,965 members of the planetary science community on April 16<sup>th</sup>, 2020. Two additional follow-up survey invitations were sent on April 22<sup>nd</sup> and April 28<sup>th</sup>. We received 2,367 responses (48% response rate). 895 (38%) of those respondents were members of the Division for Planetary Sciences.

This report will address two main goals:

- 1) For members of the Division for Planetary Sciences (DPS), we will report on members' demographics, education, employment, research, and feedback on DPS priorities.
- 2) For all respondents, we will compare employment outcomes across groups of interest including race/ethnicity, gender identity, LGBTQ+ identity, and disability status.

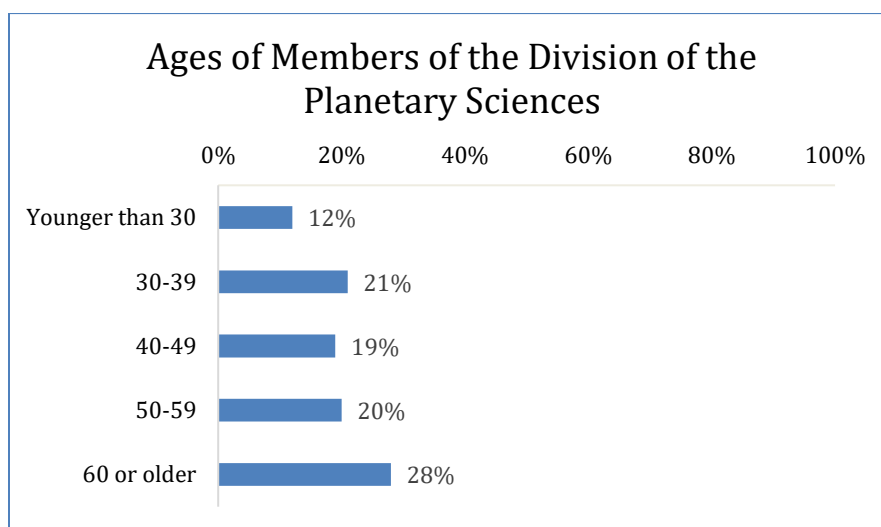
## Significance testing

Throughout this report, we conducted significance testing when comparing responses between two or more groups. A statistically significant difference means the difference in responses is large enough that it cannot be adequately explained by chance. A p-value (ranging between 0 and 1) is used to examine the level of statistical significance, and a p-value  $< .05$  is statistically significant. Statistical significance depends on several factors, not solely the absolute difference between two values. While differences that are not marked as significant may seem to be the same size as, or even larger than, those marked as significant, they are not statistically significant.

## Results from the Division for Planetary Sciences Members

### Demographics

We examined the age, gender identity, and race/ethnicity of respondents who are members of the Division for Planetary Sciences (DPS). DPS respondents were a wide range of ages, and mostly identified as men and White. We noted which race/ethnicities are currently underrepresented in the planetary science field. 9% of DPS respondents identified as a member of the LGBTQ+ community, which included those who identify as gay, lesbian, bisexual, transgender, another gender identity, or another sexual orientation.



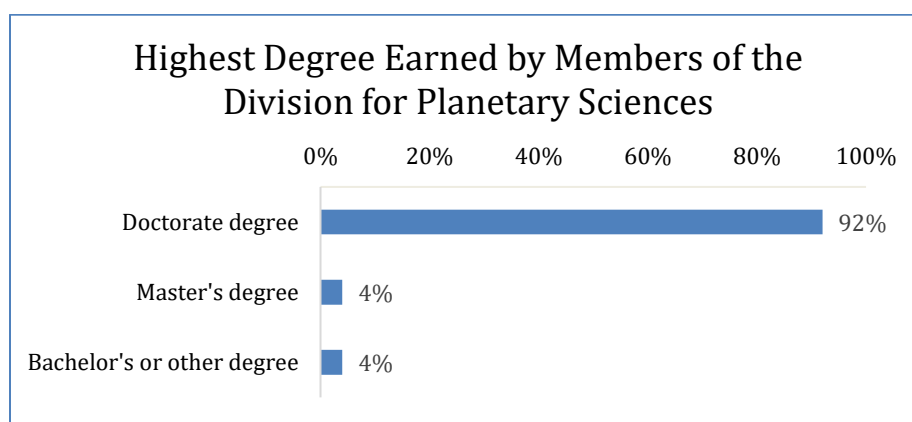
| Gender Identity of Members of the Division for Planetary Sciences |     |
|---|-----|
| Women   | 32% |
| Men   | 67% |
| Another gender identity   | 1%  |

| Race and Ethnicity of Members of the Division for Planetary Sciences |     |
|--|-----|
| <b>Underrepresented Groups in Planetary Science</b>                  |     |
| Hispanic or Latinx   | 5%  |
| American Indian or Alaska Native                                     | *   |
| Black or African American  | 1%  |
| Native Hawaiian or Other Pacific Islander                            | *   |
| Another Race/Ethnicity   | 2%  |
| <b>Not Underrepresented in Planetary Science</b>                     |     |
| Asian or Asian American  | 10% |
| White  | 87% |

\*Respondents could select multiple options, and numbers do not add up to 100%. 5% of respondents selected more than one race/ethnicity. To protect identifiability of respondents, groups with less than 5 respondents were not reported. Although we cannot report specific numbers, we can reveal that at least one respondent was in each of these groups.

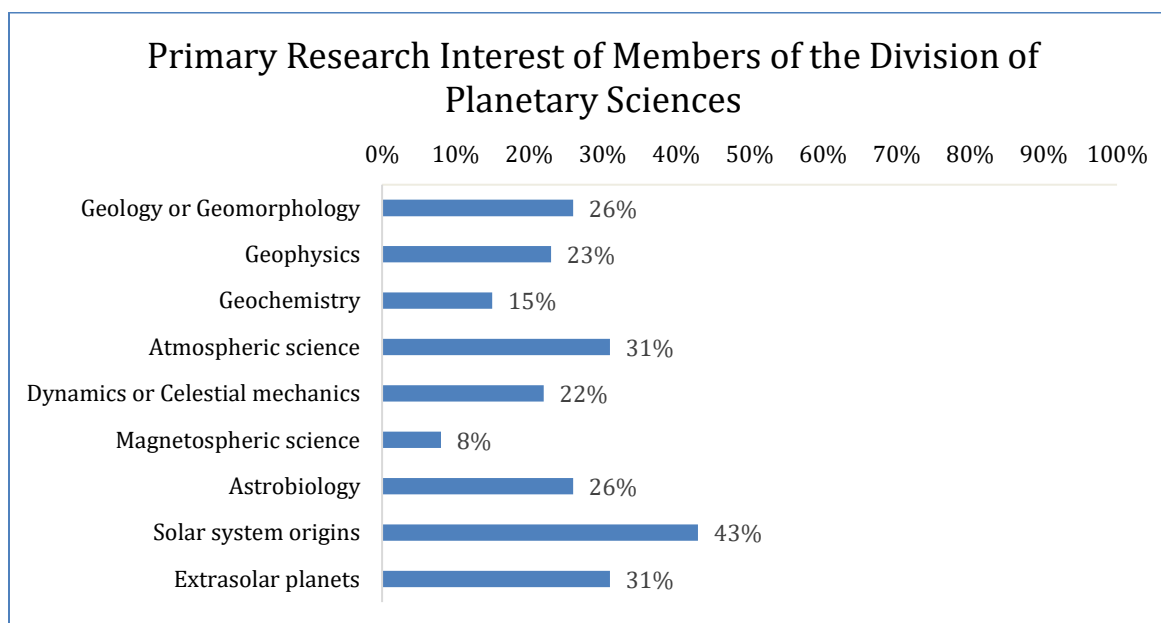
### Education and Research

Out of the 895 DPS respondents, 124 (14%) were students at the time of the survey. Almost all of these students intended to pursue a Doctorate or PhD (96%) at some point in their academic career, and only a small percentage (4%) intended to pursue a Master's as their highest degree. For non-students in the survey, the highest earned degree was overwhelmingly a Doctorate or PhD.

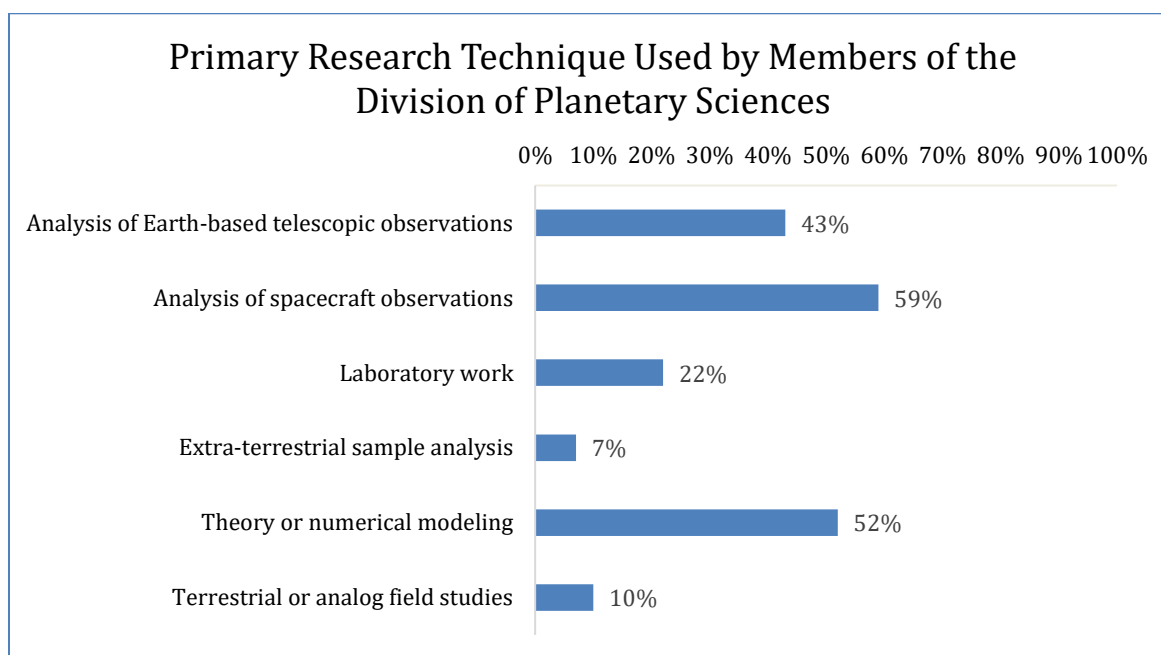


Results do not include students.

We asked both students and non-students about their primary research interests and research techniques. DPS respondents were interested in wide variety of fields, and solar system origins was the most common field of interest. Most DPS respondents performed analysis of spacecraft observations, analysis of earth-based telescopic observations, and theory or numerical modeling.



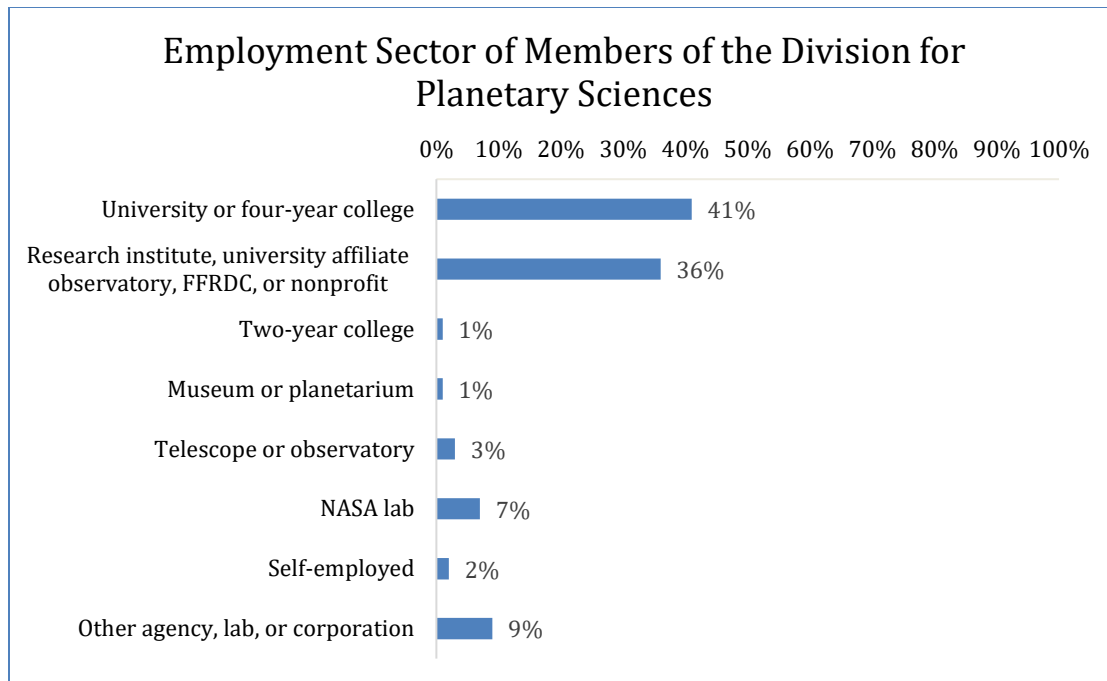
Respondents could select multiple options, and numbers do not add up to 100%.



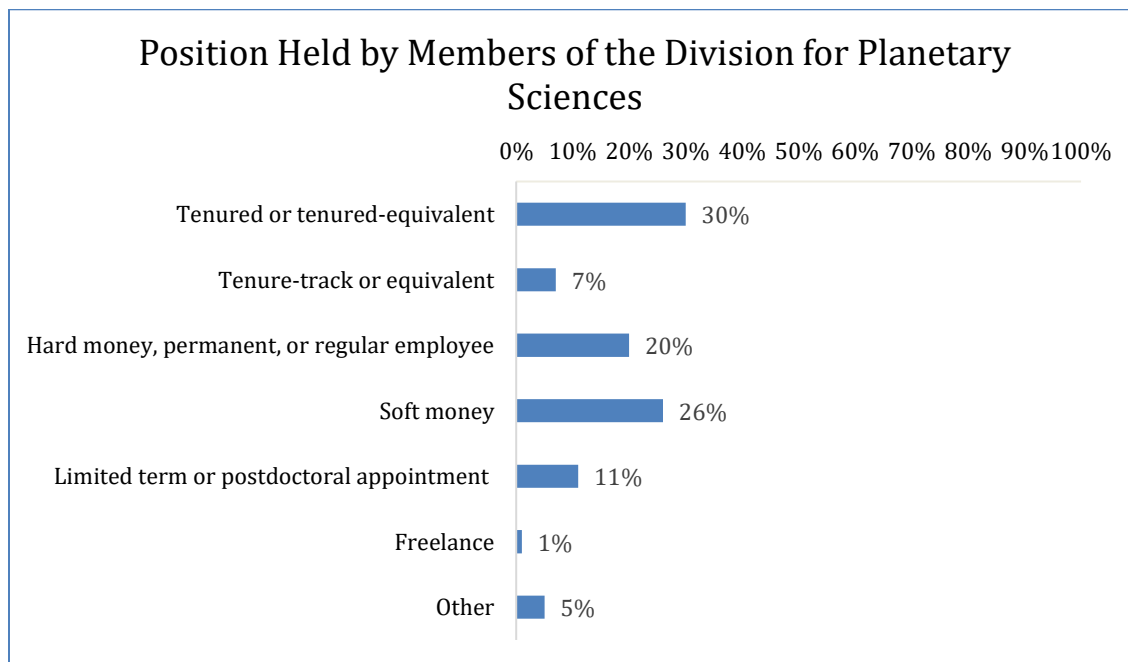
Respondents could select multiple options, and numbers do not add up to 100%.

## Employment

We asked several questions about DPS respondents' employment positions and activities. Students were not asked questions about employment and could not be included in the analysis. Most DPS respondents worked at a university, four-year college, university affiliated observatory/research institute, nonprofit, or FFRDC. In addition, DPS respondents mostly held tenured positions, permanent employee positions, hard money positions, or soft money positions.

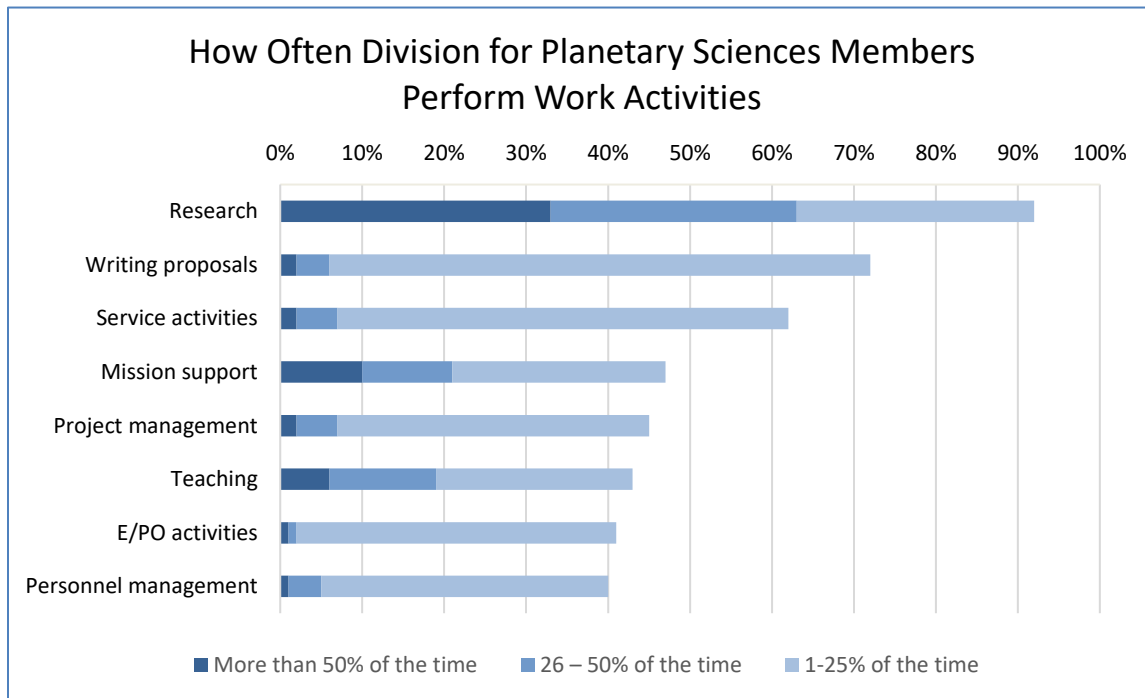


FFRDC=Federally funded research and development center. Results do not include students.



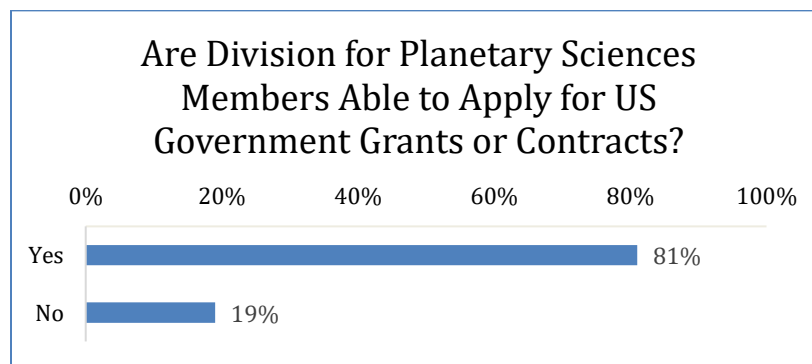
Results do not include students.

Over 90% of DPS respondents performed research during their work, and over 60% performed proposal writing and service activities.



E/PO=Education and public outreach. Results do not include students.

The majority of DPS respondents were able to apply for US government grants or contracts.



Results do not include students.

### Division for Planetary Sciences Priorities

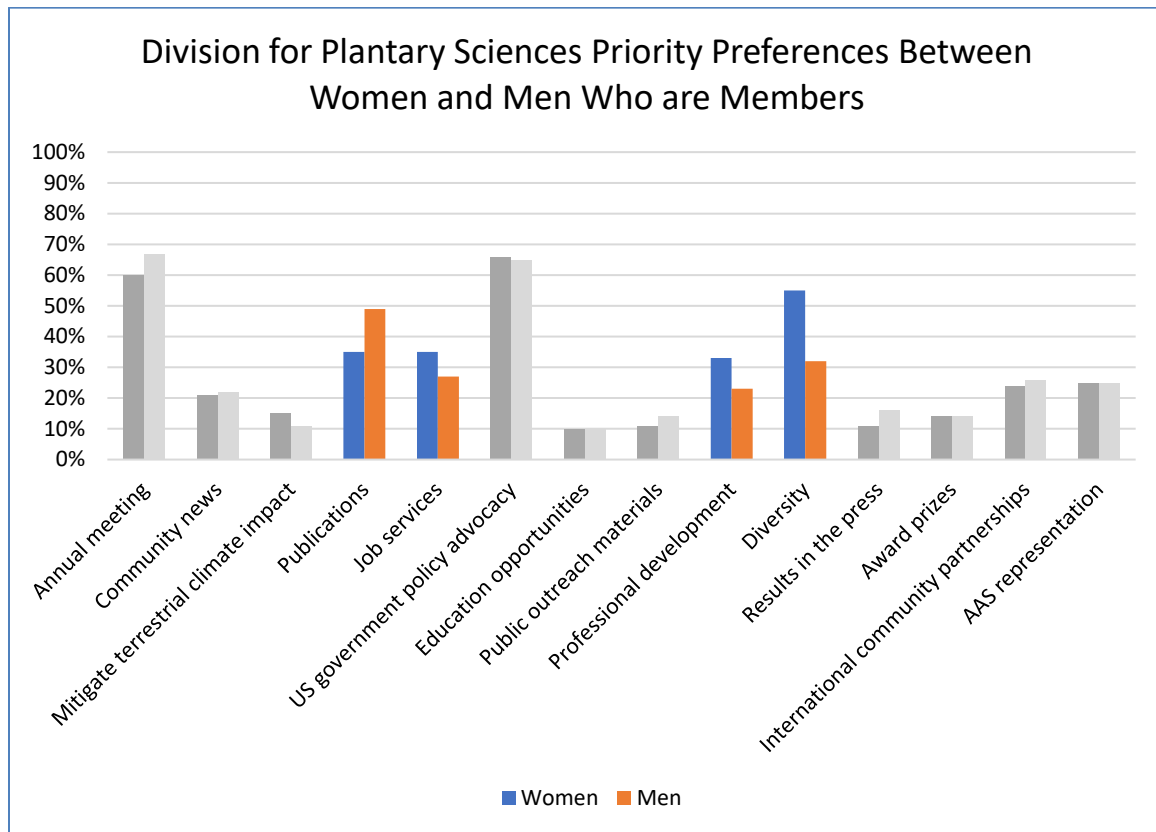
Respondents were asked to select what they felt should be the top priorities of the Division for Planetary Sciences over the next five years. We listed the priorities of DPS members from most to least popular, with the most popular being: 1) advocating for planetary science in US government policies, 2) organizing the annual meeting, 3) supporting publications, and 4) supporting diversity.

| Priority for the Division for Planetary Sciences                        | Percentage of Member Support |
|---|------------------------------|
| Advocate for planetary science priorities in US government policies     | 65%                          |
| Organize annual meeting   | 63%                          |
| Support publications for communication within the scientific community  | 44%                          |
| Support diversity in the community                                      | 40%                          |
| Provide job services  | 30%                          |
| Encourage professional development                                      | 26%                          |
| Enhance partnerships with the international planetary science community | 25%                          |
| Represent planetary science to AAS                                      | 25%                          |
| Distribute community news   | 22%                          |
| Disseminate results in the press  | 14%                          |
| Award prizes to those who excel in our field                            | 14%                          |
| Access and mitigate the DPS impact on the terrestrial climate           | 13%                          |
| Provide public outreach materials for members                           | 13%                          |
| Furnish education opportunities   | 10%                          |



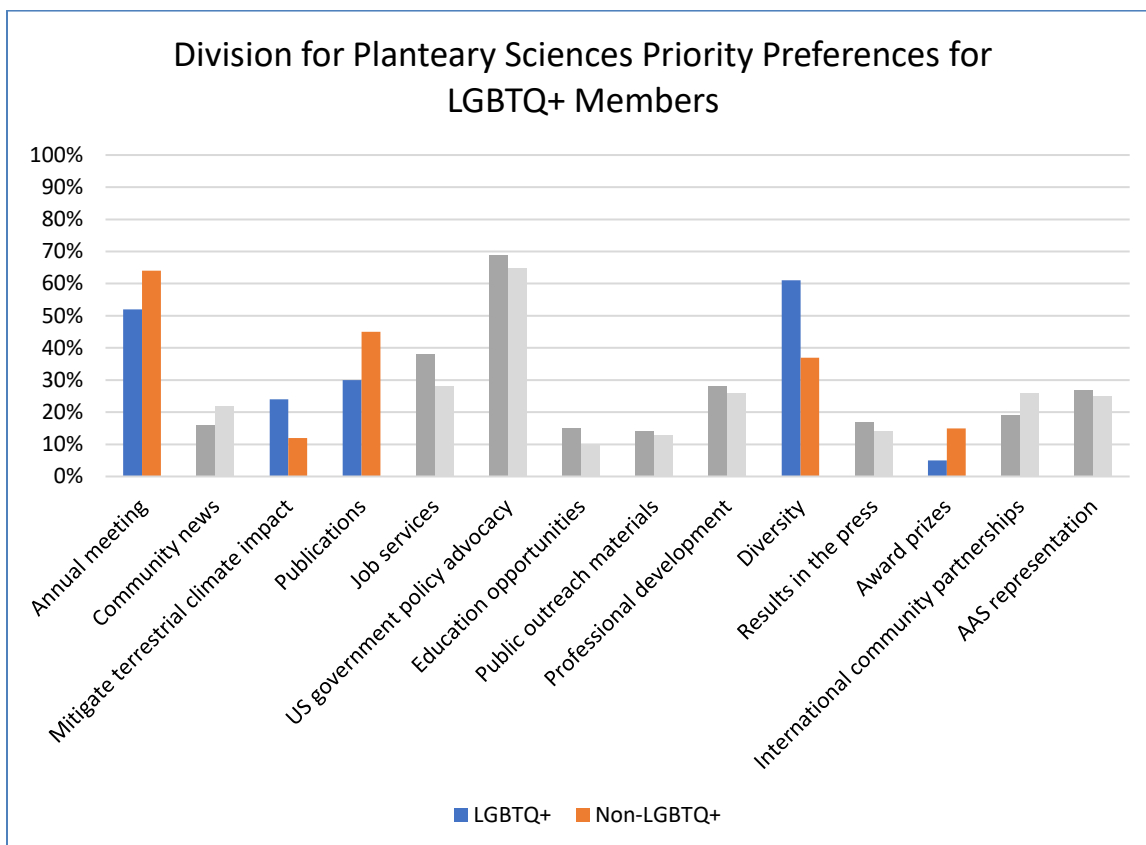
We compared these priorities across race/ethnicity, LGBTQ+ identity, and between men and women. Significance testing was used to determine if group differences were statistically meaningful.

DPS members who identified as women felt it was significantly more important for DPS to prioritize supporting diversity, encouraging professional development, and providing job services. Members who identified as men felt it was significantly more important for DPS to prioritize supporting publications.



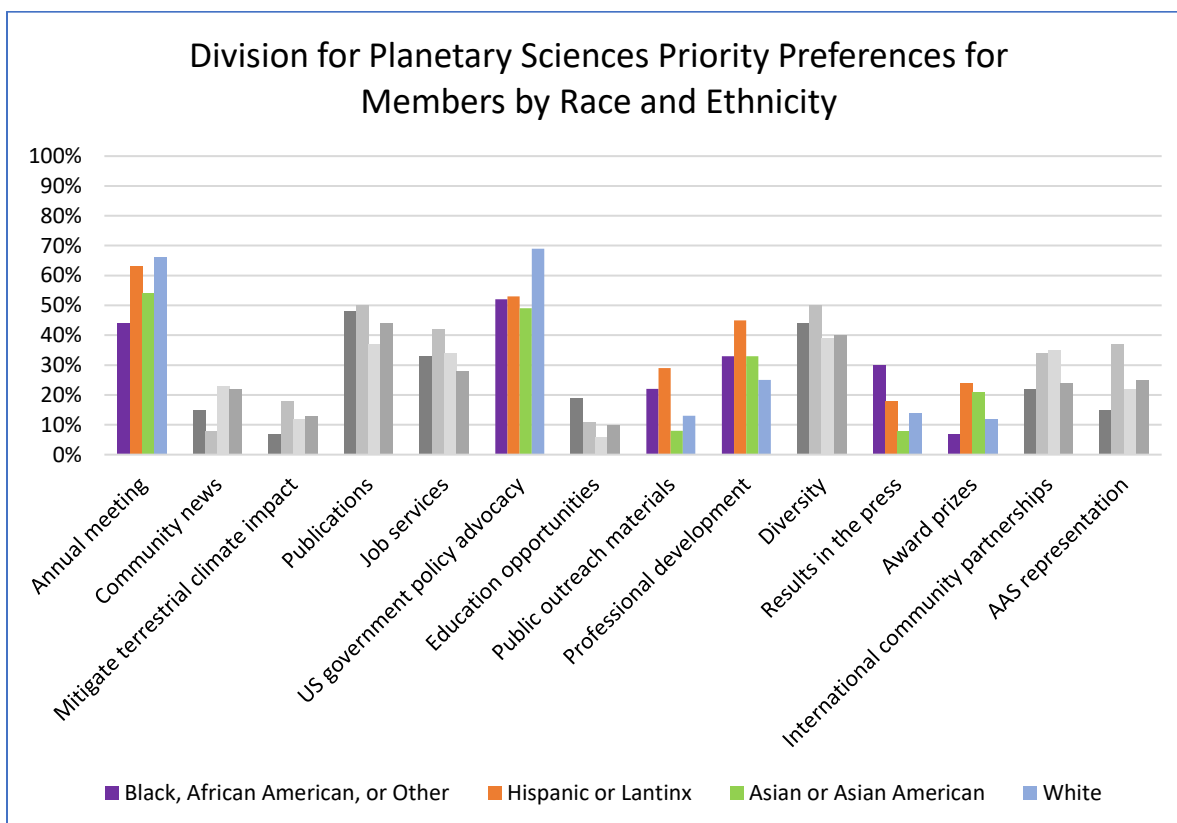
Findings shown in color were statistically significant,  $p < .05$ .

DPS members who were part of the LGBTQ+ community felt it was more important for DPS to prioritize supporting diversity and mitigating its impact on the terrestrial climate. LGBTQ+ members felt it was less important to prioritize organizing the annual meeting and supporting publications than non-LGBTQ+ members.



Findings shown in color were statistically significant,  $p < .05$ . LGBTQ+ included respondents who identify as gay, lesbian, bisexual, transgender, another sexual orientation, or another gender identity.

There were no significant differences for supporting diversity across DPS members of difference race/ethnicities. Members who are Black/African American, Native American/Alaska Native, or Native Hawaiian/Pacific Islander felt it was significantly more important to disseminate results in the press and provide public outreach materials. Members who are White felt it was more important to advocate US government policies. Members who are Hispanic/Latinx felt it was more important to encourage professional development, provide public outreach materials, and award prizes.



Findings shown in color were statistically significant,  $p < .05$ . Other Race/Ethnicity included respondents who are Native American/Alaska Native, Native Hawaiian/Other Pacific Islander, or wrote in another race/ethnicity. These groups were too small to report separately and were combined for analysis. See Appendix A for how multiple race/ethnicity selections were categorized.

## Results from All Survey Respondents

### Demographics

Overall, there were 2,367 respondents to the 2020 Planetary Science Workforce Survey. Most respondents identified as men (62%), 37% identified as women, and 1% as another gender identity. 10% of all respondents identified as a member of the LGBTQ+ community (identifying as gay, lesbian, bisexual, transgender, another gender identity, or another sexual orientation). Most respondents identified as White or Asian/Asian American.

| Race and Ethnicity of All Respondents        |     |
|--|-----|
| Underrepresented Groups in Planetary Science |     |
| Hispanic or Latinx                           | 5%  |
| American Indian or Alaska Native             | 1%  |
| Black or African American                    | 1%  |
| Native Hawaiian or Other Pacific Islander    | <1% |
| Another Race/Ethnicity                       | 4%  |
| Not Underrepresented in Planetary Science    |     |
| Asian or Asian American                      | 13% |
| White  | 83% |

\*Respondents could select multiple options, and numbers do not add up to 100%. 6% of respondents selected more than one race/ethnicity.

We also examined race/ethnicity by gender identity. We found that men were significantly more represented among those who identified as Asian/Asian American or White.

|                         | Underrepresented Groups in Planetary Science      |                    | Not Underrepresented in Planetary Science |       |
|-------------------------|---|--------------------|---|-------|
|                         | Black, African American, or Other Race/Ethnicity* | Hispanic or Latinx | Asian or Asian American                   | White |
| Women                   | 48%   | 50%                | 38%                                       | 37%   |
| Men                     | 51%   | 47%                | 62%                                       | 62%   |
| Another Gender Identity | 1%  | 3%                 | 0%  | 1%    |

\* Findings were statistically significant,  $p < .05$ . Other Race/Ethnicity included respondents who are Native American/Alaska Native, Native Hawaiian/Other Pacific Islander, or wrote in another race/ethnicity. These groups were too small to report separately and were combined for analysis. See Appendix A for how multiple race/ethnicity selections were categorized.

15% of respondents identified having a disability. Respondents were also asked what accessibility aids they use. Since only a small percentage of respondents reported disabilities in general, the percentages for accessibility aid use were also small.

| Accessibility Aids Used by Respondents                 | Percentage Who Used |
|--|---------------------|
| Quiet spaces   | 6%                  |
| Dietary accommodation                                  | 6%                  |
| Hearing aids, headphones, and other audio devices      | 3%                  |
| Closed captioning                                      | 3%                  |
| Environmental adjustments (lighting, air, noise, etc.) | 3%                  |
| Mobility aids  | *                   |
| Note-takers  | *                   |
| Speech transcription                                   | *                   |
| Service animal   | *                   |
| Sign language, American, or other                      | *                   |
| Braille  | 0%                  |

\*To protect identifiability of respondents, groups with less than 5 respondents were not reported. Although we cannot report specific numbers, we can reveal that at least one respondent was in each of these groups.

### Year of Degree

We compared the year in which respondents earned their highest academic degree between LGBTQ+ and non-LGBTQ+ respondents, and across race and ethnicity categories. The goal of this analysis was to see if a greater percentage of minority groups were earning degrees over time, which would indicate that the field is becoming more diverse. Overall, most respondents (35%) earned their highest degree after 2010. 22% of respondents earned their highest degree between 2010 and 2001, 18% between 2000 and 1991, 13% between 1990 and 1981, 7% between 1980 and 1971, and 5% before 1970.

According to significance testing, degree earners are becoming more diverse in the field over time. Respondents who identified as LGBTQ+, Hispanic/Latinx, and Asian/Asian American earned a significantly greater proportion of degrees in recent years. The proportion of degree earners did not change over time for respondents who identified as Black/African American or other race/ethnicities.

| Year of Degree  | % of Degrees Earned by LGBTQ+ Respondents |
|-----------------|---|
| 1970 or earlier | 4%  |
| 1971-1980       | 4%  |
| 1981-1990       | 2%  |
| 1991-2000       | 6%  |
| 2001-2010       | 6%  |
| 2011-2020       | 12%                                       |

Findings were statistically significant,  $p < .05$ . LGBTQ+ included respondents who identify as gay, lesbian, bisexual, transgender, another sexual orientation, or another gender identity.

| Year of Degree  | Underrepresented Groups in Planetary Science      |                    | Not Underrepresented in Planetary Science |       |
|-----------------|---|--------------------|---|-------|
|                 | Black, African American, or Other Race/Ethnicity* | Hispanic or Latinx | Asian or Asian American                   | White |
| 1970 or earlier | 5%  | 0%                 | 3%  | 92%   |
| 1971-1980       | 3%  | 0%                 | 5%  | 92%   |
| 1981-1990       | 3%  | 3%                 | 4%  | 90%   |
| 1991-2000       | 4%  | 2%                 | 11%                                       | 83%   |
| 2001-2010       | 4%  | 5%                 | 10%                                       | 81%   |
| 2011-2020       | 5%  | 6%                 | 17%                                       | 72%   |

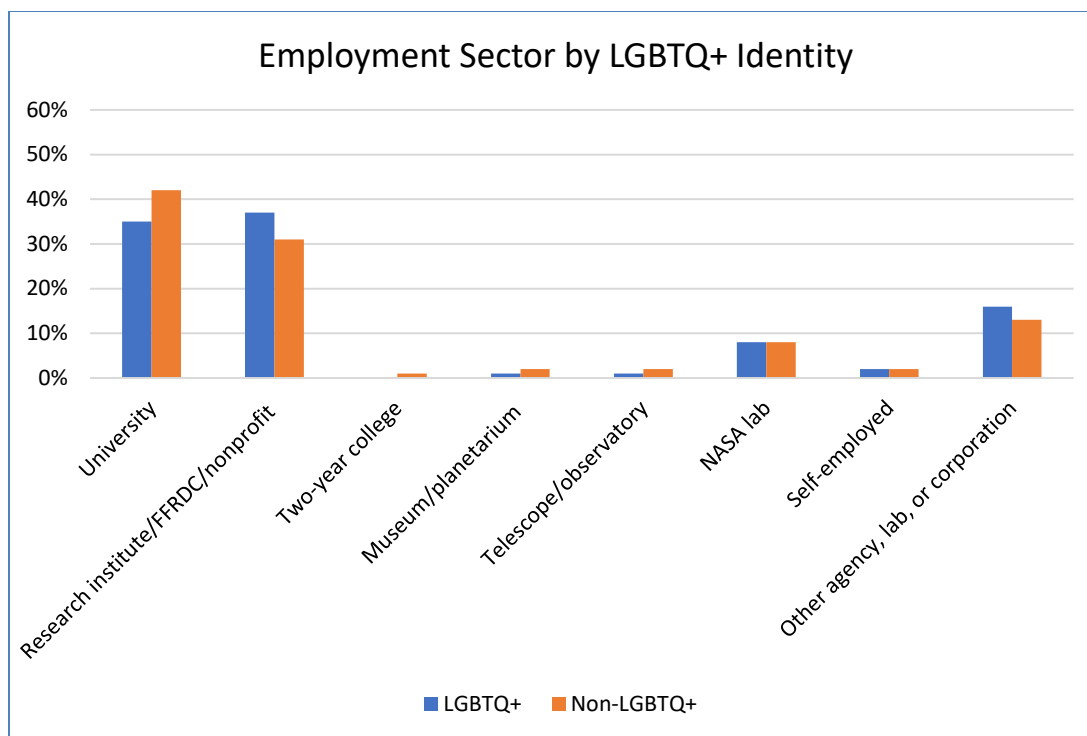
Findings were statistically significant,  $p < .05$ . Other Race/Ethnicity included respondents who are Native American/Alaska Native, Native Hawaiian/Other Pacific Islander, or wrote in another race/ethnicity. These groups were too small to report separately and were combined for analysis.

See Appendix A for how multiple race/ethnicity selections were categorized.

### Employment Positions

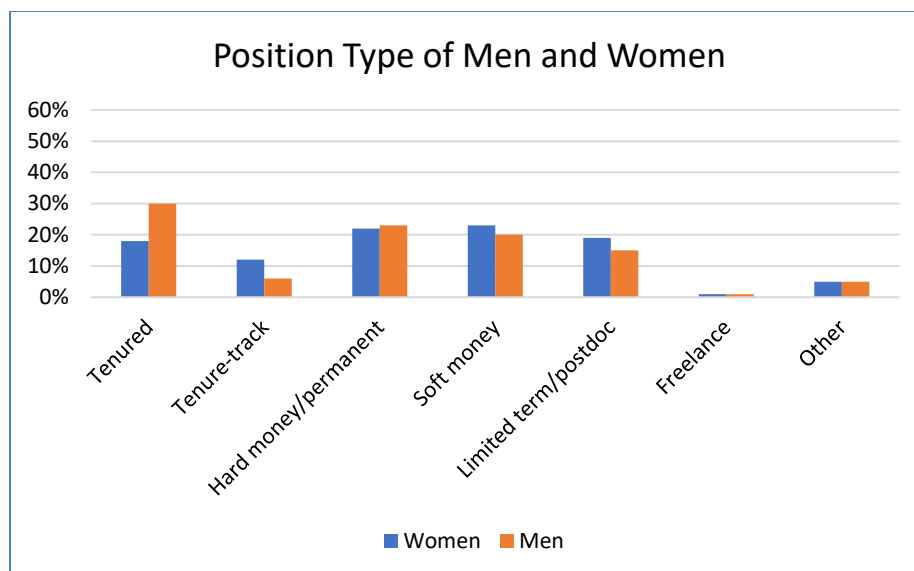
Throughout this section, we compared employment outcomes by race/ethnicity, LGBTQ+ identity, disability status, and between men and women. As stated before, students were not asked questions about employment in the survey and could not be included in the results.

Overall, most employees worked at a university or four-year college (42%) or at a university affiliated research institute/observatory, non-profit, or FFRDC (31%). There were only statistically significant differences by LGBTQ+ identity. LGBTQ+ respondents were more likely to work at a university affiliated observatory/research institute, nonprofit, or FFRDC. Non-LGBTQ+ respondents were more likely to work at a university or four-year college. There were no statistically significant differences by race/ethnicity, disability status, or between men and women.

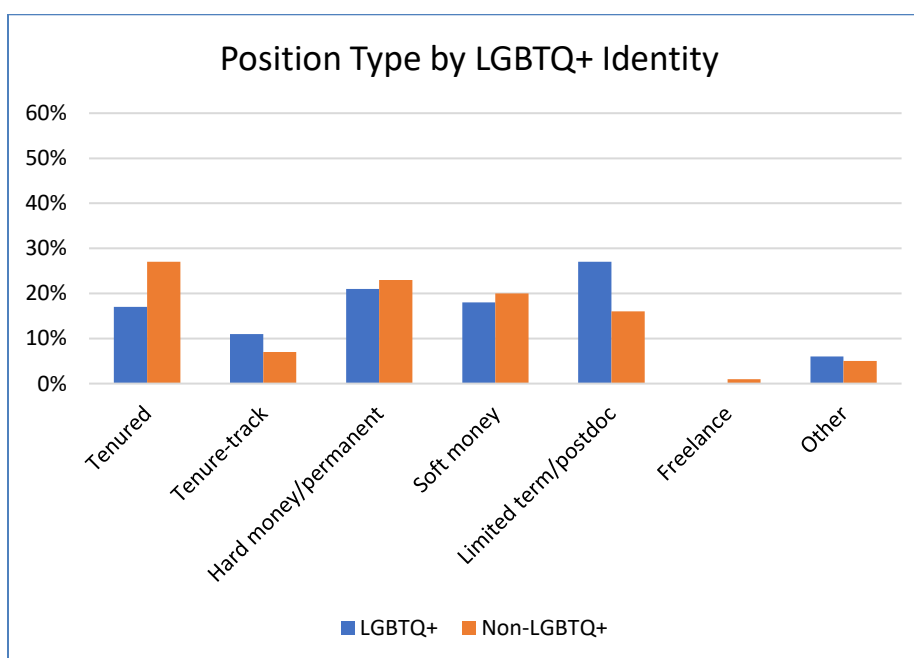


Findings were statistically significant,  $p < .05$ . FFRDC=Federally funded research and development center. LGBTQ+ included respondents who identify as gay, lesbian, bisexual, transgender, another sexual orientation, or another gender identity. Results do not include students.

Overall, employees worked in a variety of positions, such as tenured positions (26%), hard money/permanent positions (23%), and soft money positions (20%). There were no statistically significant differences by disability status, but there were significant differences by LGBTQ+ identity, race/ethnicity, and between men and women. Women and LGBTQ+ respondents were less likely to work in tenured positions, and more likely to work in tenure-track, limited term, or postdoctoral positions.



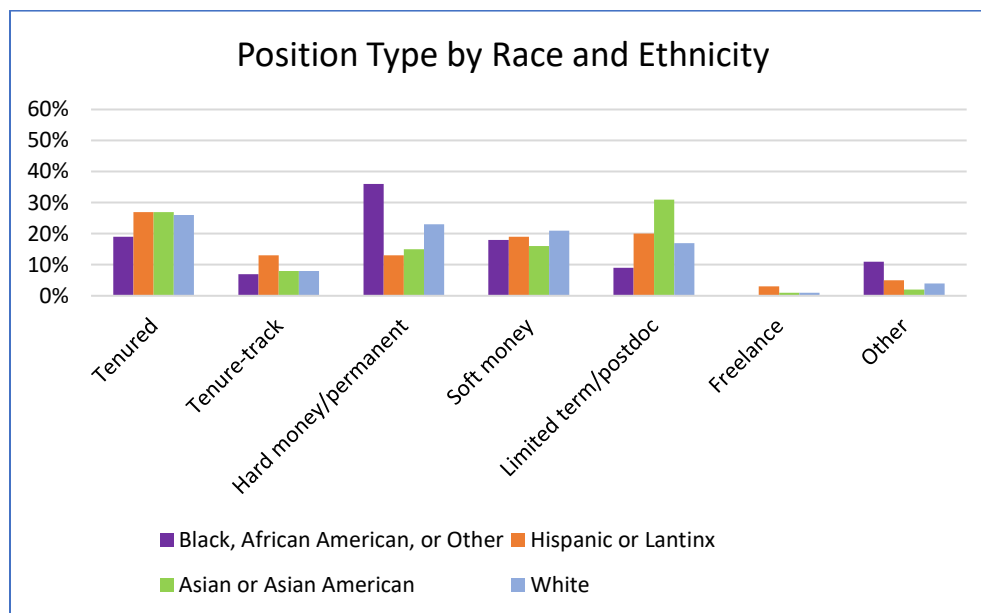
Findings were statistically significant,  $p < .05$ . Results do not include students.



Findings were statistically significant,  $p < .05$ . LGBTQ+ included respondents who identify as gay, lesbian, bisexual, transgender, another sexual orientation, or another gender identity. Results do not include students.

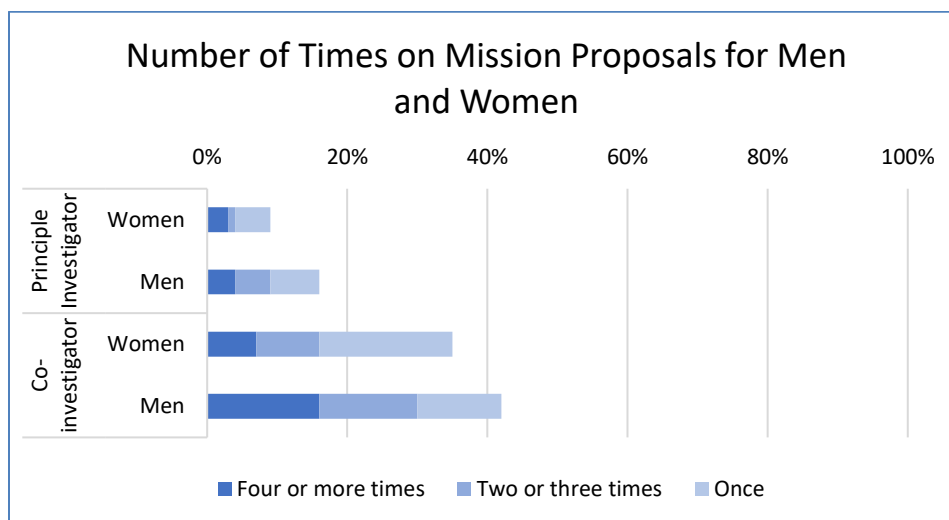


Respondents who are Black/African American or another race/ethnicity were less likely to work in tenured positions, but more likely to work in permanent positions. Hispanic/Latinx respondents were more likely to work in tenure-track positions, and Asian respondents were more likely to work in limited term positions.



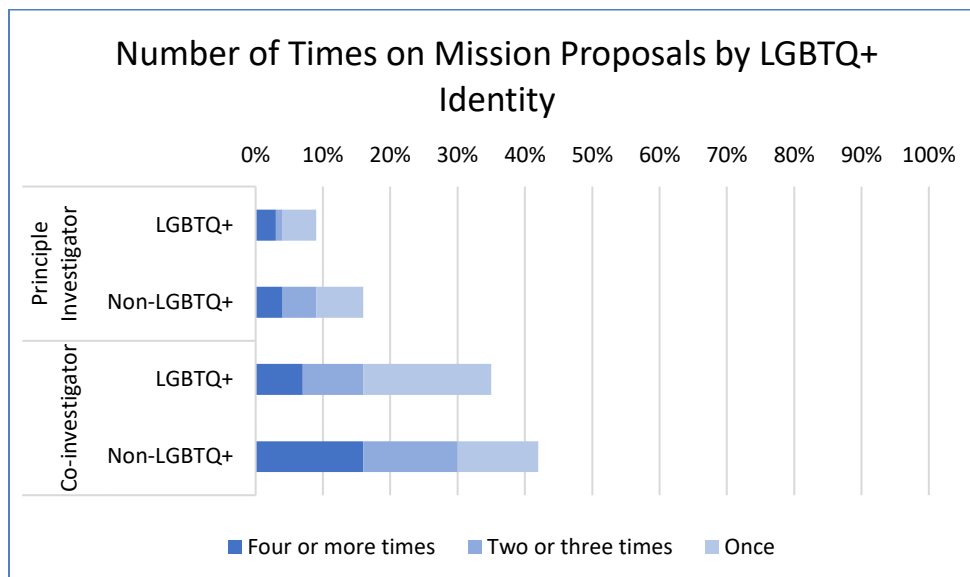
Findings were statistically significant,  $p < .05$ . Other Race/Ethnicity included respondents who are Native American/Alaska Native, Native Hawaiian/Other Pacific Islander, or wrote in another Race/Ethnicity. These groups were too small to report separately and were combined for analysis. See Appendix A for how multiple race/ethnicity selections were categorized. Results do not include students.

We also compared how often individuals were involved in mission proposals as a principle investigator (PI) or co-investigator. There were statistically significant differences across all demographic groups. Men were a PI or co-investigator significantly more often than women.



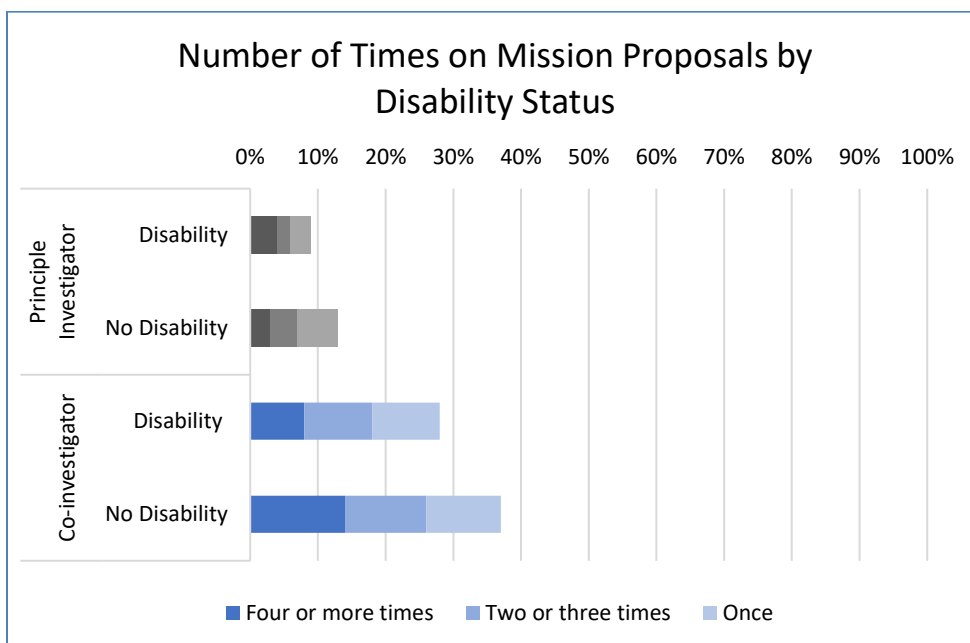
Findings shown in color were statistically significant,  $p < .05$ .

Non-LGBTQ+ respondents were a PI or co-investigator on mission proposals more often than LGBTQ+ respondents.



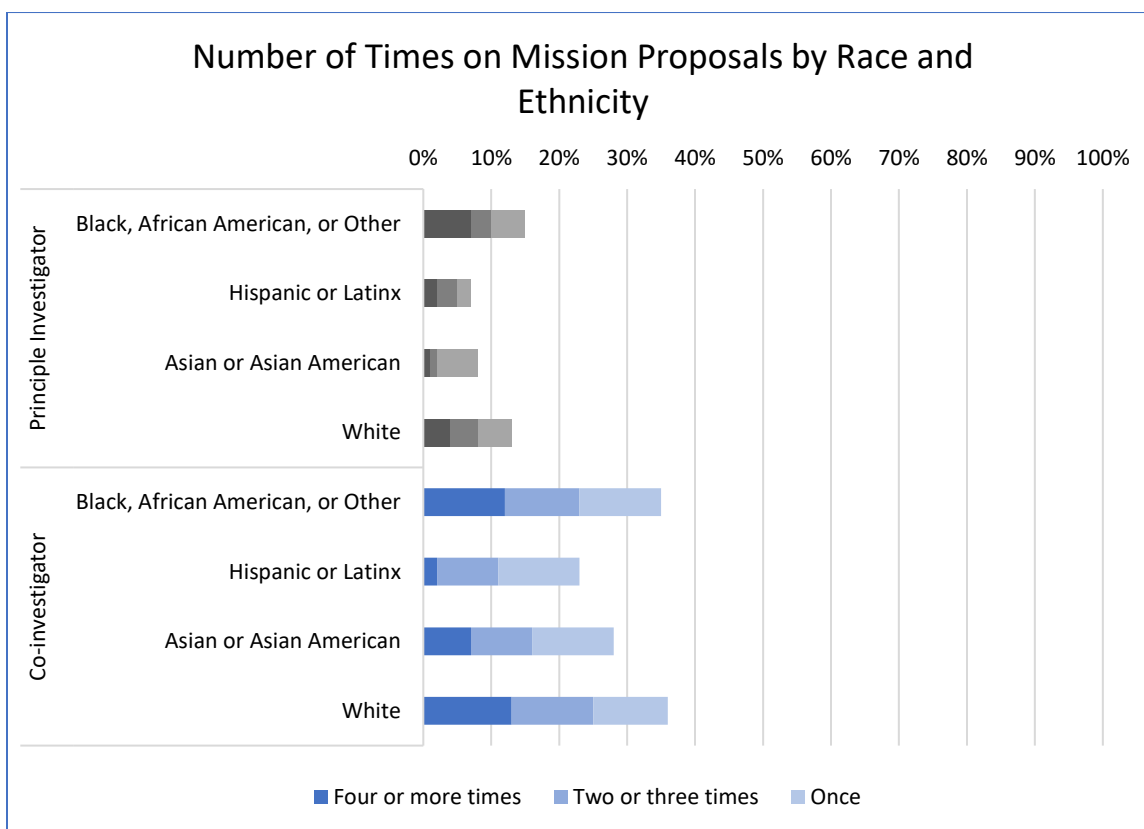
Findings shown in color were statistically significant,  $p < .05$ . LGBTQ+ included respondents who identify as gay, lesbian, bisexual, transgender, another sexual orientation, or another gender identity.

There were no significant differences by disability status and being a PI. Respondents without a disability were co-investigators on mission proposals more often.



Findings shown in color were statistically significant,  $p < .05$ . Disability status did not include respondents over 60 years old, who also indicated they were deaf, hard of hearing, or had serious difficulty standing, walking, and climbing stairs.

There were no significant race/ethnicity differences in being a PI. Hispanic/Latinx respondents were co-investigators on mission proposals less often than other groups.

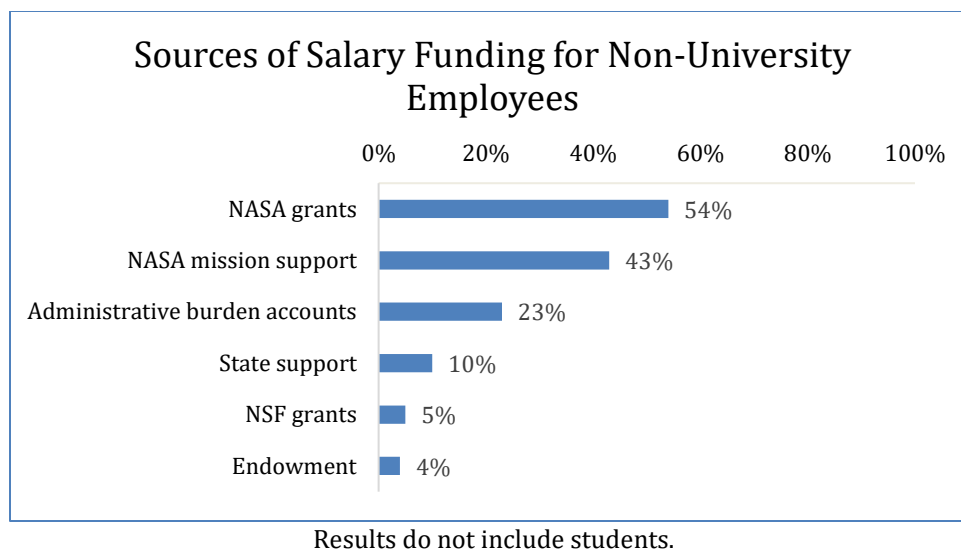


Findings shown in color were statistically significant,  $p < .05$ . Other Race/Ethnicity included respondents who are Native American/Alaska Native, Native Hawaiian /Other Pacific Islander, or wrote in another Race/Ethnicity. These groups were too small to report separately and were combined for analysis. See Appendix A for how multiple race/ethnicity selections were categorized.

### Salary Funding Sources

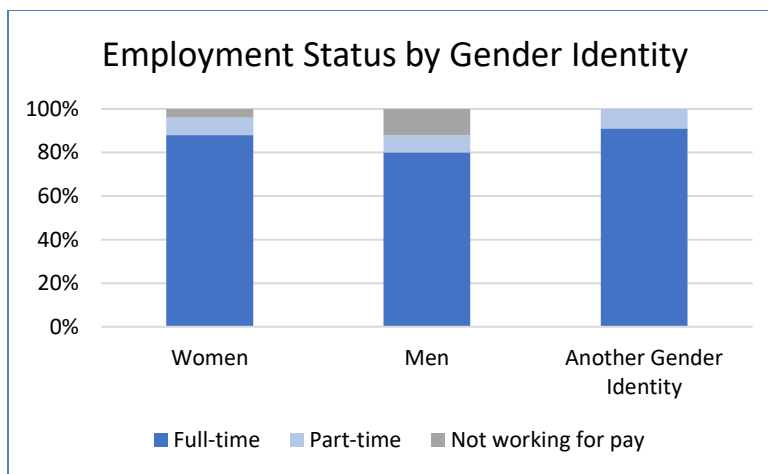
In the survey, we asked respondents if their salary was funded by several potential sources. Overall, many employees earned a portion of their salary from NASA grants (63%), NASA mission support (43%), or state support (37%).

Since university or four-year college employees were a large percentage of the sample (42%), we examined the funding sources of non-university employees in particular. NASA grants (54%) and NASA mission support (43%) were still sources of funding for many non-university employees. These employees also received more funding from administrative burden accounts (23%).



### Employment Status by Gender Identity

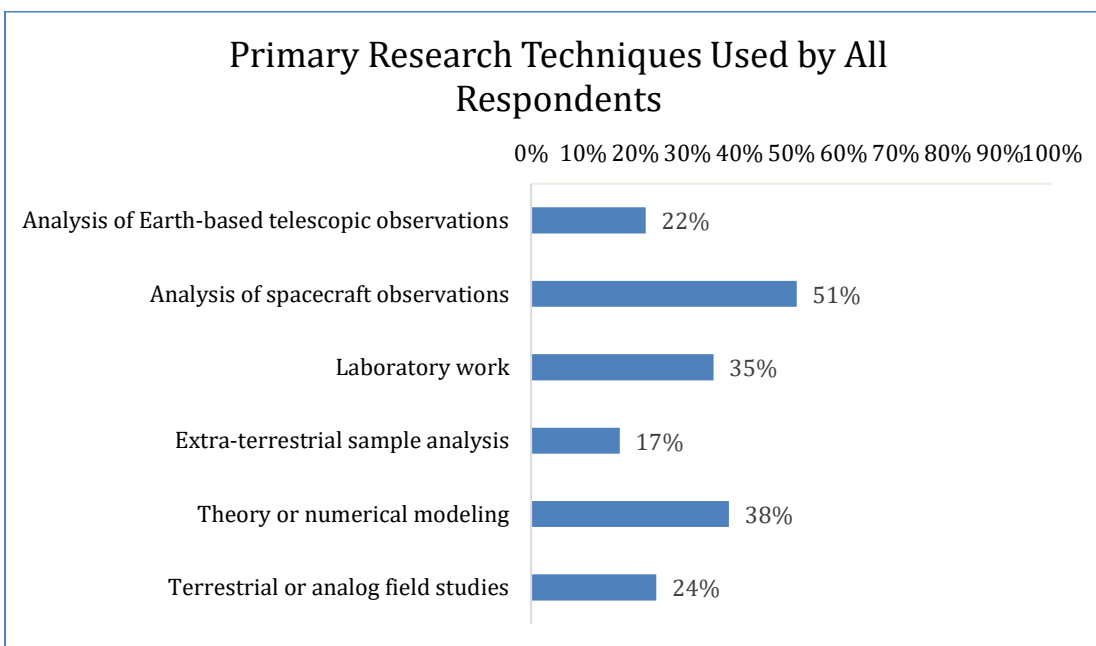
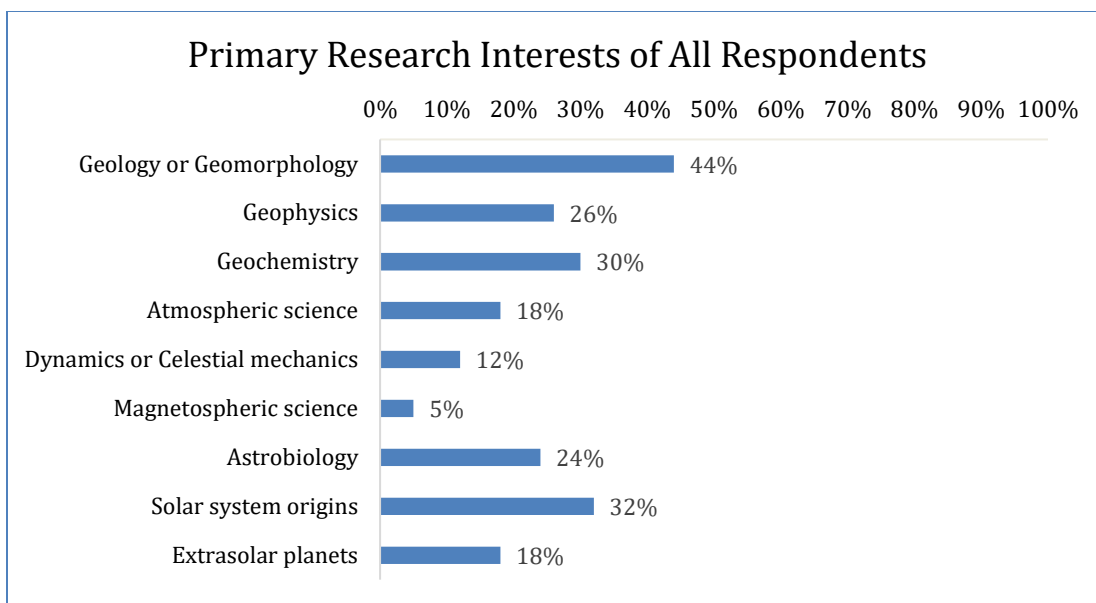
Almost all respondents in the survey were full-time employees (83%). We examined if respondents were full or part-time employees by gender identity, to determine if men were more likely to work full-time. However, the opposite was true. Results showed that men were significantly more likely to not be working for pay.



Findings were statistically significant,  $p < .05$ . Results do not include students.

### Research Interests and Techniques

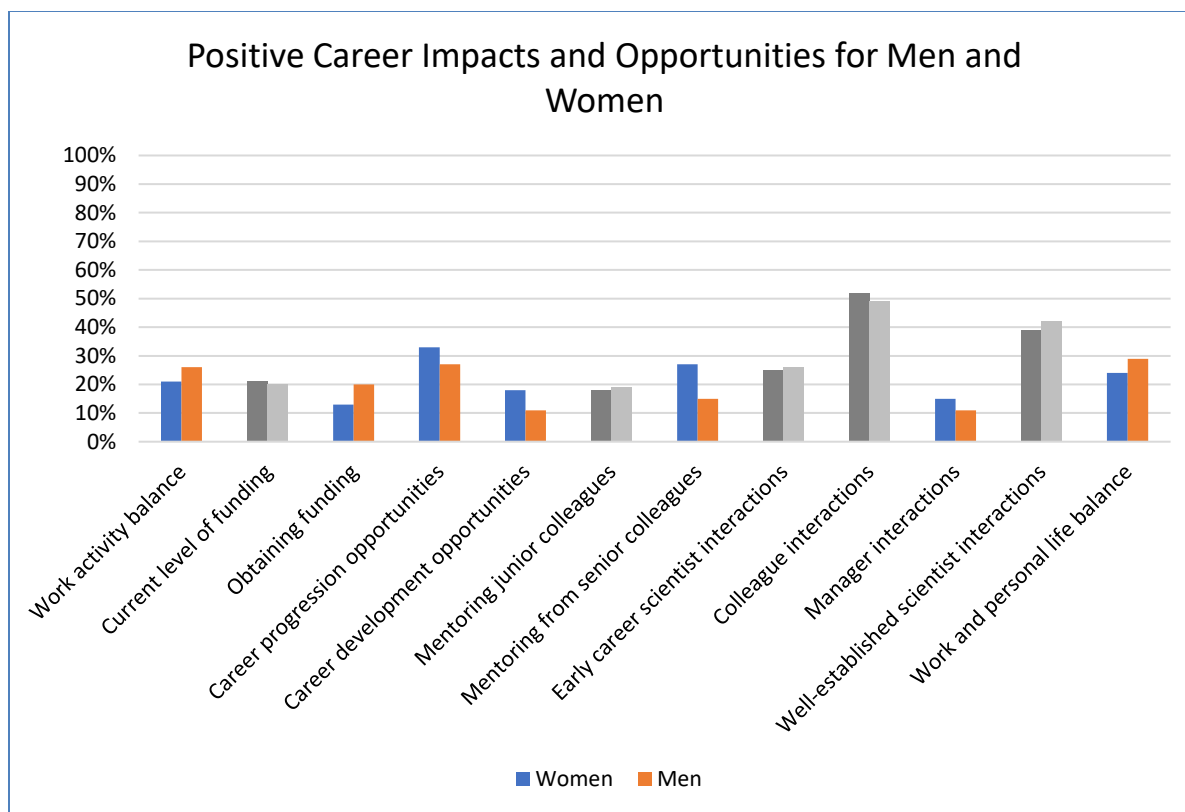
We examined the primary research interests and research techniques of all survey respondents, including students. Geology and Geomorphology were the most common fields of interest, and most respondents used analysis of spacecraft observations, laboratory work, and theory or numerical modeling techniques in their research.



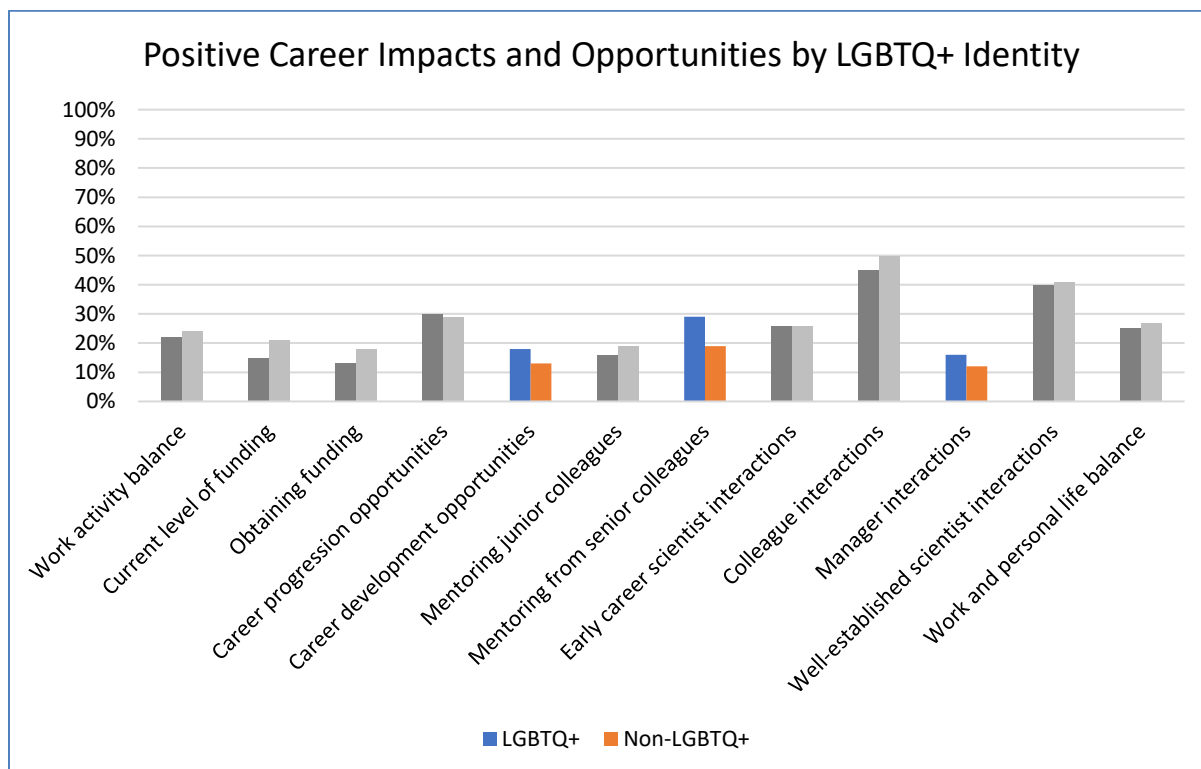
## Career Opportunities

We asked respondents to indicate what opportunities positively influenced their career satisfaction, and what lack of opportunities negatively influenced their career satisfaction. We compared opportunities by race/ethnicity, LGBTQ+ identity, and between men and women.

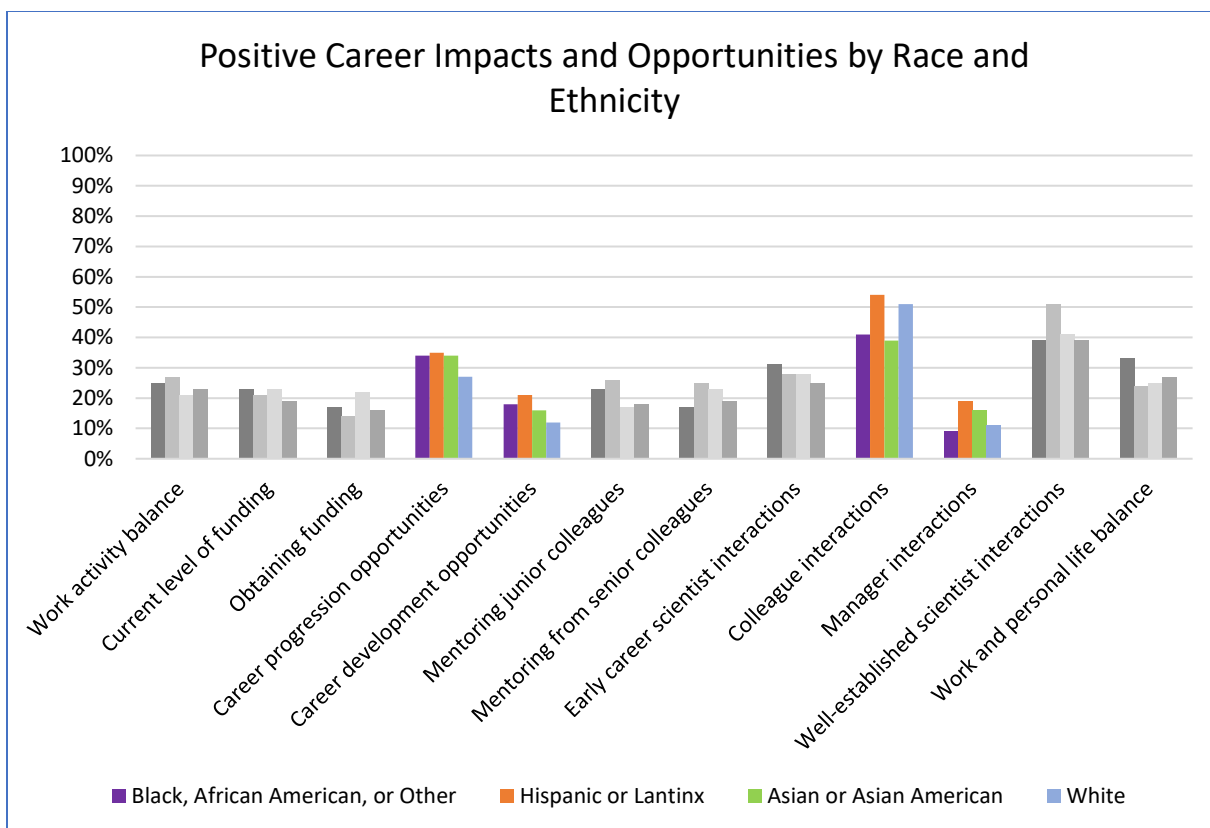
Overall, respondents who identified as women, LGBTQ+, and race/ethnicities other than White were significantly more likely to appreciate opportunities for career progression, career development, mentorship from senior colleagues, and interactions with managers and colleagues.



Findings shown in color were statistically significant,  $p < .05$ .

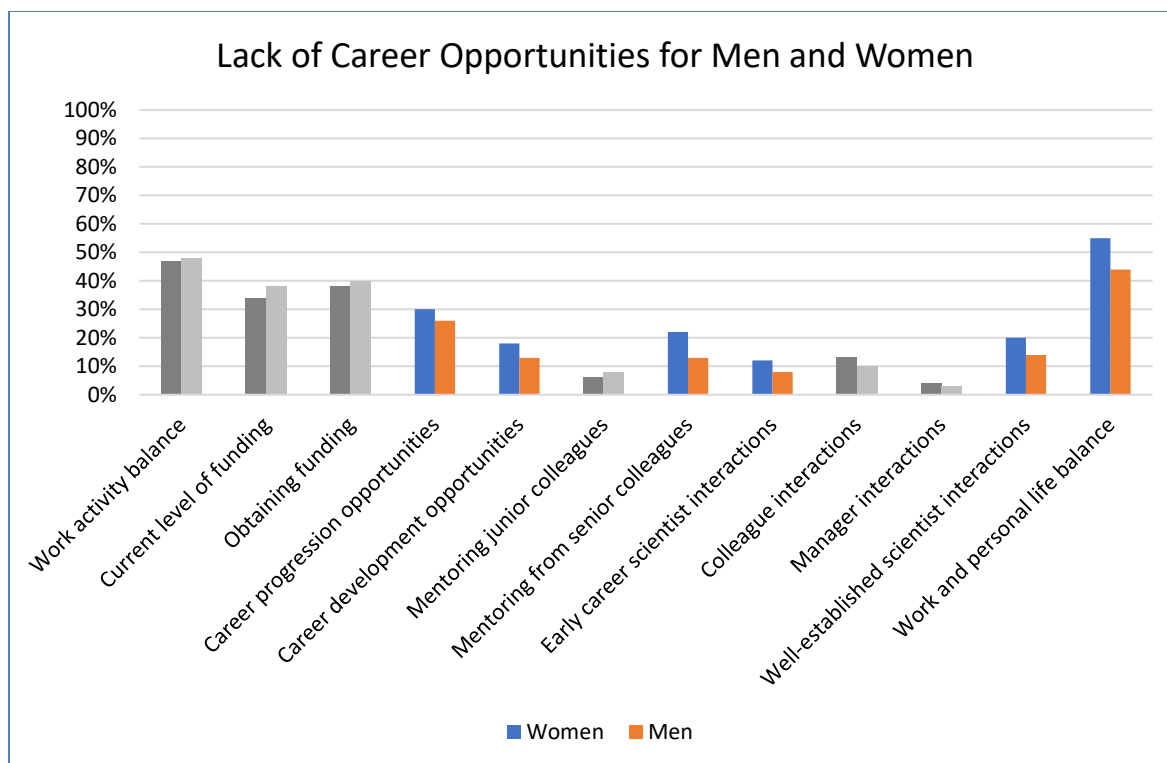


Findings shown in color were statistically significant,  $p < .05$ . LGBTQ+ included respondents who identify as gay, lesbian, bisexual, transgender, another sexual orientation, or another gender identity.

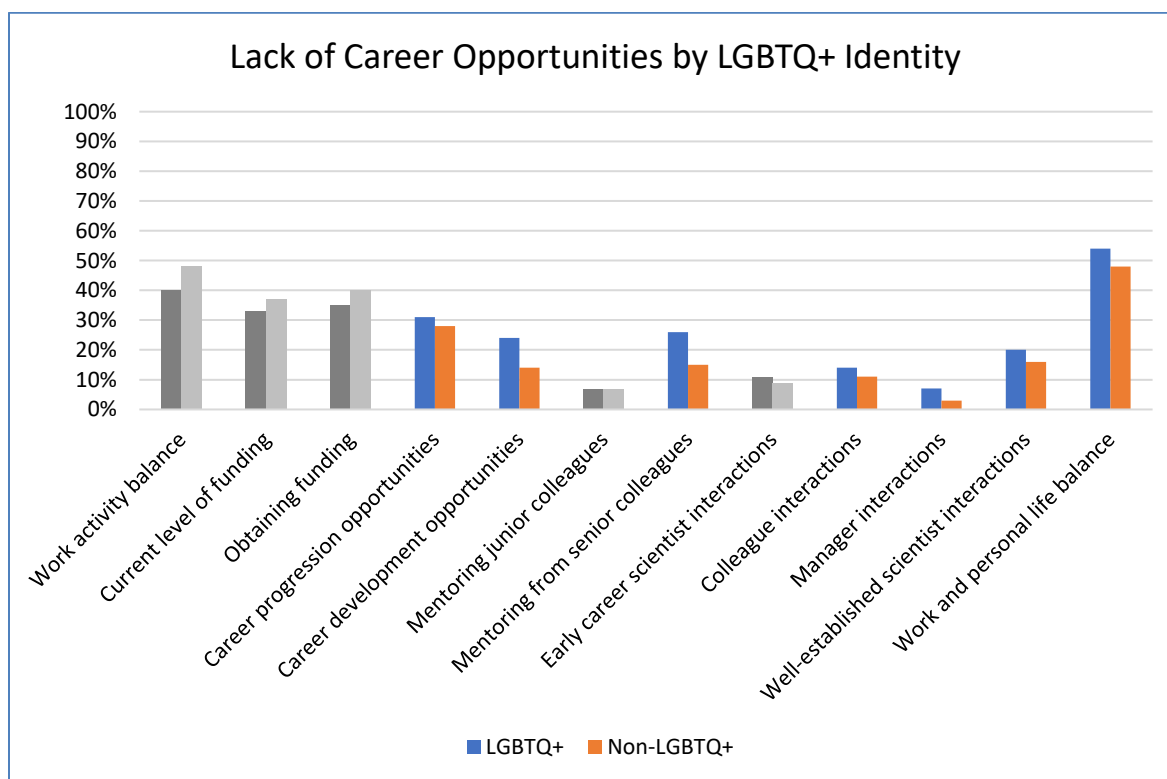


Findings shown in color were statistically significant,  $p < .05$ . Other Race/Ethnicity included respondents who are American/Alaska Native, Native Hawaiian/Other Pacific Islander, or wrote in another Race/Ethnicity. These groups were too small to report separately and were combined for analysis. See Appendix A for how multiple race/ethnicity selections were categorized.

For negative impacts on career satisfaction, respondents who identified as women, LGBTQ+, and race/ethnicities other than White were significantly more likely to struggle with having a lack of opportunities for career progression, career development, mentorship from senior colleagues, and interactions with early-career scientists, colleagues, managers, and well-established scientists. In addition, these groups were significantly more likely to struggle with managing a balance between their work and personal life.

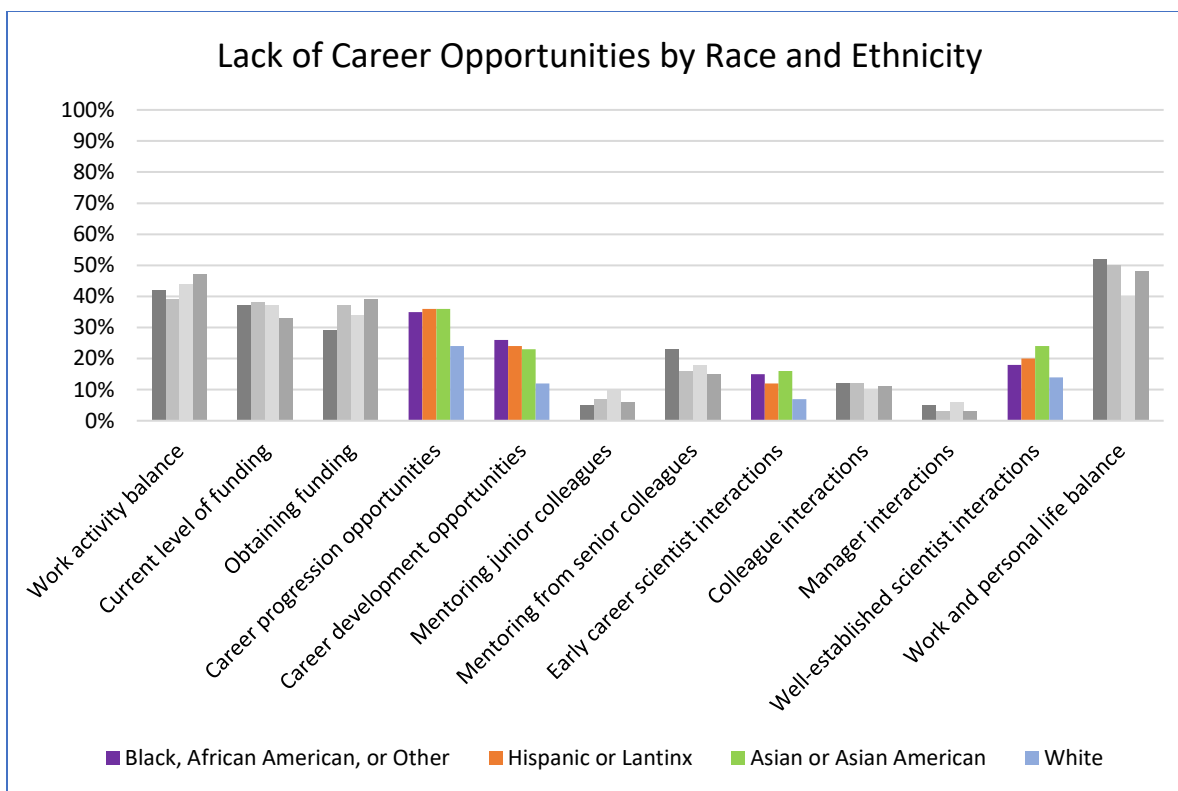


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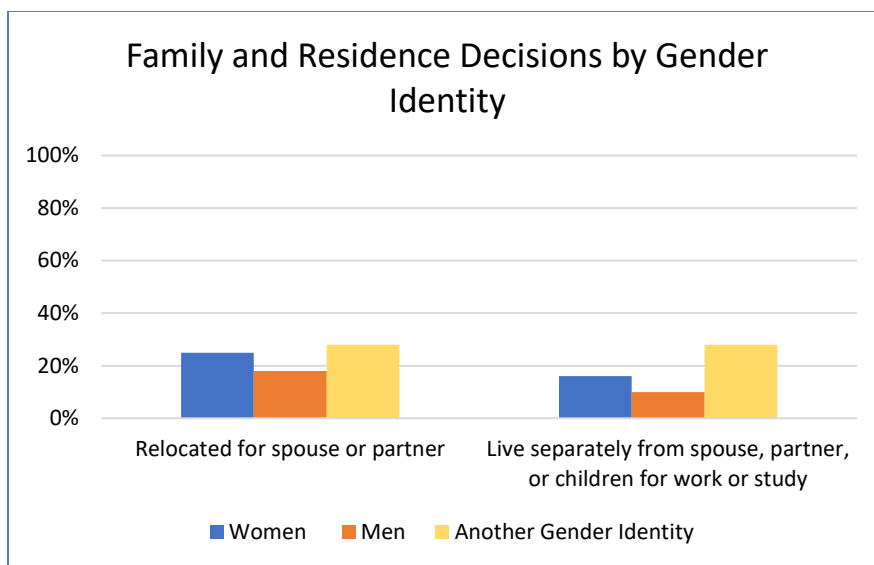


Findings shown in color were statistically significant,  $p < .05$ . Other Race/Ethnicity included respondents who are Native American/Alaska Native, Native Hawaiian/Other Pacific Islander, or wrote in another Race/Ethnicity. These groups were too small to report separately and were combined for analysis. See Appendix A for how multiple race/ethnicity selections were categorized.

### Family and Residence Decisions

We asked respondents if they ever relocated for a spouse or partner for any reason, and if they currently live separately from their spouse, partner, or children for the purpose of work or study. Overall, 21% of respondents have relocated for a partner and 12% live separately from their partner or children.

We examined these questions by gender. Respondents who identified as women or another gender identity were significantly more likely to have relocated for a partner, and significantly more likely to live separately from their partner or children than respondents who identified as men.



Findings were statistically significant,  $p < .05$ .

## Appendix A

Overall, 122 respondents (6%) identified as two or three race/ethnicities. For chi-square analyses using significance testing to be accurate, the groups being compared could not have the same individuals in multiple groups. Therefore, respondents who selected multiple race/ethnicities needed to be sorted among the four comparison groups for the analyses: “Black, African American, or Other”, “Hispanic or Latinx”, “Asian or Asian American”, and “White.”

Respondents who selected “Hispanic or Latinx” and any other race/ethnicity were sorted into the “Hispanic or Latinx” group. Of the Hispanic or Latinx respondents who selected another race/ethnicity, 86% also selected “White” and 14% also selected “American Indian or Alaska Native”, “Black or African American”, “Asian or Asian American” or “Other Race/Ethnicity.”

Respondents who selected “Asian or Asian American” and any other race/ethnicity except “Hispanic or Latinx”, were sorted into the “Asian or Asian American” group. Of the Asian or Asian American respondents who selected another race/ethnicity, 79% also selected “White”, and 21% also selected “Native Hawaiian or Pacific Islander”, “Hispanic or Latinx” (these are included in the “Hispanic or Latinx” group only), or “Other Race/Ethnicity.”

Respondents who selected two or more of the remaining race/ethnicities were sorted into the “Black, African American, or Other” group. Of these respondents, 38% selected “White” and “Other Race/Ethnicity”, 33% selected “White” and “American Indian or Alaska Native”, 17% selected “White” and “Black or African American”, and the remaining 12% selected “Native Hawaiian or Pacific Islander” and “White” or “Black or African American.”