



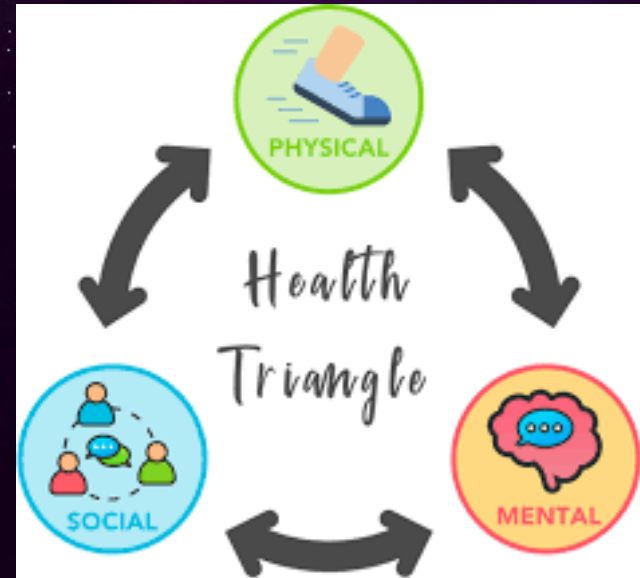
The Role of Mental Health in Affecting High Quality Research in Planetary Science

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A Quick Overview of Mental Health

- When is mental health a concern: Behavioral, emotional, and/or cognitive factors causes distress to a person's home, work, and social life.
- Poor mental health can adversely **affect research quality and production** as well as physical and social health
- Mental health issues in academia have been noted (e.g., Evans et al., 2018; Levecque et al., 2017; Vance et al., 2021)



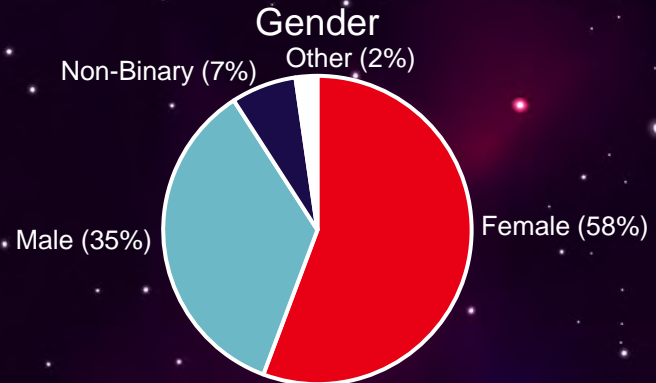
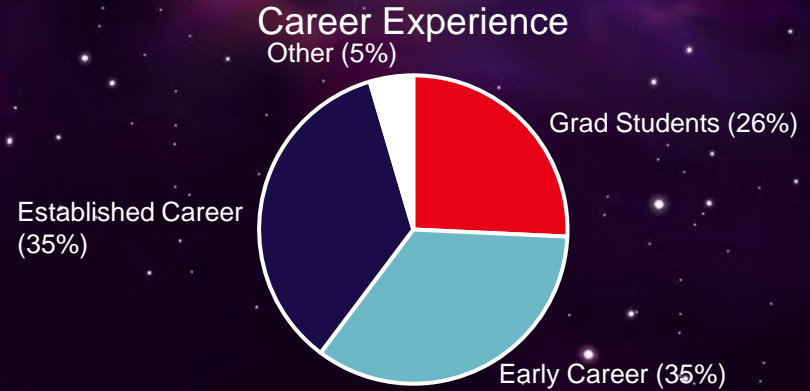
IRB-Approved Mental Health Survey

- **GOAL: Broad spectrum look at mental health (anxiety, depression, stress) in planetary science (i.e., is there a problem?)**
- *We used three assessments: to measure depression, anxiety, and stress (DASS-42, PHQ-9, GAD-7; Lovibond and Lovibond, 1996; Spitzer et al., 2006; Kroenke et al., 2001)*
- Commonly used to help screen for depressive, anxiety, and trauma/stress-related disorders
- The results are **NOT** a diagnosis

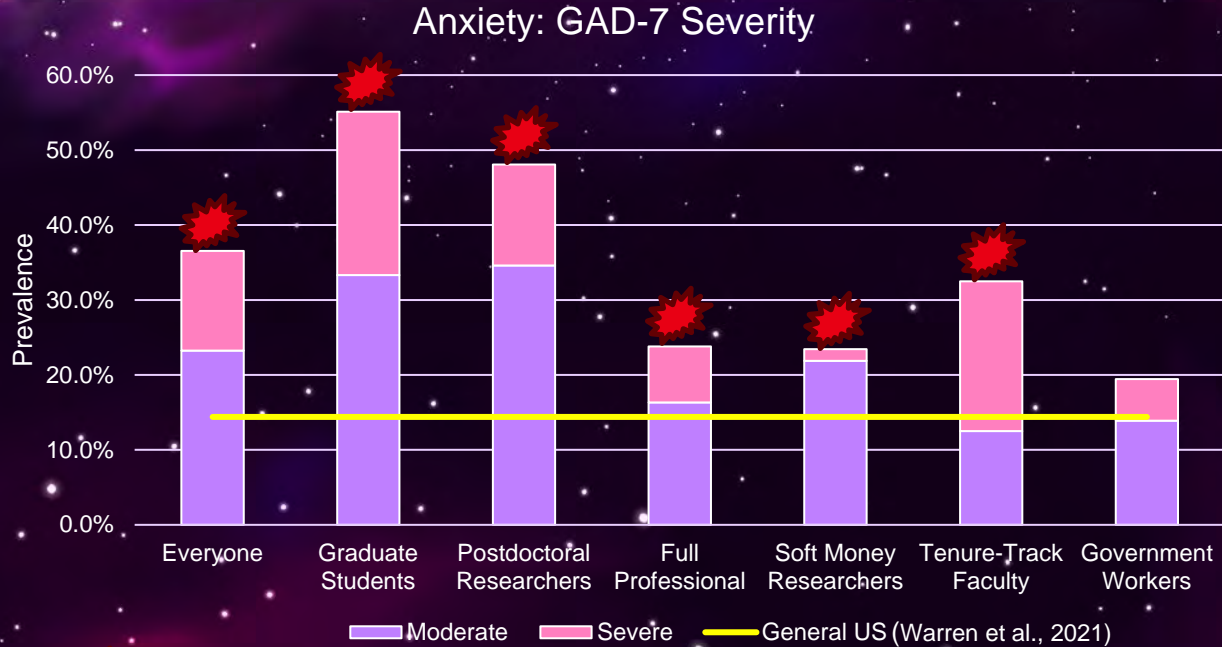


IRB-Approved Mental Health Survey

- September 14, 2022 to November 21, 2022
- 307 total participants
- Survey included demographic questions (e.g., ethnicity, LGBTQ+, gender, career stage)
- Survey demographic has higher proportion of participants that are early career, identify as female, and LGBTQ+ than the overall planetary science community (Porter et al., 2020; Vander Kaaden et al., 2020)



Prevalence of Clinically Significant Anxiety



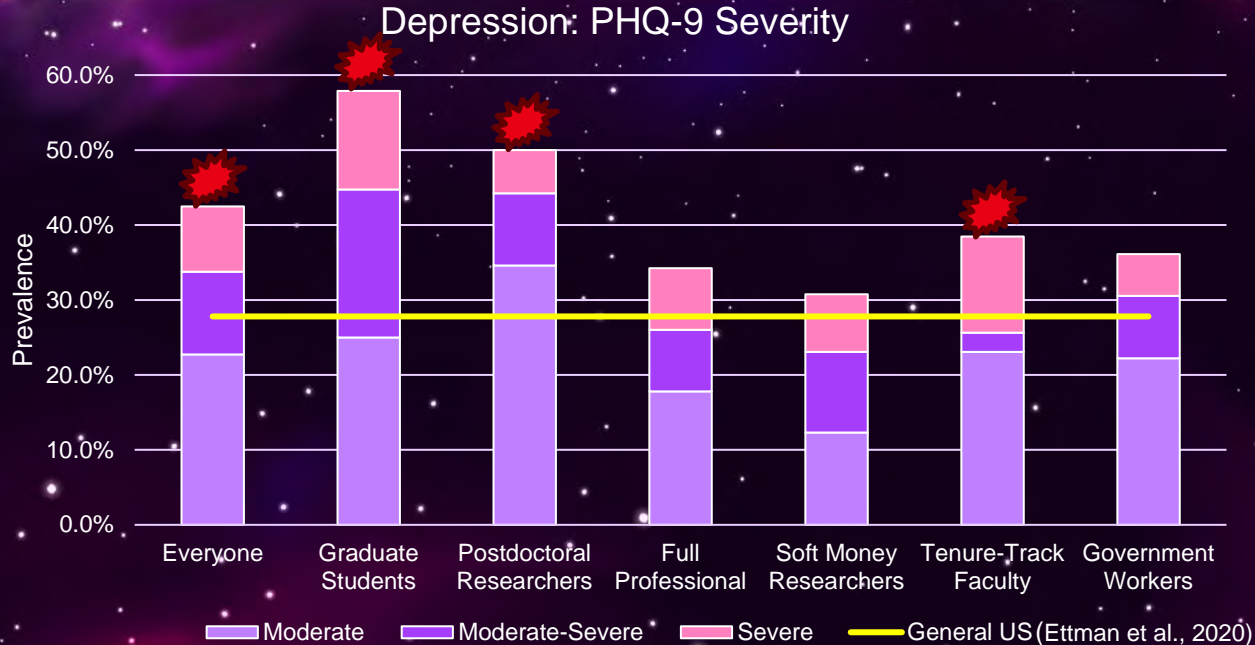
- Moderate and above severity is considered clinically significant
- Compare prevalence of clinically significant anxiety between general US population (during the pandemic) and different career stages.
- Use χ^2 test of independence to look for statistical significance ($\alpha < 0.05$)
- *The prevalence of clinically significant anxiety is greater for all groups except government workers.*

Indicates statistically significant differences between general US population and career stage

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Prevalence of Clinically Significant Depression



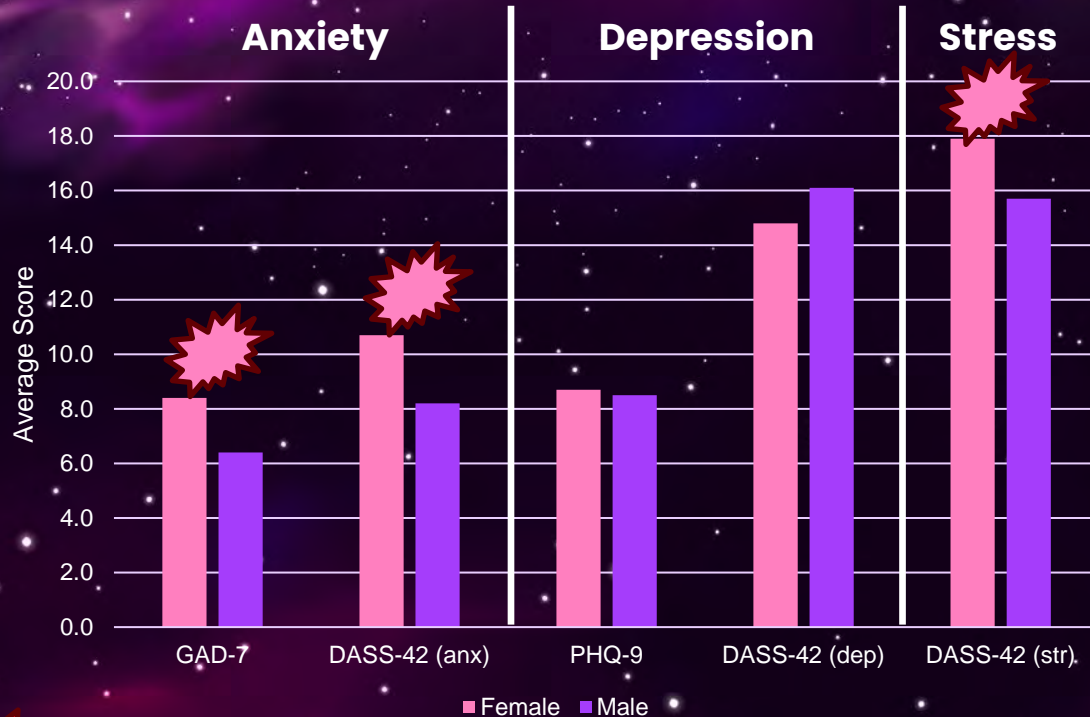
- Compare prevalence of clinically significant depression between general US population (during the pandemic) and different career stages.
- Use χ^2 test of independence to look for statistical significance ($\alpha < 0.05$)
- *The prevalence of clinically significant depression is greater for graduate students, postdocs, tenure-track faculty, and the overall planetary science community.*

Indicates statistically significant differences between general US population and career stage

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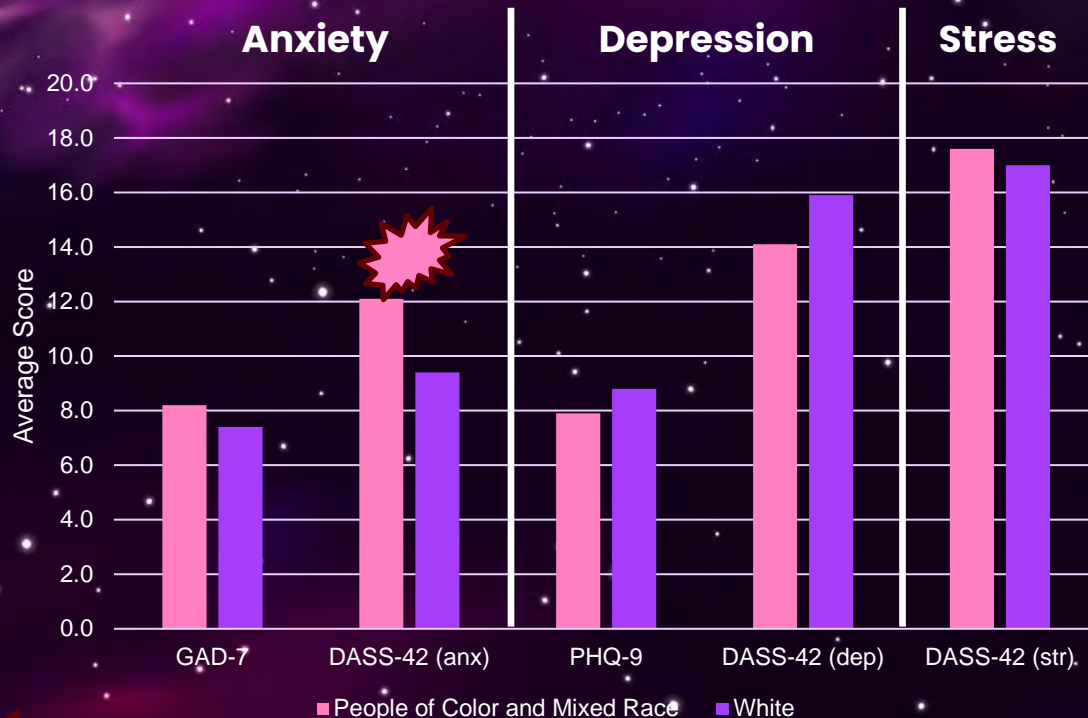
Severity of Anxiety, Depressive, Stress Symptoms: Gender



- Compare anxiety, depression, and stress severity between gender within our samples
- Used a student t-test ($\alpha < 0.05$)
- *Female participants experience greater severity of anxiety and stress than male participants.*
- No statistical difference for depression.

Indicates statistically significant differences between the two groups, color indicates higher for that group
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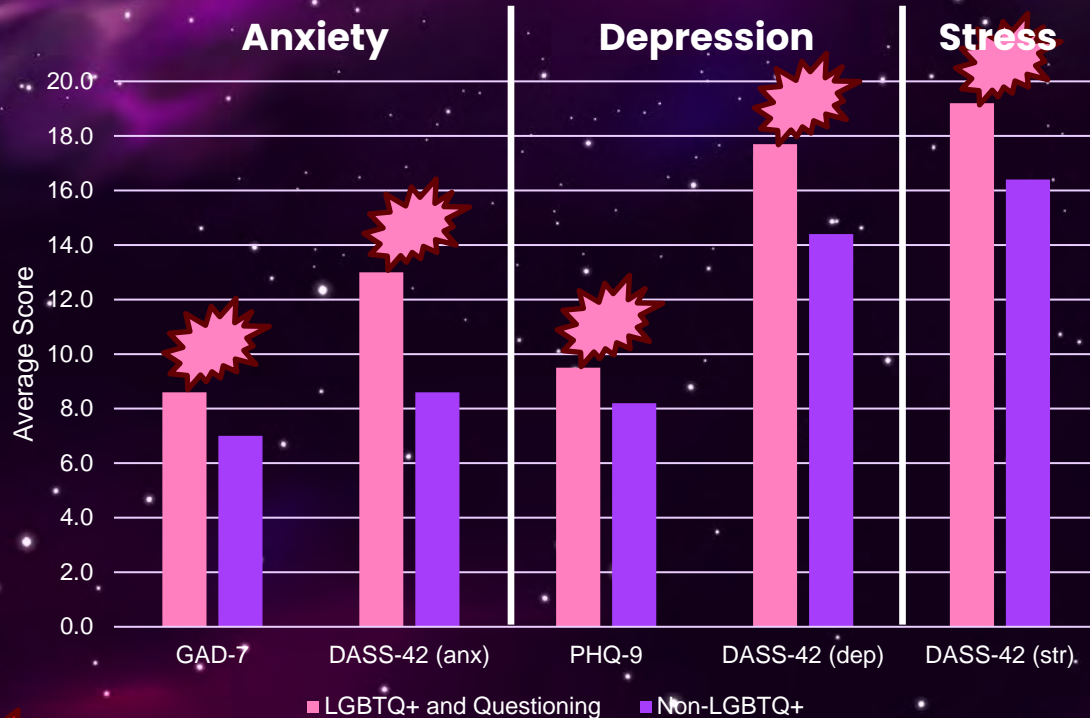
Severity of Anxiety, Depressive, Stress Symptoms: Ethnicity



- Compare anxiety, depression, and stress severity between ethnicity within our samples
- Used a student t-test ($\alpha < 0.05$)
- *People of color and mixed-race participants experience greater severity of anxiety in one measure than male participants.*
- No statistical difference for stress, depression, and one of the anxiety assessments.

Indicates statistically significant differences between the two groups, color indicates higher for that group
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Severity of Anxiety, Depressive, Stress Symptoms: LGBTQ+ Identity

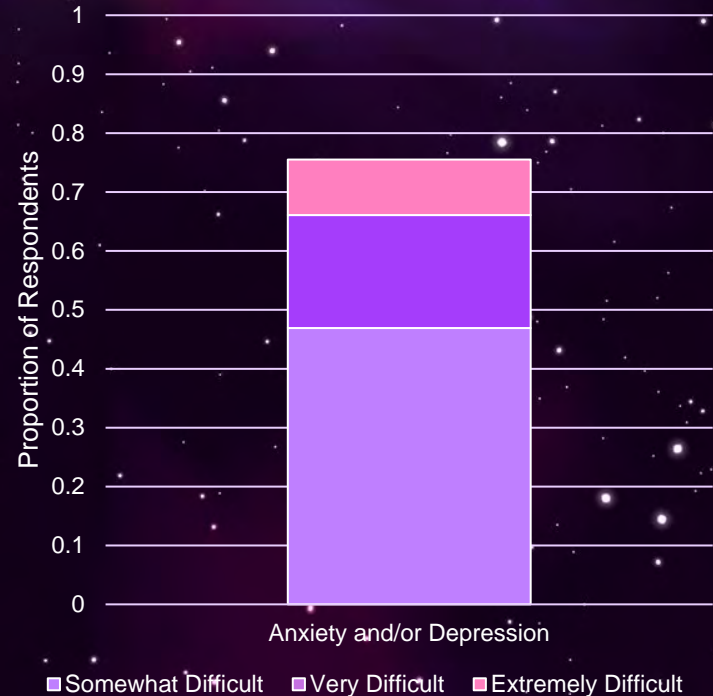


- Compare anxiety, depression, and stress severity between those who identify with LGBTQ+ and those who do not within our samples
- Used a student t-test ($\alpha < 0.05$)
- *Participants who identify with LGBTQ+ experience greater severity of anxiety, depression, and stress.*

Indicates statistically significant differences between the two groups, color indicates higher for that group
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Mental Health Impact on Research

- Work values based reasons to care about mental health:
 - 76% of our respondents said that their *anxiety and depressive symptoms are making it somewhat/very/extremely difficult to attend to their work, home, and/or social lives*
 - Poor mental health degrades research as the mind is distracted or focused on navigating symptoms (*analogy: grieving scientist*)
 - Mind cannot fully commit all mental resources to making the best interpretation or idea due to worry, stress, and/or hopelessness, hurting research quality and productivity (*analogy: limited perspective taking in young children due to developing brain*).
 - Not everyone is affected by mental health concerns, but mental health concerns in the community affects everyone



Summary

- There is a mental health problem in planetary science
- These mental health concerns impact research production and quality



2023 Mental Health Survey Ad

2023 Planetary Science Mental Health Survey

We would like to invite those associated with the planetary science field to participate in our mental health survey of the planetary science community. Mental health is an important issue to the general population and even in the science community. With this awareness, we are surveying our planetary science community to have a better understanding of how it is doing in terms of stress, depression, and anxiety as well as the factors contributing to people's symptoms.

If you decide to participate, please follow the link below. The survey takes about 10-15 minutes and the information generated will be anonymous. We appreciate you giving us your valuable time to be involved in this important matter. If possible, we ask that you send this survey to people within your institution, department, and colleagues who are also a part of the planetary science community so that we can ensure that everyone is included and heard.

<https://forms.gle/sHDmdEPE51uNCsTZ6>

If you have any other questions or concerns, you can contact:

Dr. David Trang at dtrang@hawaii.edu.

We are running an IRB-approved mental health survey again! Please share with colleagues and students!

The Link: <https://forms.gle/sHDmdEPE51uNCsTZ6>

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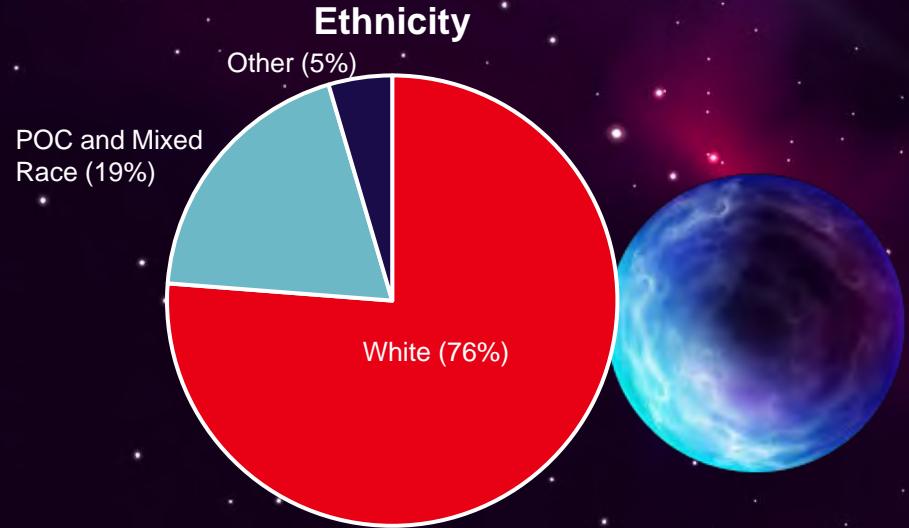
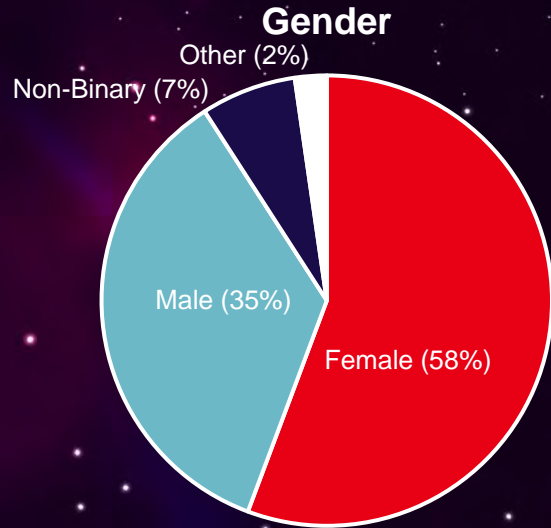
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Extra Slides

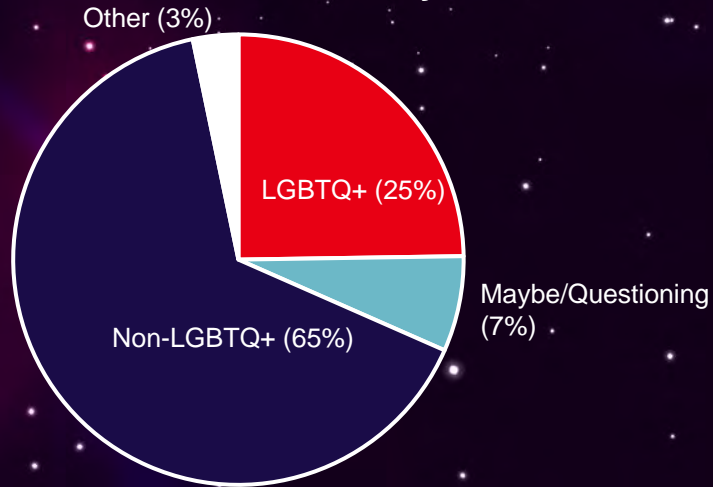


Demographic

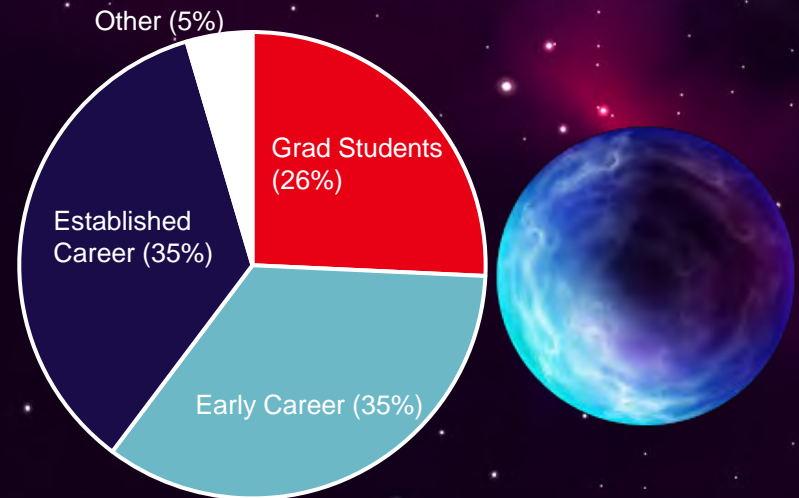


Demographic

Gender/Sexual Identity



Career Experience



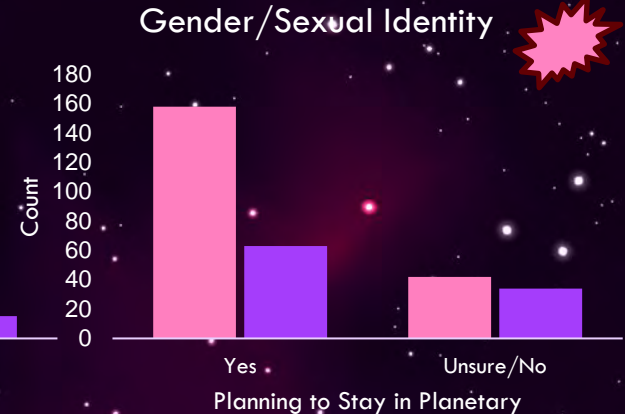
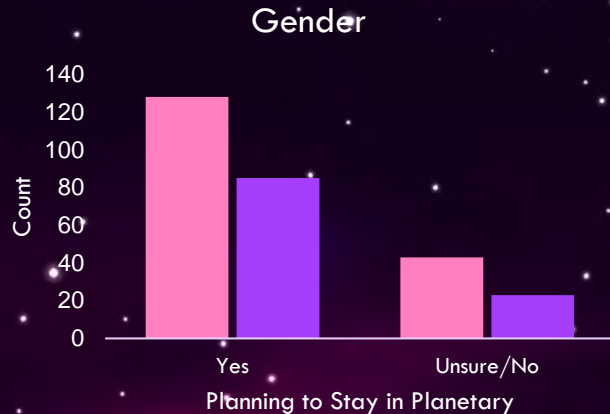
Who is Leaving Planetary Science?

- Comparison between those who plan to stay in planetary science in the next two years and those who are considering or planning to leave.
- Respondents who are considering or planning to leave planetary science show statistically significant greater anxiety, stress, and depression (t-test) than those who plan to stay.
- χ^2 test of independence show that LGBTQ+ respondents have a statistically significant greater likelihood of leaving. No difference is shown for ethnicity and gender.



Who is Leaving Planetary Science?

- Looking at mental health may have exposed other diversity, equity, and inclusion issues
- Institutions focused on diversity, equity, and inclusion need to think about retention, rather than just recruitment of marginalized groups
- Diversity, equity, inclusion is important to research production and quality. Without it, we may be turning away some of our greatest minds



■ Female ■ Male

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■ White ■ People of Color and Mixed Race

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■ non-LGBTQ+ ■ LGBTQ+ and Questioning

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Things to Think About or Just Try

For students/postdocs (lessons learned from the history of children)

- There should be mentor/advisor training before having students.
- Cultural shift: Graduate students are not little senior scientists, focus should be on training, rather increasing production.

For post training career stages

- Improved division of labor (e.g., teaching, mentoring, and research requires different personalities).
- Improved allocation of tasks/work to reinforce people's enjoyment of research.
- Cultural shift: For a scientist to win a competitive opportunity, they need to outperform everyone else. The only way to do this is to spend more hours working, which causes poor work/life balance



Summary

- There is a mental health problem in planetary science
- These mental health concerns impact research production and quality
- Be courageous and try new ideas and adapt new cultural changes
- Planetary science has always been more than exploring what's out there, but who we are and how to better ourselves and humanity

