Let's Talk EDI in Science

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Clancy, K. B. H., K. M. N. Lee, E. M. Rodgers, and C. Richey (2017), Double jeopardy in astronomy and planetary science: Women of color face greater risks of gendered and racial harassment, J. Geophys. Res. Planets , 122, 1610–1623, doi:10.1002/2017JE005256.
http://onlinelibrary.wiley.com/doi/10.1002/2017JE005256/epdf

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Definitions

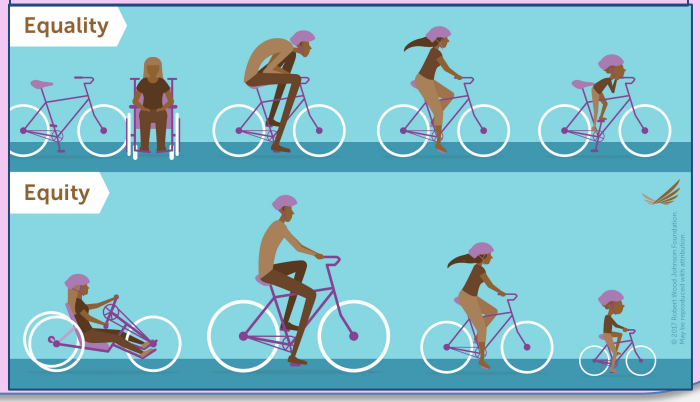
EDI?

- Improving **EQUITY** promotes justice, impartiality and fairness within the procedures, processes and distribution of resources by institutions and systems. Tackling equity issues requires an understanding of the underlying or root causes of outcome disparities within our society.
- **DIVERSITY** refers to a broad representation of a community's demographic mix, taking into account elements of human difference focusing on racial and ethnic groups, sexual orientation, gender, gender identity, disabilities, religion, age and perspectives arising from different backgrounds.
- **INCLUSION** refers to the degree in which diverse individuals are able to participate fully in the decision- making processes within an organization or group. While a truly "inclusive" group is necessarily diverse, a "diverse" group may or may not be "inclusive."

But I thought the E was Equality, not Equity?

*Definitions from: https://www.oregoncf.org/Templates/media/files/edi/edi_booklet_2017.pdf

EQUITY, **DIVERSITY** , and **INCLUSION** are all need to be considered to have healthy workplace climates!



DEMOGRAPHICS

- Collecting demographic information at ALL levels (both broadly and within individual fields and departments) is one way to gather and understand issues with **DIVERSITY**.

Demographics in Planetary Science

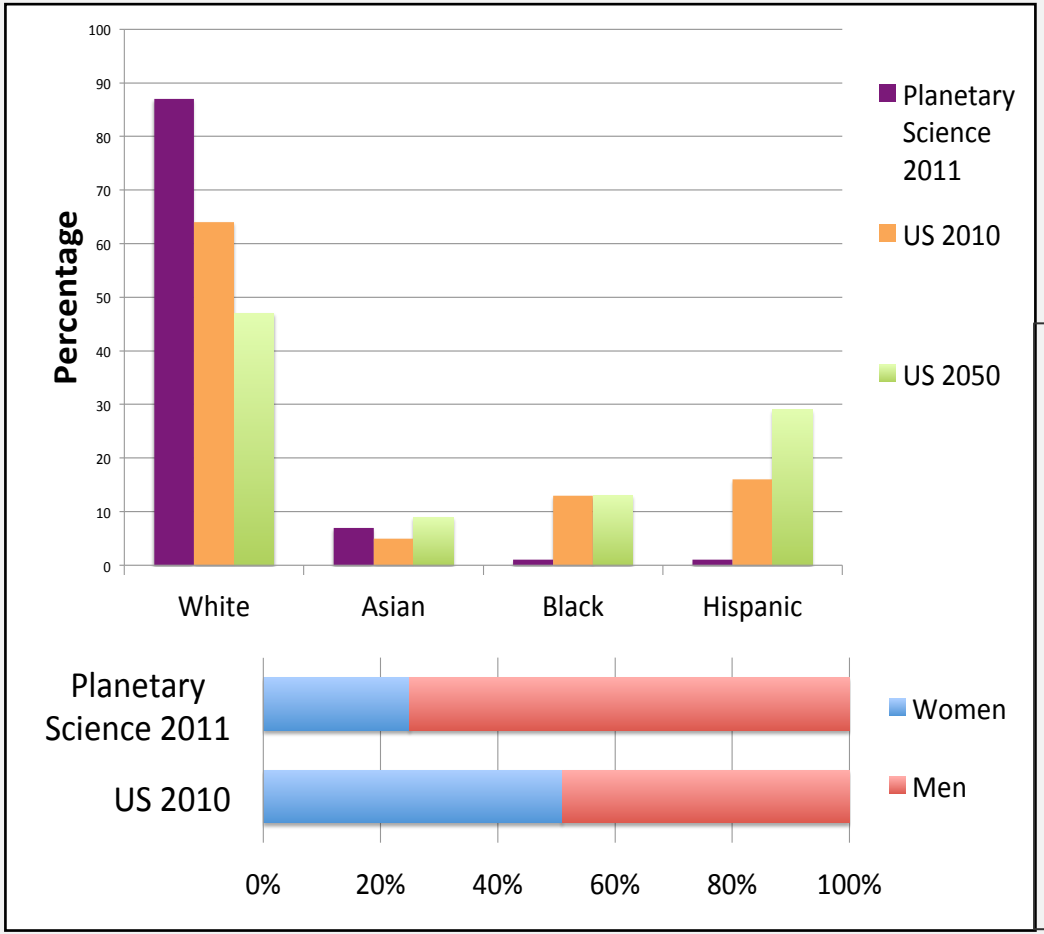


Figure by Rathbun et al. (2017), with input from the 2011 Planetary Science Workforce Survey (White et al. 2011), the 2010 US Census, and the US Population predictions (Passels and Cohn, 2008).

Women on Science Mission Teams (PSD)

Of 301 PI-led mission proposals from 2001-2017, only 30 had female PIs and 87% of those came through PSD solicitation
-Michael New's Diversity & Inclusion presentation to the Astrophysics Advisory Committee on April 12th, 2018

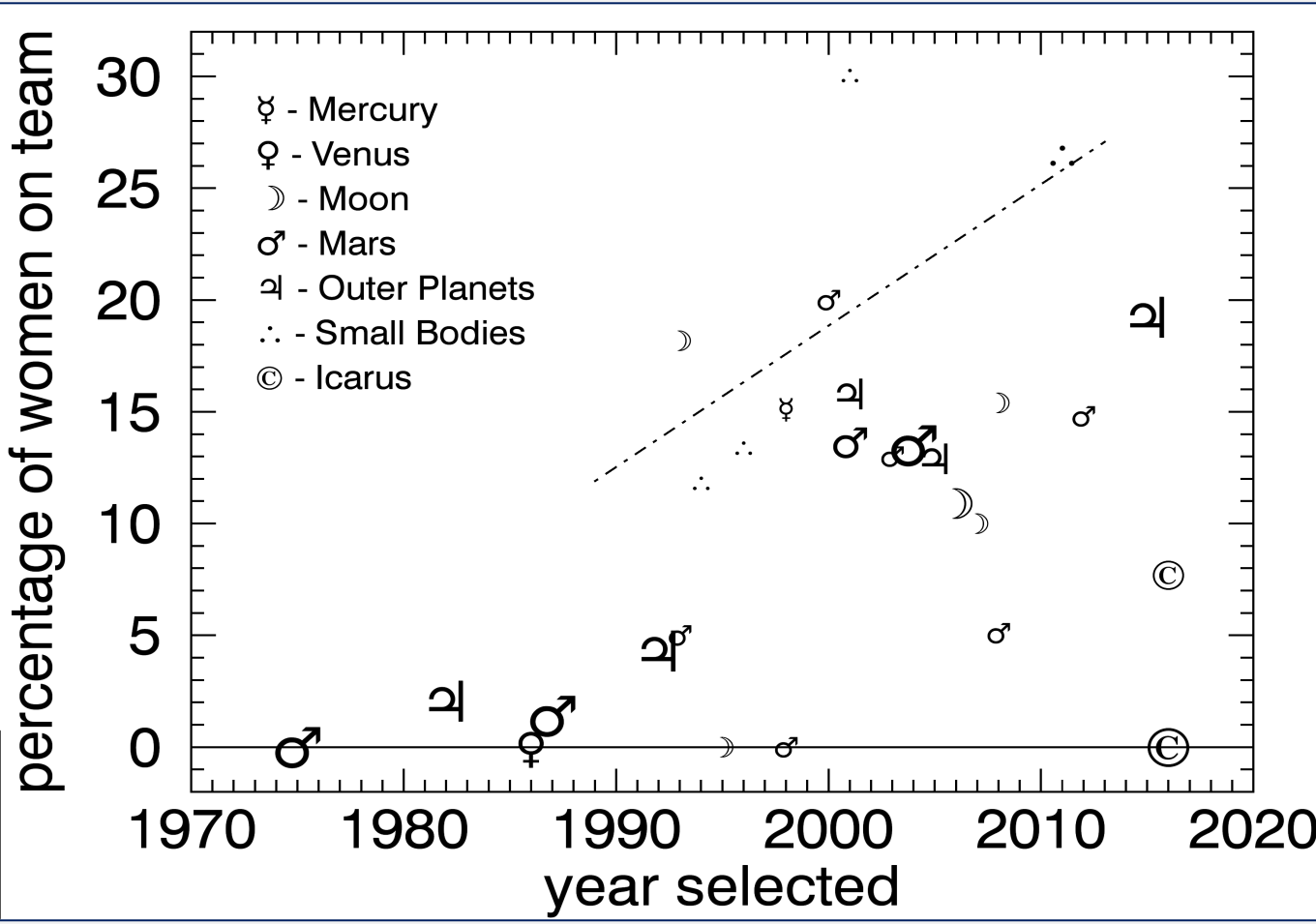


Figure by Rathbun et al. (2017).

Gender Demographics in Academia

In many disciplines, particularly the Physical Sciences, women are at single-digit percentages of full professors, and at or below 20% for assistant professors.

Table 12. Female Professors by Rank and Year at Top 50 Departments

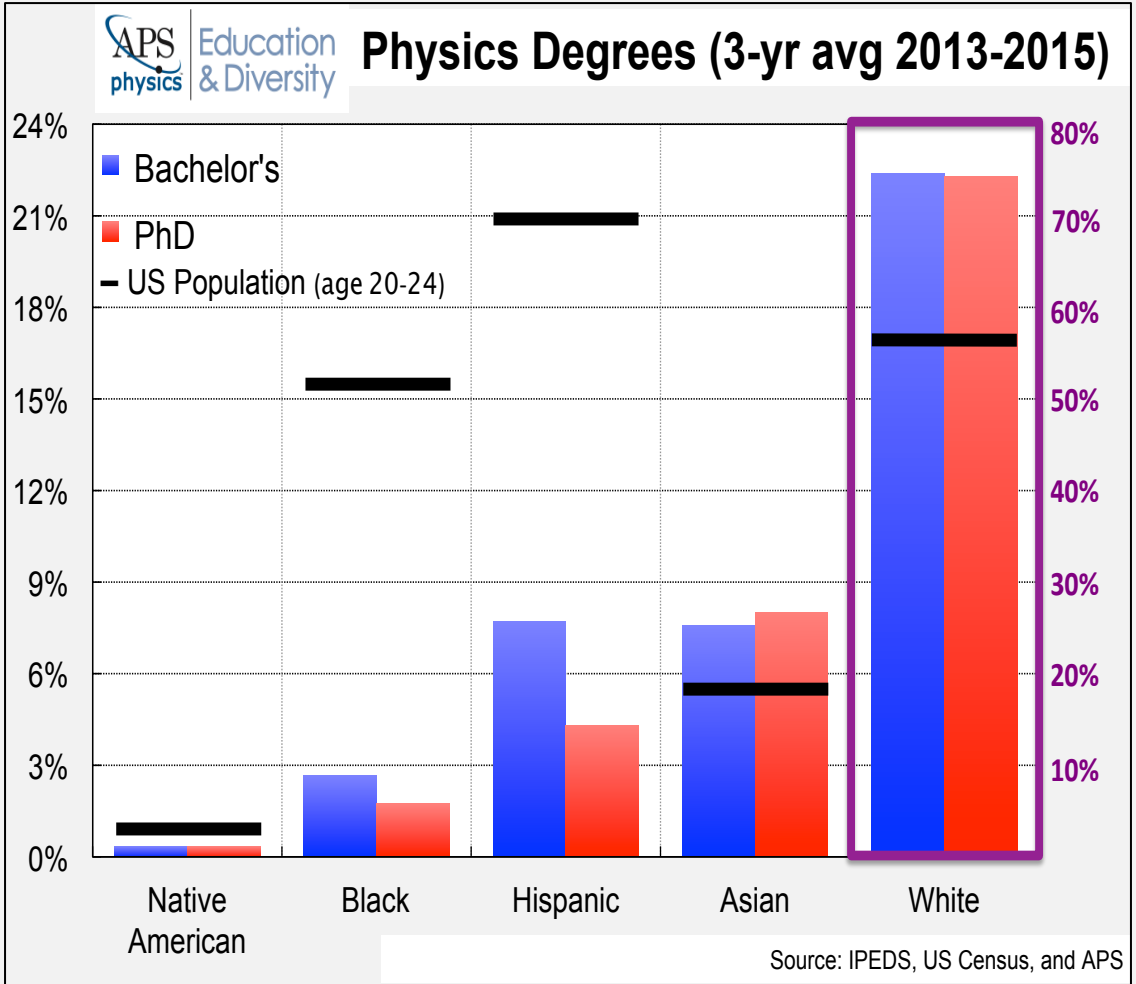
Discipline	FY2002*				FY2007			
	Assistant	Associate	Full	All Ranks	Assistant	Associate	Full	All Ranks
Chemistry	21.5%	20.5%	7.6%	12.1%	21.7%	21.3%	9.7%	13.7%
Math	19.6%	13.2%	4.6%	8.3%	28.0%	15.5%	7.2%	12.1%
Computer Sci	10.8%	14.4%	8.3%	10.6%	19.5%	11.3%	11.5%	13.5%
Electrical Engr	10.9%	9.8%	3.8%	6.5%	14.5%	14.1%	6.2%	9.7%
Mechanical Engr	15.7%	8.9%	3.2%	6.7%	18.2%	12.0%	4.9%	9.0%
Physics	11.2%	9.4%	5.2%	6.6%	17.5%	12.6%	6.8%	9.5%
Civil Engr	22.3%	11.5%	3.5%	9.8%	25.3%	14.3%	7.1%	12.7%
Chemical Engr	21.4%	19.2%	4.4%	10.5%	23.7%	17.8%	8.3%	12.9%
Astronomy**	20.2%	15.7%	9.8%	12.4%	25.3%	21.6%	12.3%	15.8%
Economics	19.0%	16.3%	7.2%	11.5%	30.7%	16.0%	8.5%	15.1%
Political Science	36.5%	28.6%	13.9%	23.5%	35.9%	30.1%	17.4%	25.6%
Sociology	52.3%	42.7%	24.3%	35.8%	57.9%	45.6%	28.0%	39.7%
Psychology	45.4%	40.1%	26.7%	33.5%	44.9%	41.9%	29.9%	36.0%
Biological Sci	30.4%	24.7%	14.7%	20.1%	36.0%	30.9%	17.7%	24.8%
Earth Sciences	not available				28.6%	21.7%	10.6%	16.1%

*Chemistry and astronomy data are for FY2003. **Top 40 departments

Female Profs, Top 50 Depts. [28]

http://faculty-staff.ou.edu/N/Donna.J.Nelson-1/diversity/Faculty_Tables_FY07/07Report.pdf

Racial Demographics: Physics



URM Demographics in Academia

Table 1. URM Professors (Black, Hispanic, Native American) by Rank and Year at the Top 50

Discipline	FY2002*				FY2007			
	Assistant	Associate	Full	All Ranks	Assistant	Associate	Full	All Ranks
Chemistry	2.8%	7.5%	2.3%	3.2%	4.7%	5.4%	3.0%	3.7%
Math	6.0%	4.6%	3.0%	3.6%	2.3%	2.7%	2.2%	2.3%
Computer Science	2.1%	1.7%	1.3%	1.6%	3.1%	2.9%	1.9%	2.5%
Astronomy**	5.5%	4.0%	1.6%	2.5%	3.3%	2.1%	2.0%	2.2%
Physics	5.2%	2.8%	2.0%	2.6%	4.4%	2.2%	2.0%	2.5%
Chemical Eng.	3.4%	8.2%	4.2%	4.9%	7.7%	6.8%	4.7%	5.6%
Civil Eng.	9.3%	4.8%	3.9%	5.4%	10.5%	8.0%	4.4%	6.6%
Electrical Eng.	5.4%	8.2%	2.2%	4.3%	4.3%	4.6%	3.0%	3.6%
Mechanical Eng.	7.0%	5.4%	2.4%	3.9%	8.1%	5.3%	2.8%	4.3%
Economics	6.6%	4.4%	3.4%	4.3%	10.9%	5.7%	3.7%	5.7%
Political Science	8.0%	9.8%	4.5%	6.9%	8.3%	8.3%	5.4%	6.9%
Sociology	14.8%	12.4%	6.6%	10.1%	19.2%	11.1%	10.8%	12.9%
Psychology	12.0%	9.4%	3.1%	6.3%	12.5%	8.0%	4.5%	7.1%
Biological Sciences	5.7%	3.0%	2.1%	3.0%	6.5%	4.4%	2.5%	3.8%
Earth Sciences	not available				5.4%	5.4%	2.0%	3.4%

*Chemistry and astronomy data are for FY2003. **Top 40 departments in FY2007

URM Profs, Top 50 Depts. [28]

http://faculty-staff.ou.edu/N/Donna.J.Nelson-1/diversity/Faculty_Tables_FY07/07Report.pdf

DEMOGRAPHICS

- Collecting demographic information at ALL levels (both broadly and within individual fields and departments) is one way to gather and understand issues with **DIVERSITY**.

Workplace Climate Surveys

- Collecting proper data from workplace climate surveys and using that data to analyze your workplace environment is one way to understand issues with **Inclusion** and **Equity**.

Definitions

Unconscious (Implicit) Bias: the attitudes or stereotypes that affect our understanding, actions, & decisions in an unconscious manner.

This occurs regardless of the dominant group:

- Gender: Both men and woman downplay women's contributions
- Race: Both whites and minorities downplay minorities' contributions

Microaggressions: subtle, indirect, or unintentional acts of discrimination

Conscious (Explicit) Bias: an intentional prejudice in favor of or against one thing, person, or group compared with another usually in a way that's considered to be unfair.

- **Sexism**: a conscious bias: prejudice, stereotyping, or discrimination on the basis of sex.
- **Racism**: a conscious bias: prejudice, stereotyping, or discrimination on the basis of race.

Harassment: unwelcome conduct that is based on **race, color, religion, sex, national origin, age, disability or genetic information**.

What do Biases and Harassment look like in STEM:

- STEM fields are shown to have implicit bias that is impactful (both gender & race based):
  - Opportunities in mentorship [Milkman et al. 2015]
  - Opportunities in the classroom [Eddy et al. 2014; 2015; Grunspan et al. 2016]
  - Workplace conflict & stereotype issues [Williams et al. 2014; 2016; Rios & Stewart, 2015]
- WOC Science faculty have decreased, even as white women faculty have increased [Armstrong & Javanovic, 2015]
- WOC are more likely to be junior in rank [NSF, 2015]
- In physics, women (and WOC specifically) are isolated & experience microaggressions in workplace [Barthelemy et al., 2015a; 2015b]
- White women and POC are underrepresented in physical sciences to a far greater degree than the biological or social sciences [NSF, 0215]
- Women and POC experience more workplace incivilities [Cortina et al., 2013; Kabat-Farr & Cortina, 2012; Clancy et al. 2017]

These biases have names:

- **Matthew Effect in STEM**: most famous name gets all the work attributed to them. Lower status scientists are overlooked & their work attributed to their higher status colleagues. (Merton, 1968, w/ credit to the work of Harriet Zuckermann)
- **Matilda Effect in STEM:** Women in collaborations with men- whether married or unmarried- typically receive less credit & men profit more from their discoveries (Rossitier, 1993)

From 2017 Winter OPAG, Janet Vertesi:
http://www.lpi.usra.edu/opag/meetings/feb2017/presentations/Vertesi.pdf

- Major scandals within STEM, and in particular, the astronomical, astrophysical, astro-educational, and geophysical fields, have put STEM fields into discussions with major media outlets & congressional officials.

The CSWA Survey on Workplace Climate

Kathryn B. H. Clancy[2], Katharine M. N. Lee[2],
Erica M. Rodgers[3], & Christina R. Richey[1]

1. The AAS Committee of the Status of Women in Astronomy (CSWA), christina.richey.2@gmail.com.
2. University of Illinois, Urbana-Champaign, IRB approval (#15354, University of Illinois)
3. Space Science Institute, Boulder, Colorado

With Gracious Support from the American Astronomical Society!

Clancy, K. B. H., K. M. N. Lee, E. M. Rodgers, and C. Richey (2017), Double jeopardy in astronomy and planetary science: Women of color face greater risks of gendered and racial harassment, J. Geophys. Res. Planets , 122, 1610–1623, doi:10.1002/2017JE005256.
http://onlinelibrary.wiley.com/doi/10.1002/2017JE005256/epdf

Survey Construction and Recruitment

lgbt+physicists

Adapted survey questions regarding workplace climate

39 questions Administered via Survey Monkey website January – March 2015

Recruitment

Women in Astronomy Blog
Featured at 225th AAS Meeting
AAS Division of Planetary Sciences
The Planetary Exploration Newsletter
The AAS Women Newsletter
Multiple Facebook groups (in community)
Several academic departments

Over 400 astronomers and planetary scientists responded

Results: 2017 Paper (W0C)

Regarding current position

Negative Language Heard

88% heard from peers
51.9% heard from supervisors
88% from others

Responses to Harassment

39% report verbal harassment
9% report physical harassment

Safety

27% have felt unsafe

11% have skipped at least one professional event because felt unsafe

Statistically significant associations

- hearing negative comments from peers and supervisors
- experiencing verbal and physical harassment
- feeling unsafe

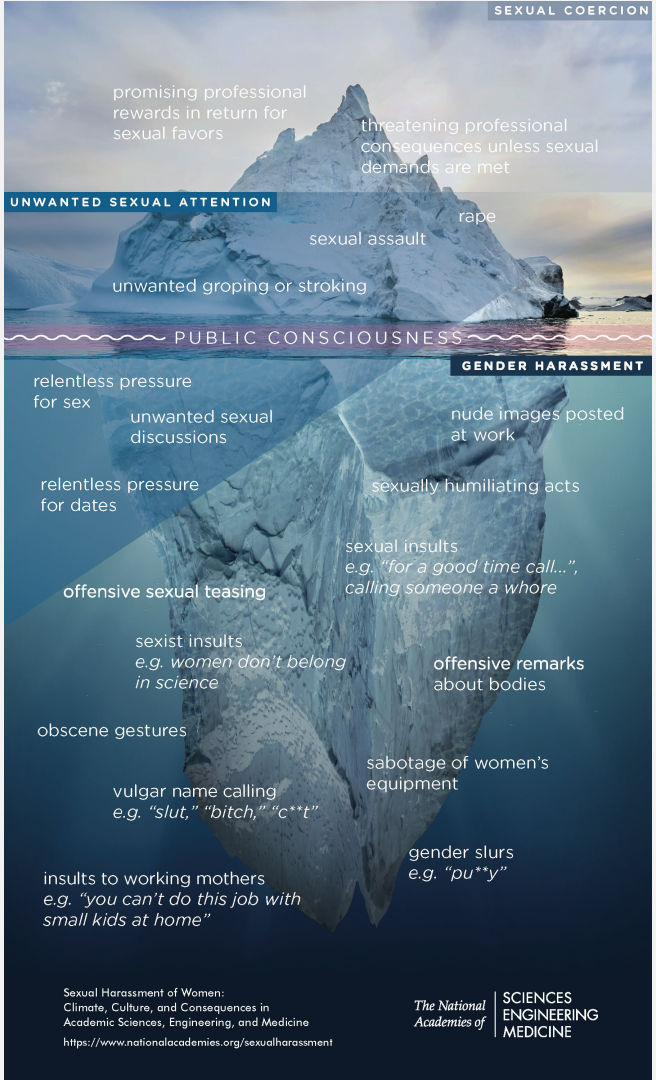
Career Consequences to Climate

Women of Color face harassment in intersectional ways:

- 40% of women of color & 27% of white women in sample have felt unsafe due to gender.
- 28% of women of color have felt unsafe due to race

Loss of professional opportunities for women generally and men and women of color

- Negative climate keeps numbers low especially for women of color
  - increases the risk of stereotype threat [Steele, 1997; Steele and Aronson, 1998]
  - underestimation of performance [Keller and Dauenheimer, 2003; Nielsen, 2015; Shapiro and Williams, 2012]
  - lack of critical mass in job searches [Valian, 1998]

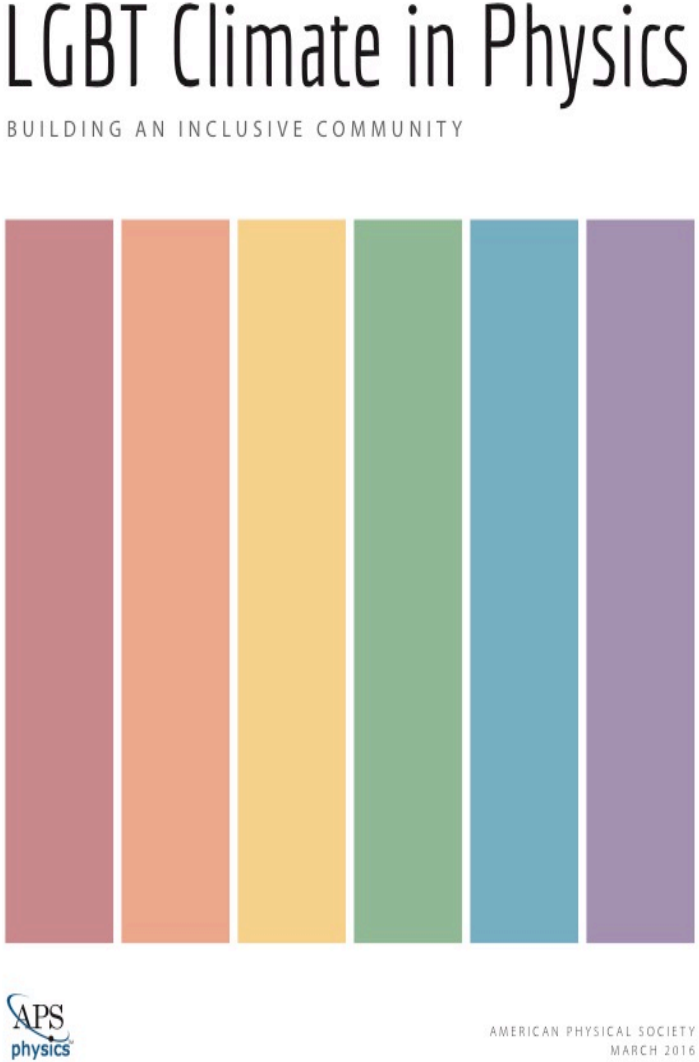


NASEM Report on Sexual Harassment (2018):

http://sites.nationalacademies.org/shstudy/index.htm

Findings:

- ~50% of women faculty and staff in academia experience sexual harassment.
- Between 20-50% of students in science, engineering, and medicine experience sexual harassment from faculty or staff.
- The cumulative effect of sexual harassment is significant damage to research integrity and a costly loss of talent in academic sciences, engineering, and medicine.
- The 2 characteristics most associated with higher rates of sexual harassment are (a) male-dominated gender ratios and leadership and (b) an organizational climate that communicates tolerance of sexual harassment
- **Organizational climate is, by far, the greatest predictor of the occurrence of sexual harassment, and ameliorating it can prevent people from sexually harassing others.**

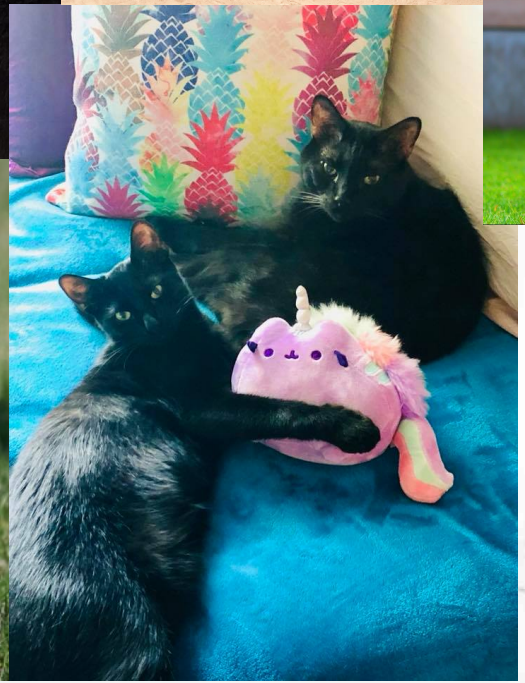


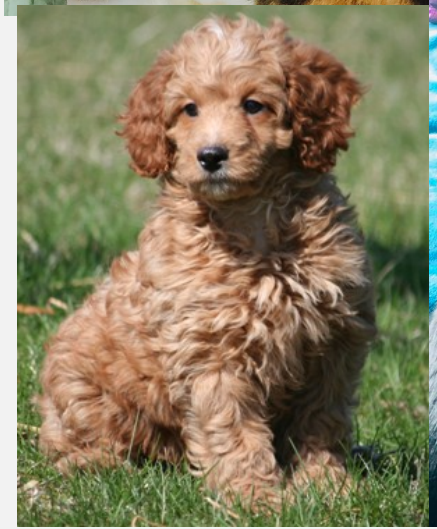
APS Report LGBT Climate in Physics (2016):

https://www.aps.org/programs/lgbt/upload/LGBTClimateInPhysicsReport.pdf

Findings:

- LGBT physicists have faced uneven protection & support from legislation and policies.
- The overall climate experienced by LGBT physicists was highly variable.
- In many physics environments, social norms established expectations of closeted behavior.
- Isolation was a common theme for many LGBT physicists.
- A significant fraction of LGBT physicists have experienced or observed exclusionary behavior.
- **LGBT physicists with additional marginalized identities faced greater level of discrimination.**
- **Transgender and gender-nonconforming physicists encountered the most hostile environments.**
- Many LGBT physicists were at risk for leaving their workplace or school.
- LGBT physicists reported trouble identifying allies to help mitigate isolation, exclusion, or marginalization.





There has been sooooo much positive change, AND we continue to push forward!

- Rolling Stone article on The Women of NASA's Mission to Mars: https://www.rollingstone.com/culture/culture-news/nasa-insight-mission-mars-799914/
- What does a scientist look like?: https://www.sciencemag.org/news/2018/03/what-does-scientist-look-children-are-drawing-women-more-ever
- Boundless Brilliance: empowering young girls to love STEM: https://www.boundlessbrilliance.org

Workplace Climate Surveys

- Collecting proper data from workplace climate surveys and using that data to analyze your workplace environment is one way to understand issues with **Inclusion** and **Equity**.

KEY NEXT STEPS:

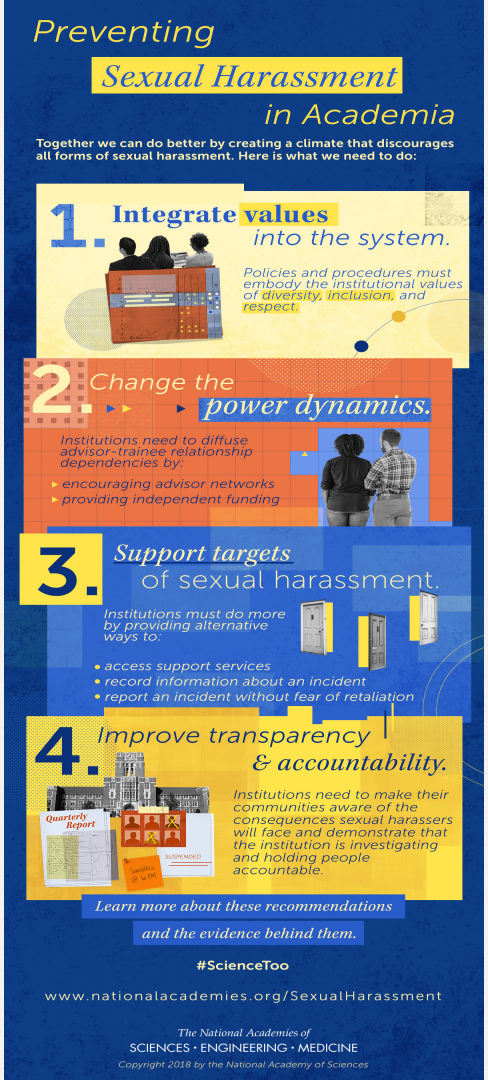
- Create recommendations, followed by policies, that actually impact **EDI** for the better.

CSWA Survey on Workplace Climate: Solutions

1. Education on appropriate workplace behavior required for all employees [Clancy et al., 2014; Cortina et al., 2013]
2. Diversity and cultural awareness training necessary to raise awareness and understanding of the problems faced by women of color and other underrepresented groups [Norman et al., 2013]
3. Leaders need to model inclusive behavior and define inclusive culture [Clancy et al., 2014; Cortina et al., 2013 Settles et al., 2006]
4. When abuses are reported, "instigators should be swiftly, justly, and consistently sanctioned" [Cortina et al., 2013, p. 1600]

Initiatives to increase numbers of women of color [Norman et al., 2013]

- Build cohorts of women of color to enable creation of peer networks
- Encourage fair hiring practices to minimize implicit bias
- Incentivize departments who support women of color



NASEM Report on Sexual Harassment:

http://sites.nationalacademies.org/shstudy/index.htm

Recommendations:

- Leaders in academic institutions and research and training sites **must pay increased attention to and enact policies** that cover gender harassment as a means of addressing the most common form of sexual harassment and of preventing other types of sexually harassing behavior.
- **Move beyond legal compliance to address culture and climate.** Academic institutions, research and training sites, and federal agencies should move beyond interventions or policies that represent basic legal compliance and that rely solely on formal reports made by targets.
- Professional societies should accelerate their efforts to be viewed as organizations that are helping to create culture changes that reduce or prevent the occurrence of sexual harassment.

Recommendations for Institutions:

- Create diverse, inclusive, and respectful environments
- Diffuse the hierarchical and dependent relationship between trainees and faculty
- **Provide support for targets**
- **Improve transparency and accountability**
- Strive for strong and diverse leadership
- Make the entire academic community responsible for reducing and preventing sexual harassment

APS Report LGBT Climate in Physics (2016):

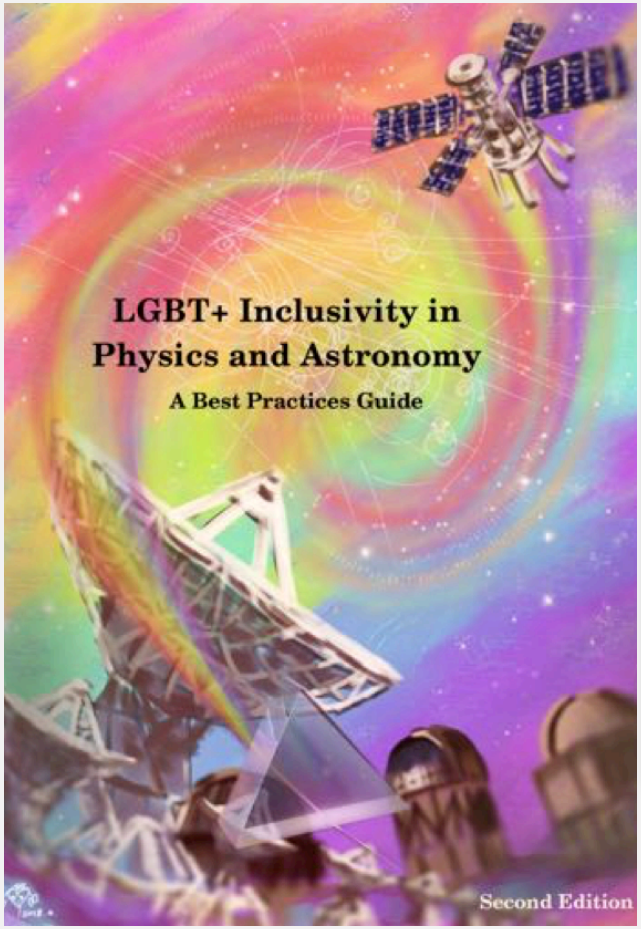
https://www.aps.org/programs/lgbt/upload/LGBTClimateInPhysicsReport.pdf

Recommendations:

- **Ensure a safe and welcoming environment** at meetings.
  - **Establish written best practices**
  - **Implement Code of Conduct**
- Address the need to systematically accommodate name changes in publication records.
- Develop advocacy efforts that support LGBT equity and inclusion
- Promote LGBT-inclusive practices in academia, national labs, and industry.
  - Disseminate Best Practice Guide developed by LGBT+ physicists
  - Develop training program on inclusive workplace and mentorship practices
  - Utilize Climate Site Visit Programs.
- Implement LGBT-inclusive mentoring programs.
  - Includes creating a professional network of LGBT mentors and mentees and hosting networking events.
- Support the establishment of a Forum on Diversity and Inclusion.

LGBT+ Inclusivity in Physics & Astronomy Best Practices Guide (2nd ed, 2018):

https://sgma.aas.org/sites/sgma.aas.org/files/LGBTInclusivityPhysicsAstronomy-BestPracticesGuide2ndEdn_small.pdf



Recommendations:

- **Assess and address**: participate in or conduct a climate survey, collecting demographic information, carrying out classroom climate assessments. Establish a departmental climate committee and/or liaison and explicit LGBT+ supportive policies.
- **Break the silence and invisibility**: Initiate department-wide discussions of LGBT+ concerns, highlight the scientific contributions of LGBT+ department members at all levels, join an "Out List" as an ally or LGBT+ scientist, identify LGBT+ supportive mentors, invite LGBT+ speakers to campus.
- **Educate and advocate**: Participate in LGBT+ friendly climate and anti-bias training, work for campus-wide LGBT+ supportive practices such as supportive first responders and gender-inclusive restrooms and accompanying signage.
- **Set the example and expectations**: include preferred pronouns in your email signature, invite students and/or meeting participants to share their preferred pronouns, articulate classroom environment expectations on the first day of class, speak up in response to discriminatory behavior and report where appropriate.
- **Support and include**: Plan gender-neutral and inclusive social events, create LGBT+ safe spaces in your department, provide equal restroom access, include LGBT+ faculty in positions of authority, provide support for participation in LGBT+ networking events, ensure LGBT+ needs are considered in dual-career hires, family-friendly policies, and benefits.

Tips to do better:

Recognize that Team Diversity is valuable!

- Intellectual cross-fertilization is an important source of novel ideas (Burt, 2004; Stark & Verdes 2011)
- Diversity fosters better solutions to problems (Hoffman, 1958; Hoffman and Maier, 1961; Watson et al. 1993; MacLeod et al 2013)
- Diversity combats group-think (Vaughan, 1997)
- Ability to reach new groups for outreach & support (Wright et al. 1995)
- Reduces risk & adds robustness to a population (Neff 2012)

Proportionality matters!

From 2017 Winter OPAG, Janet Vertesi:
http://www.lpi.usra.edu/opag/meetings/feb2017/presentations/Vertesi.pdf

Proportionality Matters

Uniform Group: Minority <15%: minorities behave like majority; no diversity impacts

Skewed Group: 15-30%: Tokenism occurs

Tokenism: the practice of making only symbolic effort to do a particular thing.

-'She only got the fellowship because she is a WOC.'

Tilted groups: 30-50%: group gains some benefits of diversity, but backlash can occur

Balanced groups: 50-50: traditional minorities contribute equally & at ease

30% rule: aim to have minorities make up AT LEAST 30% at each rung of organization.

From 2017 Winter OPAG, Janet Vertesi:
http://www.lpi.usra.edu/opag/meetings/feb2017/presentations/Vertesi.pdf

Tips to do better

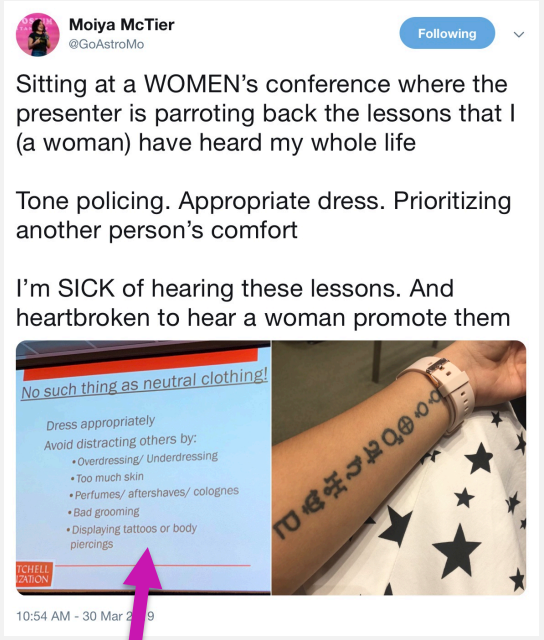
- **Collect demographic information & use it to build policies**
- Diversify your network & institution
  - Aim for 30% across all levels (proportionality matters!)
  - Make sure your department/institution seminars, committees, panels, etc. have a good diversity balance (race, gender, etc.)
  - Don't reinforce stereotypes when diversifying
- Amplify minority voices in the room during discussions
- Foster and draw on mentorship roles & responsibilities
- Work with experts in the fields in demographic data collecting and social scientists who study workplace climates
- Make sure you're aware of unconscious/implicit bias: https://implicit.harvard.edu/implicit/
- Discuss how Implicit Bias affects your daily work efforts:
  - Resumes, Job credentials, Fellowships, Hiring, Awards, Promotions, Proposal Reviews

Remember to account for ALL the components of EDI when building policies: Equity, Diversity, and Inclusion!

Tips to do better

- Avoid making sexual remarks when in the work environment
  - Also avoid trying to make sexual advancements at folks beneath you in the power dynamic.
- Offer and Take Bystander Intervention Training!
  - http://stepupprogram.org
- **LEAN IN TO YOUR DISCOMFORT**
  - Learn about benevolent sexism, mansplaining, & tone arguments & avoid these behaviors
    - It's **NOT** the job of marginalized community members to teach you these things. Instead, try google, twitter, social science literature, talks like this, etc.
  - Know when to listen
  - Don't belittle or dismiss someone
  - **Avoid victim blaming**
- **Don't expect a cookie when you do all of these things**

- For those who have been an ally for a long time, or you are someone who has dealt personally with being harassed or assaulted, it's okay to take breaks. Remember Self Care. Avoid Burnout.
  http://www.compassionfatigue.org/pages/selftest.html



Call out tone policing and unnecessary dress codes!

Combatting Negativity

Combatting Negative Thoughts Within Yourself:

- Talk about the issue with someone you trust
- Ask your friends what they think of you
- Use your own words to influence how you think
- Build alliances
- Own your accomplishments
- Re-orient yourself around your VALUES

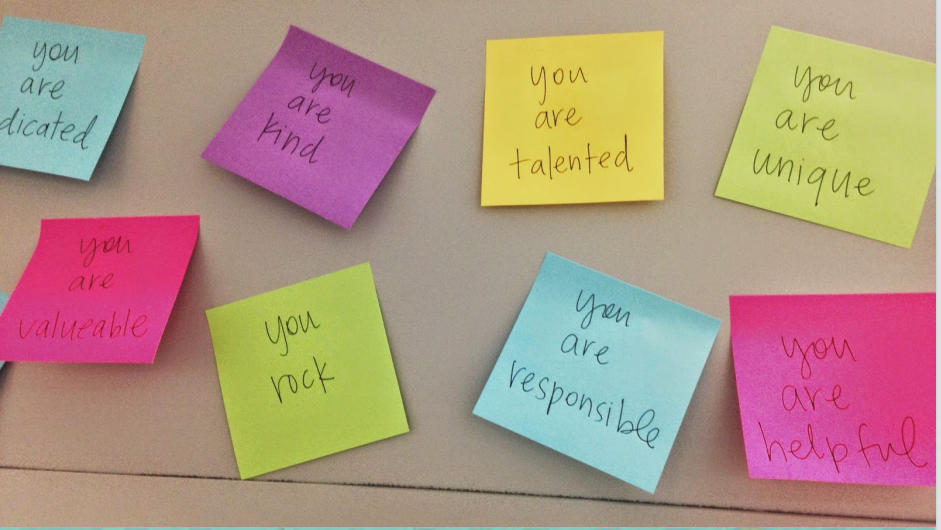
Combatting Negative Thoughts Within Others:

- Encourage people
- Discourage hostility and bickering
- As a leader, show your own uncertainties & demonstrate your own learning process
- Reward and encourage people in your group for mentoring others
- Don’t make it personal when someone’s work needs improvement.

Values Exercise

Courtesy of SMARTORG

Exercise adapted from:
http://adainitiative.org



Questions for everyone:

What should the values of your institution be?

How can you ensure those values are followed within the practices and policies of yours and other organizations?

Additional Resources

DPS Professional Culture and Climate Subcommittee:
https://dps.aas.org/leadership/climate
Women in Planetary Science's Blog: http://womeninplanetaryscience.wordpress.com/blogroll/

Committee on the Status of Women in Astronomy page:
https://cswa.aas.org
Committee on the Status of Women in Astronomy Unofficial Blog:
http://womeninastronomy.blogspot.com
Committee on the Status of Minorities in Astronomy page:
https://csma.aas.org
Committee on the Status of Minorities in Astronomy Unofficial Blog:
http://astronomyincolor.blogspot.com
Working Group on Accessibility and Disability (WGAD) page:
https://wgad.aas.org
Sexual-Orientation and Gender Minorities in Astronomy (SGMA) page:
https://sgma.aas.org
NASEM Report on Sexual Harassment in Academia:
http://sites.nationalacademies.org/shstudy/index.htm
LGBT+ Inclusivity in Physics in Astronomy Best Practices Guide:
https://sgma.aas.org/sites/sgma.aas.org/files/LGBTInclusivityPhysicsAstronomy-BestPracticesGuide2ndEdn_small.pdf
Rape, Abuse and Incest National Network page on Sexual Harassment:
https://rainn.org/get-information/types-of-sexual-assault/sexual-harassment

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Be the change

Values

- Accomplishment
- Accountability
- Achievement
- Action
- Activism
- Adventure
- Affection
- Ambition
- Autonomy
- Challenge
- Close relationships
- Commitment
- Community
- Compassion
- Competence
- Competition
- Confidence
- Conformity
- Control
- Coolness under fire
- Cooperation
- Courage
- Creativity
- Credibility
- Decisiveness
- Desires
- Economic security
- Effectiveness
- Efficiency
- Enthusiasm
- Environmentalism
- Excellence
- Excitement
- Fairness
- Faith
- Fame
- Family
- Foresight
- Free time
- Freedom
- Friendships
- Growth
- Happiness
- Health
- Helping other people
- Helping society
- Honesty
- Hospitality
- Independence
- Influence
- Inner harmony
- Insight
- Inspiration
- Integrity
- Intellectual status
- Introspection
- Justice
- Knowledge
- Leadership
- Location
- Love
- Loyalty
- Meaningful work
- Mentorship
- Merit
- Money
- Movement
- Music
- Nature
- Openness
- Order
- Patriotism
- Peace
- Persistence
- Personal development
- Physical challenge
- Pleasure
- Power and authority
- Privacy
- Public service
- Purity
- Quality
- Recognition
- Reputation
- Responsibility
- Romance
- Security
- Self-knowledge
- Self-reliance
- Self-respect
- Serenity
- Sophistication
- Spirituality
- Stability
- Status
- Tenacity
- Tranquility
- Truth
- Vibrancy
- Volunteering
- Wealth
- Will-power
- Wisdom

[add any that are missing]

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