

Pervasiveness and Impact of Single-Day Episodes of Harassment, Microaggression, and Incivility of Biomedical Health Trainees

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This file includes:

Main Text

Tables 1 and 2

Abstract

The biomedical workforce needs the talents and insights of people from all cross-sections of identity to advance scientific discovery and to improve research application. To build and sustain this workforce, trainees must be treated with respect and support. We assessed the prevalence of daily experiences of harassment, racial mistreatment, and incivility by conducting a national survey of NIH funded graduate students (n=249) and post-doctoral fellows (n=148). Our findings suggest there is an alarming prevalence of mistreatment within research training environments. Our random sampling of F30, F31, F32, and K99 recipients suggests that as many as 45% of graduate students and postdoctoral trainees experience or observe at least one form of mistreatment on any given day, with incivility being the most reported experience. Furthermore, we found that mistreatment experiences and observations were significantly associated with negative program attitudes, indicating a potential risk for attrition among trainees. Moreover, the prevalence of mistreatment was consistent across gender and racial identities. These findings underscore the urgent need for interventions to address mistreatment in research training environments. This study is the first to report empirical data from the trainee perspective on the prevalence and impact of single-day mistreatment in biomedically relevant training programs. Our research is important for understanding the underpinnings of the mentor-mentee and peer-peer interactions responsible for the prevalence of negative environments, as well as highlighting where interventions are necessary to develop supportive leadership and lab culture practices that will improve career outcomes for participants in these fields.

Introduction

The National Institutes of Health (NIH) has recently identified a need to address sexual harassment in science training environments, noting that harassment and related mistreatment is a major trigger for the derailment of female and underrepresented minority trainees in the biomedical research training enterprise at a time when the loss of such talent is damaging to the scientific enterprise (1). The prevalence and impact of harassment in many contexts, including academic (2), work (3), and military (4), have been documented, but those estimates vary in length of time in which prevalence is calculated, ranging from twelve months to an indefinite range, which may also be affected by current events and errors in recall (5). Moreover, these surveys do not commonly measure the co-occurrence of other forms of mistreatment that can harm students' and post-doctoral fellows' career pursuits, particularly for those who are most vulnerable, such as racial harassment, microaggressions, and incivility. Furthermore, research demonstrates that merely observing others being treated poorly has detrimental impacts on observers (6, 7), which is rarely estimated.

To understand the in-situ prevalence of daily experiences of such forms of mistreatment and their short-term impact, we conducted a national, probability survey of graduate students and post-doctoral fellows in the U.S. who received NIH F or K awards and were in biomedical health training programs (n=397). Participants reported their experiences and attitudes within 24 hours of completing the survey, and they repeated these assessments ten days later (n=299). These data provide a precise estimate of the extent to which trainees experience or observe harassment, microaggression, and incivility on any given day and how those singular experiences can impact trainees' attitudes toward their training programs that may lead to their departure from the scientific enterprise (8, 9). Knowledge of the extent to which harassment, microaggression, and incivility occur daily can guide training and other interventions to reduce such incidents and create and sustain educational environments that affirm and support trainees and improve their career outcomes.

Results

Prevalence of sexual harassment, racialized mistreatment, and incivility reported within the last 24 hours of the day 1 survey ranged from 9% (sexual harassment) to 27% (incivility), with 32.2% of the sample experiencing or observing at least one type of any of these negative experiences on the first survey day (see Table 1). Across two surveys, separated by 10 days, test-retest reliability was established. On either of the two survey days, 44.8% of the full sample experienced or observed at least one negative experience, with specific experiences or observations ranging from 13% (sexual harassment) to 38% (incivility) (see Table 1).

Experiences of sexual harassment, racial mistreatment, incivility, or a combination of negative experiences measured on day 1 were negatively correlated with trainees' attitudes toward their program on day 10 (see Table 1). These attitudes concerned the degree to which trainees were committed to remain in their program, their sense of productivity, confidence in their abilities, and satisfaction with their graduate or post-doctoral program. Hence, more frequent negative experiences were associated with poorer program attitudes. Independently, commitment to remain, productivity, and satisfaction (but not confidence) with the program measured on day 10 were negatively correlated with frequency of negative experiences measured on day 1 (r 's = -0.24, -0.17, and -0.25, respectively).

Surprisingly, the frequency of any form of negative experiences did not significantly differ by participant gender or participant status as an underrepresented minority (URM) or not (see Table 2). Moreover,

there were no statistically significant differences by the role of the perpetrator (mentor, another lab leader, or lab member; see Table 2). Data were analyzed with SPSS v.28.

Discussion

The prevalence of harassment, microaggression, and incivility among trainees in biomedical health research programs on any single day is astonishingly high and no social identity group is immune. Moreover, those experiences predict negative attitudes, including commitment to training programs, which could result in career derailment. Immediate attention to intervention strategies, such as PI and lab member training and lab climate reform, is called for. Additionally, further investigation into the prevalence of negative environments and the impact of supportive leadership and lab culture practices is necessary to improve biomedical training environments.

Materials and Methods

A random sample of 2000 graduate students and post-doctoral trainees from NIH's Reporter database who had F30, F31, F32, or K99 awards in 2023 were solicited for an online survey for which harassment or mistreatment was not advertised. The response rate was 19.9% (n=397) and included 65.7% female and 17.1% Underrepresented Minority (URM, Hispanic or not White nor Asian). Ten days later, respondents were surveyed again. The response rate was 75.3% of initial respondents (n=299) and included 64.5% female and 16.1% URM. On both days, participants completed modified versions of the Sexual Experiences Questionnaire (SEQ) (10) with one item measuring each of the four domains of the psychological definition of sexual harassment: sexist hostility, sexual hostility, unwanted sexual attention, and sexual harassment. They also completed a seven-item measure of racial mistreatment, which included items from measures of microaggressions (11) and racist harassment (12), a three-item modified measure of incivility (13), and a four-item measure of program attitudes including commitment to remain in the program, productivity, confidence in one's abilities, and satisfaction with one's graduate or post-doctoral program. Together, the program attitude questions formed a reliable, unitary scale ($\alpha = .91$) where high scores indicated a positive attitude. The survey also measured demographic and lab characteristics. For all experiential measures, participants were asked to report the extent to which they experienced or observed an event in their lab in the past 24 hours (0=no, 1=possibly, 2=definitely). The program attitude measure was completed before the experiential measures so as not to bias reports of program attitudes. Participants were incentivized with the chance to win one of ten \$100 gift certificates. The study was approved by the Indiana University Institutional Review Board, protocol #15142. Participants read a study information sheet (informed consent) before agreeing to participate in the research. All study materials and the data sets may be accessed at <<https://osf.io/7wfsm/>>.

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Tables

Table 1. Prevalence, means (SDs) of experiencing or observing mistreatment in their research training program, and cross-lagged correlations with program attitudes.

	Day 1 n=397					Day 10 n=299					Total Unique Prev	Cross-lagged r with program attitudes
	Prev	Obs	Exp	Obs & Exp ¹	Mean (SD)	Prev	Obs	Exp	Obs & Exp ¹	Mean (SD)		
Sexual Harassment ($\alpha = .63$)	8.8%	3.3%	3.0%	2.0%	0.15 (0.51)	7.0%	2.3%	2.7%	1.3%	0.14 (0.62)	13.4%	-0.25, p < .001
Racial Mistreatment ($\alpha = .84$)	11.8%	4.0%	4.0%	3.0%	0.35 (1.30)	8.4%	3.7%	2.7%	1.7%	0.33 (1.35)	13.9%	-0.21, p < .001
Incivility ($\alpha = .84$)	26.7%	8.6%	9.1%	9.6%	0.67 (1.39)	19.7%	6.0%	9.4%	3.7%	0.49 (1.23)	37.5%	-0.19, p = .001
All Experiences ($\alpha = .86$)	32.2%	10.6%	7.5%	12.8%	1.78 (2.76)	23.4%	8.7%	9.4%	5.0%	0.97 (2.76)	44.8%	-0.25, p < .001
Program Attitudes ($\alpha = .91$)	3.07 (0.64)					3.10 (0.65)						

Notes: Prev = prevalence of at least one experience or observation; Obs = prevalence of observing; Exp =prevalence of experiencing; ¹Observed and/or Experienced prevalence may not add up to total prevalence because some participants did not record whom the mistreatment was targeted toward. Total Unique Prev = sum of Day 1 prevalence plus Day 10 prevalence of those who had 0 prevalence on Day 1. Cross-lagged r is the bivariate correlation between the Day 1 negative experience measure and the Day 10 program attitude measure.

Table 2. Means (SDs) of Negative Experiences by participant gender, participant URM status, perpetrator role, and mentor rank, Day 1 (n=397)

	All Experiences		Sexual Harassment		Racial Mistreatment		Incivility	
	M (SD)	p	M (SD)	p	M (SD)	p	M (SD)	p
PARTICIPANT GENDER		.870		.815		.815		.561
Male	1.15 (2.62)		0.18 (0.75)		0.35 (1.27)		0.63 (1.18)	
Female	1.20 (2.86)		0.16 (0.55)		0.48 (1.70)		0.56 (1.10)	
PARTICIPANT URM STATUS		.279		.723		.158 ¹		.769
Non-URM	1.11 (2.59)		0.16 (0.62)		0.36 (1.35)		0.59 (1.15)	
URM	1.51 (3.57)		0.19 (0.65)		0.78 (2.33)		0.54 (1.04)	
PERPETRATOR ROLE ²		.681		.572		.198		.344
Mentor	4.07 (3.39)		0.33 (0.72)		1.53 (2.10)		2.20 (1.52)	
Other lab leader	5.24 (4.44)		0.65 (1.11)		2.12 (2.74)		2.47 (1.55)	
Lab member	4.26 (4.32)		0.67 (1.17)		1.69 (3.06)		1.91 (1.36)	
MENTOR RANK		.898		.965		.943		.767
Assistant Professor	1.22 (2.42)		0.18 (0.53)		0.49 (1.45)		0.55 (1.02)	
Associate Professor	1.30 (3.30)		0.18 (0.74)		0.46 (1.90)		0.66 (1.19)	
Professor	1.14 (2.66)		0.17 (0.63)		0.42 (1.47)		0.56 (1.13)	

URM = underrepresented minority (non-White, non-Asian, or Hispanic of any race)

¹Levene's test for equality of variances was significant, $p < .001$. Therefore, the t-test was based on equal variances not assumed.

²Data for this analysis included only those who experienced or observed mistreatment and who answered this question (n=86).

Notes: t-tests were conducted for participant gender, participant URM status, and perpetrator role. A one-way ANOVA was conducted for Mentor Rank. Tests for perpetrator gender could not be conducted because participants could select (and did select) multiple perpetrators.

Supplemental Information

Demographic Items

Gender: What is your gender?

1. Male
2. Female
3. Non-Binary/Genderfluid
4. Prefer not to say
5. Prefer to self-describe

Gender_5_TEXT: What is your gender – Prefer to self-describe

Trans: Do you identify as transgender?

1. Yes
2. No

Hispanic: Are you of Hispanic, Latine, or Spanish origin?

1. Yes
2. No

Race: What is your race? (Check all that apply)

1. American Indian, Native American, First Peoples
2. Asian, Asian American
3. Black, African American, African Caribbean
4. Native Hawaiian, Pacific Islander
5. White
6. Other

Race_6_TEXT: What is your race – Other

Citizen: Are you an American citizen?

1. Yes
2. No (if no, what is your country of citizenship?)

Citizen_2_TEXT: Are you an American citizen? – No (if no, what is your country of citizenship?)

Lab Information

Degree: What degree are you currently seeking?

1. BA/BS or equivalent
2. MA
3. MS
4. MPH

5. MFA
6. MBA
7. MLS
8. MPH
9. MSW
10. March
11. PhD
12. PsyD
13. M.D.
14. MD/PhD
15. DSW
16. JD
17. DDS
18. DDM
19. DVM
20. DPH
21. DEng
22. Ed.D
23. Other
24. Combined bachelors and master's degree

Degree_Mentor_tenure: Indicate the number of years (to the nearest whole number) that you have:

1. Been pursuing this degree
2. Been working in the lab (or under the mentorship) of your primary research mentor

LabSize: How many graduate students and/or postdoctoral fellows are working with your primary research mentor?

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10
11. More than 10 (how many?)

LabSize_11_TEXT: How many graduate students and/or postdoctoral fellows are working with your primary research mentor? – More than 10 (how many?)

LabRace: In this lab, or under your primary research mentor's mentorship, there are:

1. One or very few people of the same race/ethnicity as me

2. Slightly fewer people of the same race/ethnicity as me
3. About the same number of people with the same race/ethnicity as me and people with a different race/ethnicity than me
4. Slightly more people of the same race/ethnicity as me
5. All or almost all of the same race/ethnicity as me

Mentor Demographics

Gender_mentor: What is the gender of your primary mentor?

1. Male
2. Female
3. Non-binary/Genderfluid/Other

Hispanic_mentor: Is your primary research mentor of Hispanic, Latine, or Spanish origin?

1. Yes
2. No
3. Not sure

Race_mentor: What is the race of your primary research mentor?

1. American Indian, Native American, First Peoples
2. Asian, Asian American
3. Black, African American, African Caribbean
4. Native Hawaiian, Pacific Islander
5. White
6. Other
7. Not sure

Race_mentor_6_TEXT: What is the race of your primary research mentor? – Other

Rank_mentor: What is the rank of your primary research mentor?

1. Assistant Professor
2. Associate Professor
3. Full Professor
4. Non Tenure Track Professor
5. Other

Rank_mentor_5_TEXT: What is the rank of your primary research mentor? – Other

Work Outcomes

ProgAtt: Please complete the following sentences based on how you have felt over the past 24 hours (1 = Much lower than normal, 2 = Somewhat lower than normal, 3 = About normal, 4 = Somewhat higher than normal, 5 = Much higher than normal)

1. My commit to remaining in this program was:
2. My productivity was:
3. My confidence in my abilities was:
4. My satisfaction in my graduate/post-doc program was:

Daily Interactions

LabType: Please indicate the type of lab that you typically work in (check all that apply)

1. Wet lab
2. Dry lab
3. Virtual lab
4. Field location
5. Other (please indicate)

LabType_5_TEXT: Please indicate the type of lab that you typically work in (check all that apply) – Other (please indicate)

PI: How much time did you spend with your primary research mentor in the past 24 hours?

1. No time at all
2. A little time (1-2 hrs)
3. A moderate amount of time (3-4 hrs)
4. A lot of time (5-6 hrs)
5. All day (7+ hrs)

PI_virtual: What percent of the time spent with your primary research mentor was virtual (e.g., video conferencing, such as Zoom or Teams, on the phone, or through email or messaging)?

LabLeader: How much time did you spend with a lab leader other than your primary research mentor, such as a lab supervisor or lab manager in the past 24 hours?

1. No time at all
2. A little time (1-2 hrs)
3. A moderate amount of time (3-4 hrs)
4. A lot of time (5-6 hrs)
5. All day (7+ hrs)

LabLeader_virtual: What percent of the time spent with lab leaders other than your primary research mentor was virtual (e.g., video conferencing, such as Zoom or Teams, on the phone, or through email or messaging)?

LabMates: How much time did you spend with other lab mates in the past 24 hours?

1. No time at all
2. A little time (1-2 hrs)
3. A moderate amount of time (3-4 hrs)
4. A lot of time (5-6 hrs)

5. All day (7+ hrs)

LabMates_virtual: What percent of the time spent with other lab mates was virtual (e.g., video conferencing, such as Zoom or Teams, on the phone, or through email or messaging)?

Unwanted Sexist, Sexual, Racist, or Uncivil Experiences

SexHarass: Please indicate the extent to which you experienced the following events in the past 24 hours (1 = Definitely not, 2 = Possibly, but not sure, 3 = Yes, definitely)

1. Someone in my lab engaged in sexist behavior toward me or others
2. Someone in my lab engaged in sexually crude behavior toward me or others
3. Someone in my lab gave me or others unwanted sexual attention
4. Someone in my lab implied that I or others would be treated differently if we cooperated sexually with them

SexHarass_targetgender: Who was this behavior directed toward? (check all that apply)

1. Me
2. Other women
3. Other men
4. Other people/person with a different gender identity

Incivility: Please indicate the extent to which you experienced the following events in the past 24 hours (1 = Definitely not, 2 = Possibly, but not sure, 3 = Yes, definitely)

1. Someone in my lab put me down or was condescending to me or others
2. Someone in my lab paid little attention to my or others' opinions
3. Someone in my lab addressed me or others in unprofessional terms either publicly or in private

Incivility_target: Who was this behavior directed toward? (check all that apply)

1. Me
2. Others

RaceHarass_L: Please indicate the extent to which you experienced the following events in the past 24 hours (1 = Definitely not, 2 = Possibly, but not sure, 3 = Yes, definitely)

1. Someone in my lab engaged in racist behavior toward me or others
2. Someone in my lab engaged in racially crude behavior toward me or others

RaceHarass_L_target: Who was this behavior directed toward? (check all that apply)

1. Me
2. Others

RaceMicro: Please indicate the extent to which you experienced the following events in the past 24 hours (1 = Definitely not, 2 = Possibly, but not sure, 3 = Yes, definitely)

1. Someone in my lab made assumptions that I or other minorities were inferior

2. Someone in my lab treated me or other minorities as a second-class citizen
3. Someone in my lab invalidated me or other minorities' experiences as a person of color
4. Someone in my lab was subtly aggressive toward me or other minorities
5. Someone in my lab ignored me or other minorities or made us feel invisible

RaceMicro_target: Who was this behavior directed toward? (check all that apply)

1. Me
2. Other people with minoritized identities
3. Other people who do not have minoritized identities

Perpetrator: Was the person or persons who did this: (0 = No, 1 = Yes)

1. Your primary research mentor?
2. Another lab leader, such as a lab manager or senior lab member?
3. Another lab member?
4. One or more men?
5. One or more women?
6. One or more gender nonbinary people?
7. A combination of men, women, or gender nonbinary people?