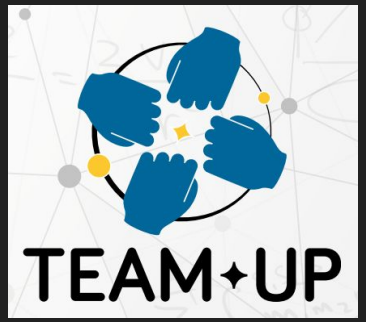


THE TIME IS NOW

Systemic Changes to Increase African Americans with Bachelor's Degrees in Physics and Astronomy

Diversity Journal Club, 8/27/20

American Institute of Physics

AIP provides the means for its 10 member societies to pool, coordinate, and leverage their diverse expertise and contributions in the pursuit of the shared goal of advancing the physical sciences in the research enterprise, in the economy, in education, and in society. AIP also acts as an independent institute where research in social science, policy, and history advances the discipline of the physical sciences.

The charge for this study was provided by the Liaison Committee on Underrepresented Minorities of the AIP. This report not only lays out the case for change, but also incorporates important research that points to the roles that the physics community needs to play at every level. It calls for actions at every level and for a specific timeline and targets.

Acoustical Society of America

American Association of Physicists in Medicine

American Association of Physics Teachers

American Astronomical Society

American Crystallographic Association

American Meteorological Society

American Physical Society

AVS: Science & Technology of Materials, Interfaces, and Processing

The Optical Society

The Society of Rheology

Summary and Goal

The persistent underrepresentation of African Americans in physics and astronomy is due to (1) the lack of a supportive environment, and (2) the enormous financial challenges facing them and the programs that have consistently demonstrated the best practices in supporting their success.

Goal: at least double the number of bachelor’s degrees in physics and astronomy awarded to African Americans by 2030 by transforming the norms, values, and culture of physics and astronomy.

Work Together

This is not something that one person can do on their own. We all need to work together to systematically increase the number of African American students earning bachelor’s degrees in physics and astronomy.

An “Unusual” Report

- Researched and written by a team of physicists, astronomers, and social scientists, collectively called TEAM-UP
- Full of quotes from students and discusses concepts like belongingness and change management, in addition to numerical data
- Emphasizes changing how we think, rather than changing the processes and outcomes

The Contents

1. Supporting Student Success
2. A Call to Action
3. Appendices - data, methodology, rubrics and resource guides

Gathering Data

- National survey of all physics undergraduate students
- Survey of a cross-section of physics departments
- Interviews with African American students conducted at the 2018 National Society of Black Physicists conference
- Site visits to five high-performing physics departments
- Research literature review
- Input from several hundred individuals to guide the work

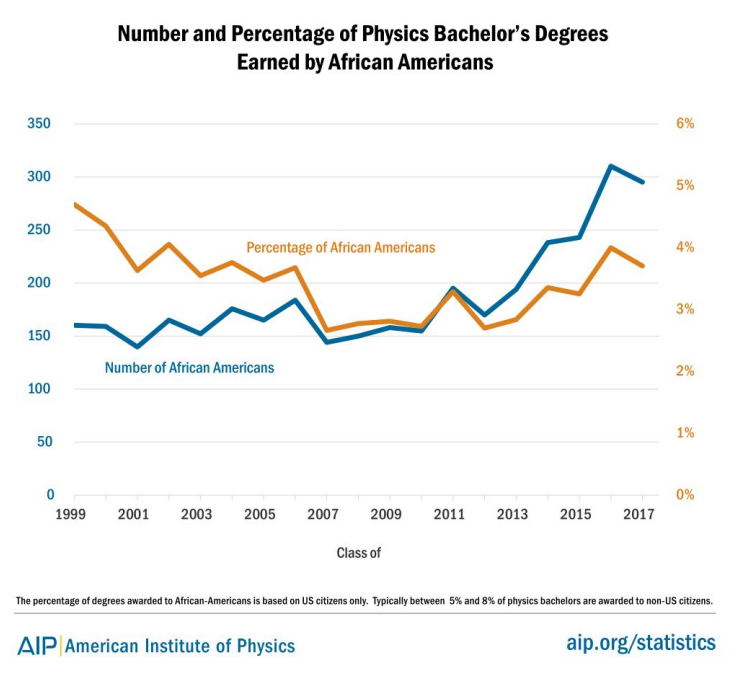
Five Factors for Success or Failure

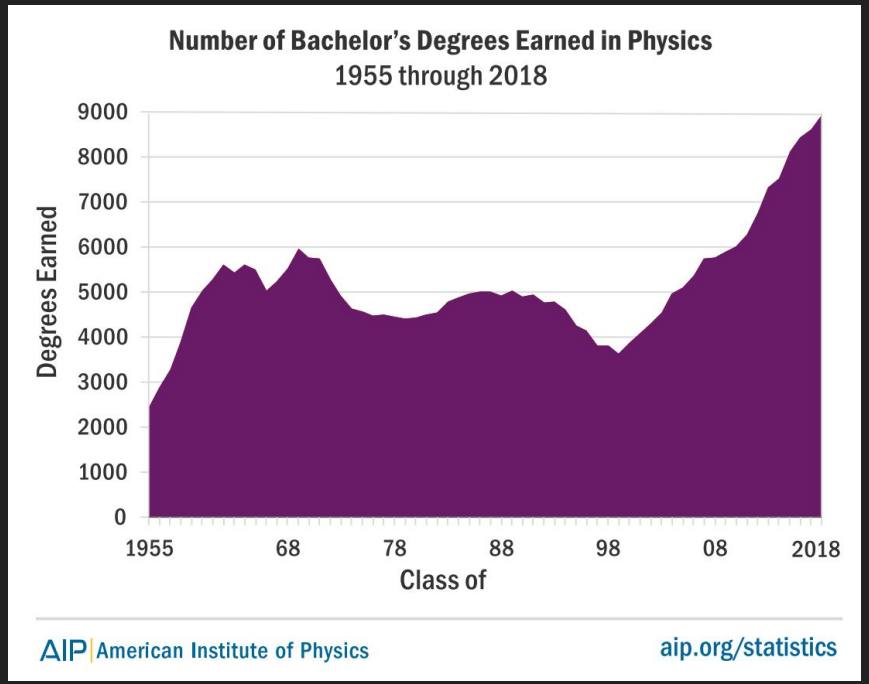
1. Belonging
2. Physics Identity
3. Academic Support
4. Personal Support
5. Leadership

6. Change Management

This report focuses specifically on African American participation for several reasons.
First, while there is widespread acknowledgement that physics and astronomy must improve diversity, equity, and inclusion overall, the number and percentage of bachelor's degrees awarded to African Americans in these fields has been appallingly low, dropping from about 5% in the late 1990s to less than 4% in recent years.

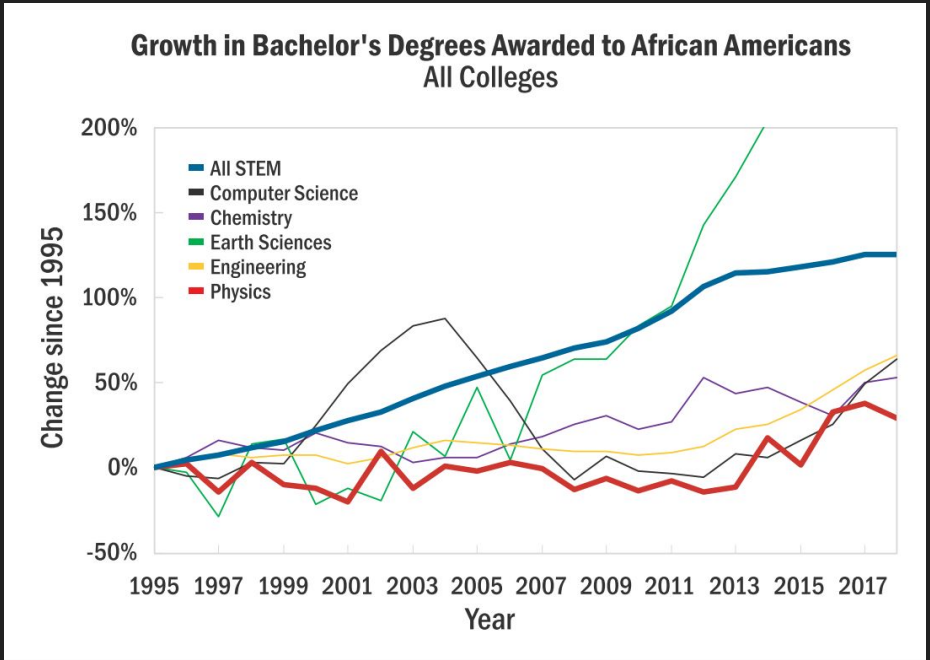
Over the past 20 years, the overall number of bachelor's degrees awarded in physics in the US has more than doubled and is now at an all-time high.





Second, during this same period, the percentage of African Americans earning bachelor's degrees in all STEM fields has grown much faster than the overall populations (number of STEM degrees more than doubled between 1995 and 2015 while the population grew by 23%).
But physics has not benefitted from this growth. From 1995 to 2015, the number of physics bachelor's degrees awarded to African Americans increased by only 4%.

In contrast, the fraction of Latinx students among physics bachelor's degree earners, while still below the Latinx representation in the US population, has significantly increased in the past 20 years.



The “Pipeline”

Fewer African American students earning bachelor’s degrees leads to a reduced pool of students pursuing graduate study, entering the academy, and ultimately being in a position to educate and inspire the next generation of students.

Factor 1: Belonging

Fostering a sense of belonging is essential for African American Student persistence and success.

Positive implications

- Students who have positive experiences in their department tend to have a stronger sense of belonging to the physics and astronomy community and are more likely to persist
- Students who expressed a sense of belonging:
  - Reported interactions with faculty and staff that are affirming
  - Cited the value of interacting with faculty, staff, and peers that know them personally, invite them to events, and encourage participation in department activities.
- Conversely, students who reported interactions with faculty, staff, and/or peers that were discouraging, unwelcoming, and toxic had a strong sense they do not belong in the department.

Key Findings

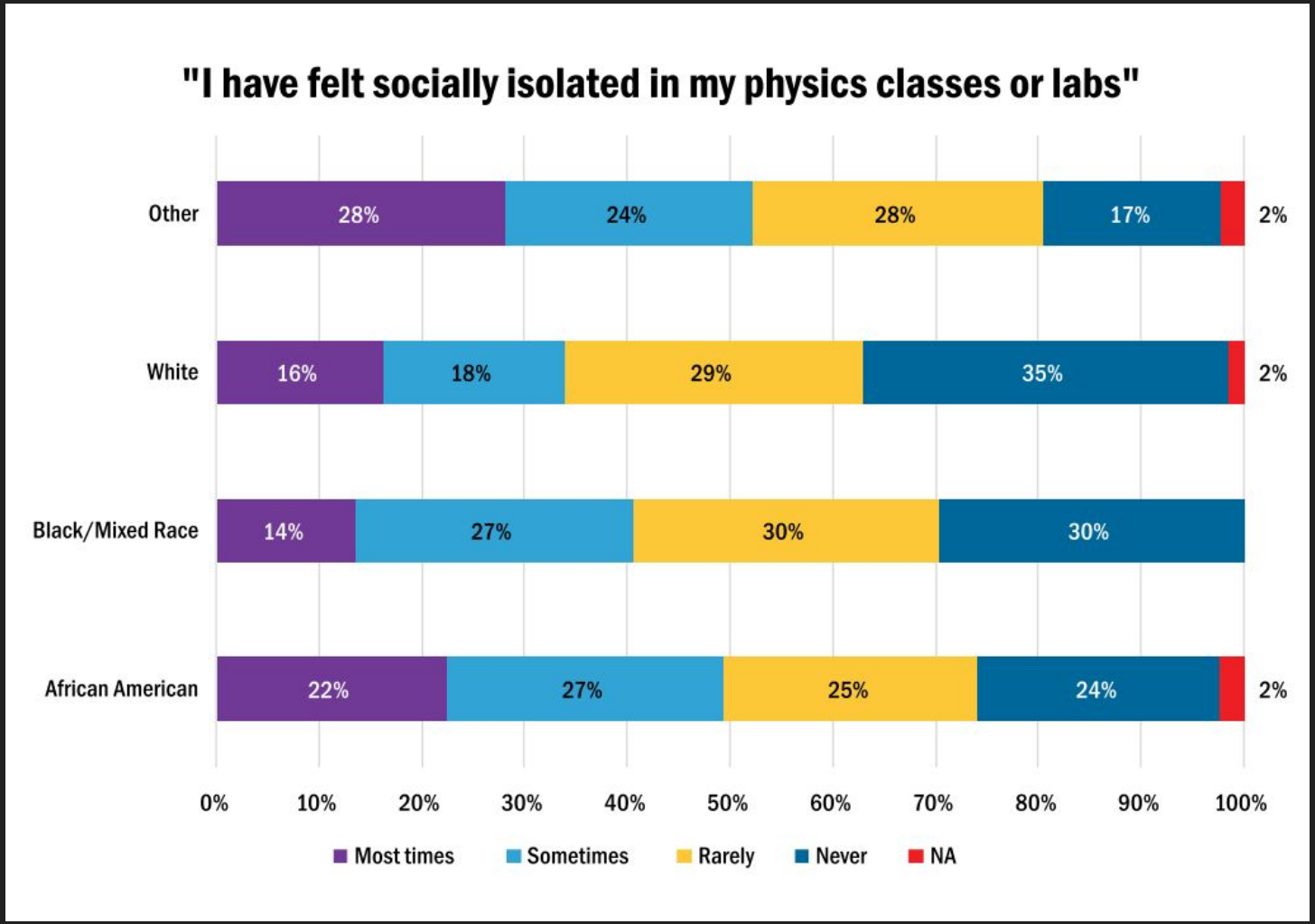
1. Faculty interactions have a powerful effect on student retention in, or departure from, the major. Students' sense of belonging increases with the number of faculty who get to know them as individuals and demonstrate support for their success.

2. Peer interactions are important, especially in mitigating or exacerbating imposter phenomenon and stereotype threat. When student clubs and organizations like the Society of Physics Students are inclusive and supportive of all students, they can provide valuable peer support.

Stereotype Threat

One student noted the impact of stereotype threat on a sense of belonging, describing a

“Constant feeling that I am a representative; therefore I must be flawless [and] not seeing people like me in professors or even grad positions, not really having a confidant within the department… feeling incapable of doing the work and feeling less than.”


"I have felt socially isolated in my physics classes or labs"
Other
28%
24%
28%
17%
2%
White
16%
18%
29%
35%
2%
Black/Mixed Race
14%
27%
30%
30%
African American
22%
27%
25%
24%
2%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Most times
Sometimes
Rarely
Never
NA

Recommendations

1. With the encouragement and support of their chairs, faculty should learn, practice, and improve skills that foster student belonging in their interactions with African American undergraduates.

2. In classrooms, student clubs, and common spaces, departments should establish clear rules of engagement that ensure that everyone is welcomed and valued and convey that inappropriate behavior will not be tolerated. Departments should also provide spaces and opportunities for education and ongoing discussion among faculty and students on ways to actively foster a sense of belonging and reduce barriers to inclusion.

Key Findings (cont.)

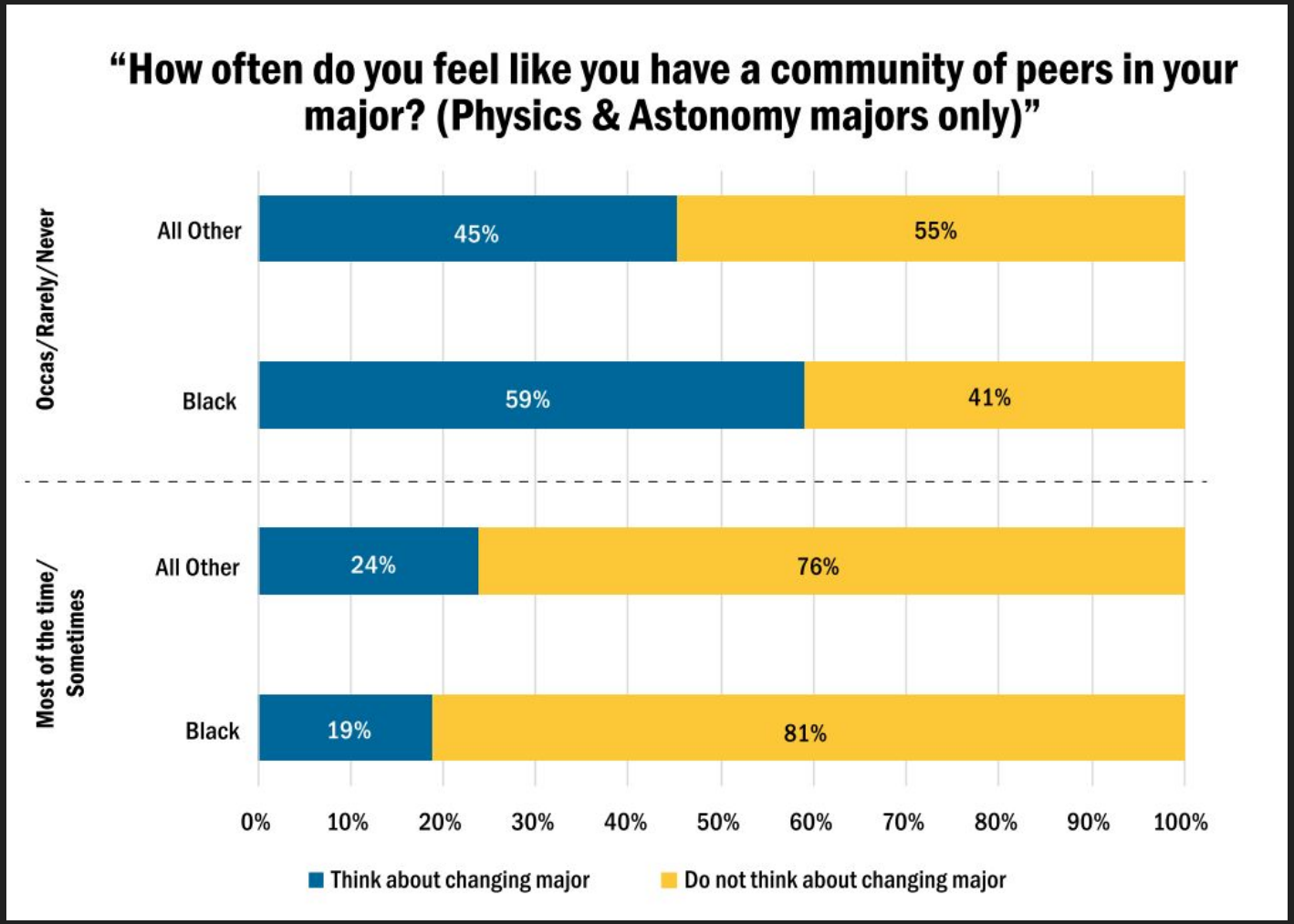
3. Peers of the same race/ethnicity/gender provide valuable social and academic support, often through counterspaces serving as refuges from departmental cultures that are not highly supportive of African American students.

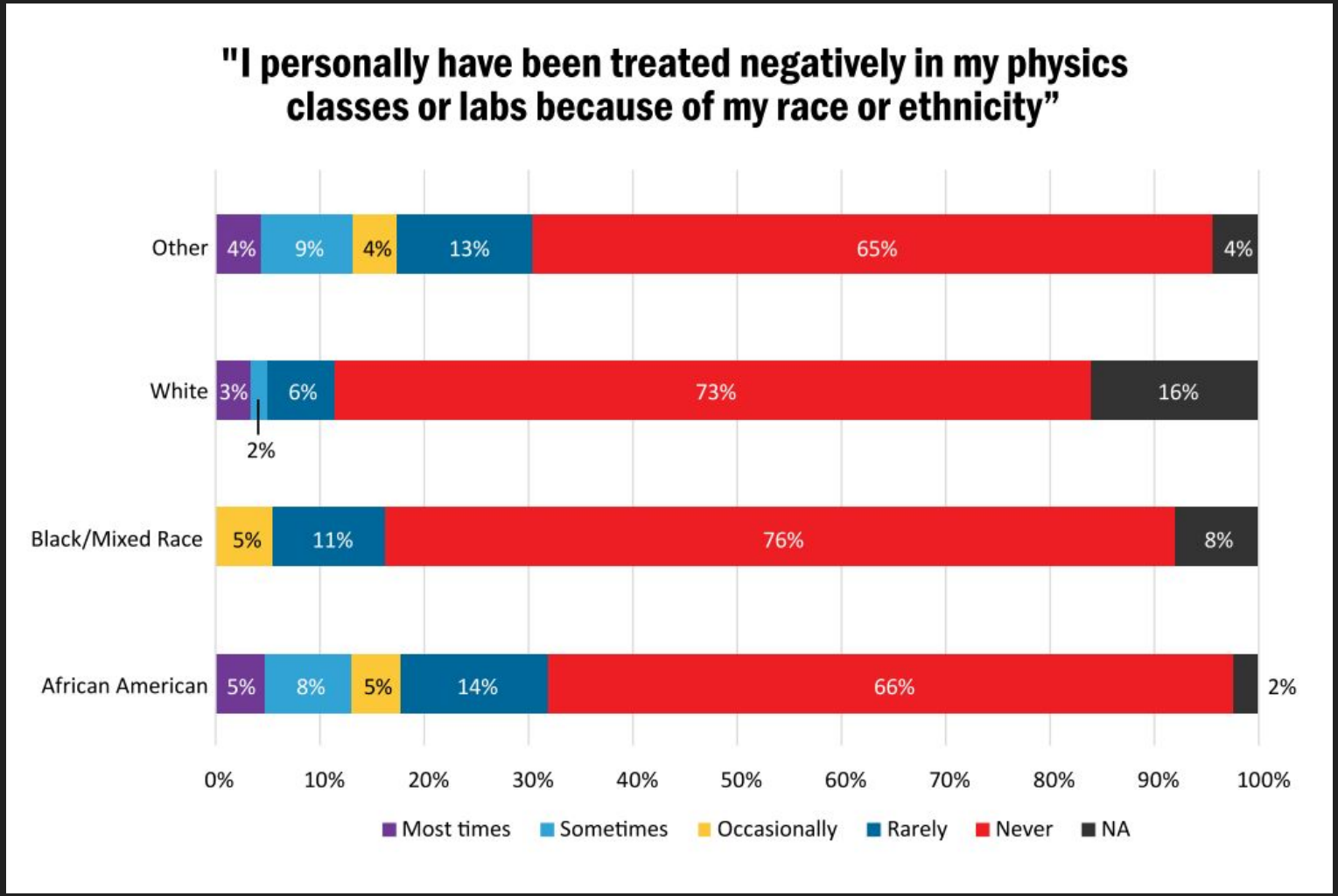
4. Microagressions and discrimination received from their peers diminish students' self-efficacy and percistence.

Isolation

When asked to identify the greatest barriers to success, one student commented,

“Feeling isolated in my department and my field and knowing that as I got further in my education, less and less people of color would be there.”


"How often do you feel like you have a community of peers in your major? (Physics & Astonomy majors only)"
Occas/Rarely/Never
All Other
45%
55%
Black
59%
41%
Most of the time/ Sometimes
All Other
24%
76%
Black
19%
81%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Think about changing major
Do not think about changing major


"I personally have been treated negatively in my physics classes or labs because of my race or ethnicity"
Other
4%
9%
4%
13%
65%
4%
White
3%
6%
73%
16%
2%
Black/Mixed Race
5%
11%
76%
8%
African American
5%
8%
5%
14%
66%
2%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Most times
Sometimes
Occasionally
Rarely
Never
NA

Recommendations (cont.)

3. Faculty who teach or advise undergraduates should become aware that counterspaces are important for African American students and should assist students in finding the support they need inside and outside the department.

4. Departments should establish and consistently communicate norms and values of respect and inclusion. They should periodically assess departmental climate and should respond, as needed, with educational workshops led by experts from student affairs or other resources.

5. Professional societies should lead a coalition to address identity-based harassment beyond sexual harassment.