

Supplemental Material

CBE—Life Sciences Education

Hernandez *et al.*

Supplemental Material

Detailed methods

Participants in the larger research study consisted of faculty members who lead STEM research labs across three universities in Southern California and their student researchers (see the pre-registration for the larger project here: https://aspredicted.org/blind.php?x=137_DGH). Eligible faculty participants were faculty research mentors who (a) conduct research in life sciences, physical sciences, or engineering and computer science, and (b) lead a research lab where they mentor student researchers. All eligible STEM faculty research mentors at each of the three universities received an email invitation to participate in the larger study. In the email invitation, faculty were told that the purpose of the study was to examine the role that research experiences play in students' intentions to pursue STEM careers or advanced studies, with a specific focus on diversifying the STEM workforce. Once faculty research mentors were successfully recruited, they completed a 45-minute semi-structured interview over Zoom or in person and a 10-minute online study questionnaire before all of the student researchers working in their labs were invited to participate in the study. Faculty research mentor participants were compensated with a \$100 gift card for their participation and agreed to inform the research team whenever new student researchers joined their lab over the course of three years.

Student researchers working in the STEM labs of the participating faculty research mentors were invited via email to complete a 30-minute online Baseline survey after reading all of the relevant study information and providing consent. Student researcher participants were compensated \$25 for completing this particular Baseline survey. Three months after the initial Baseline survey, student researcher participants received an invitation to complete a follow-up (i.e., Time 1) survey for which they were compensated \$30 upon completion. Six months after

the initial Baseline survey, student researcher participants received an invitation to complete a second follow-up (i.e., Time 2) survey for which they were compensated \$35 upon completion.

Table 1SM

Longitudinal Study Timeline – Summary of the Variables Measured at Specific Timepoints and Relevant Descriptive Statistics

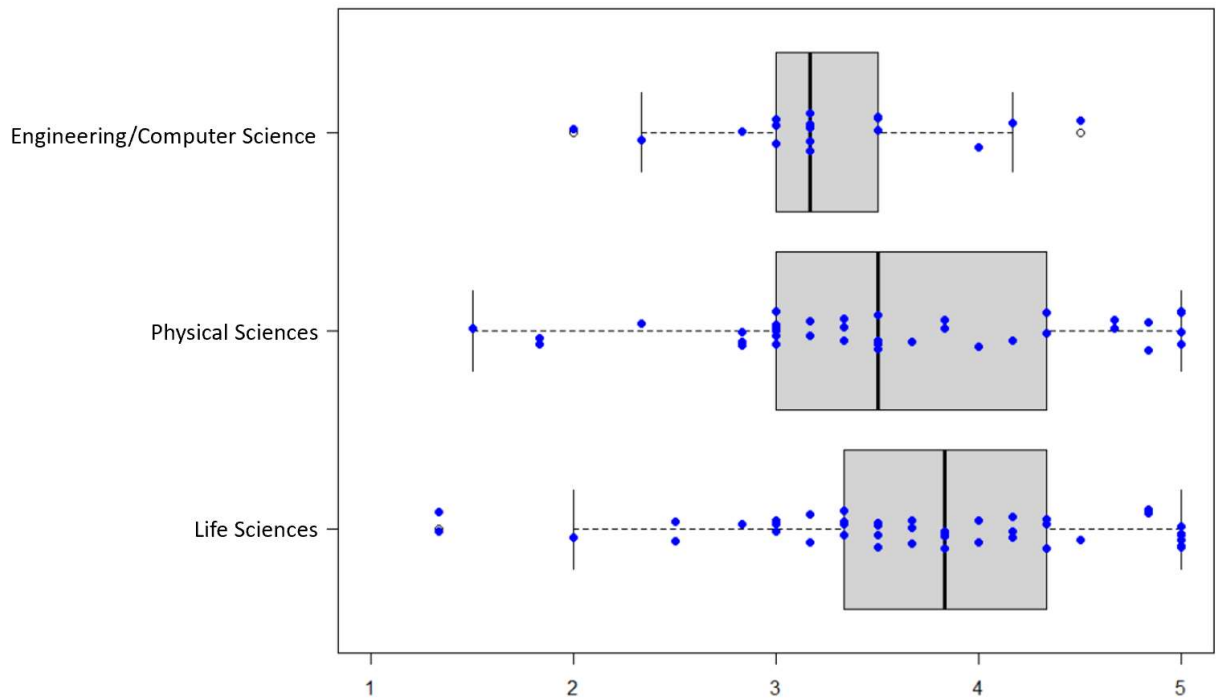
Variables measured	Timepoint		
	Time 0 (Baseline controls)	Time 1 (3 months)	Time 2 (6 months)
Perceived cultural awareness of faculty mentor		$\alpha = .92, M = 3.59, SD = 0.89$	
Research team atmosphere	$\alpha = .87, M = 3.69, SD = 0.42$	$\alpha = .89, M = 3.71, SD = 0.42$	
Science identity	$\alpha = .84, M = 5.39, SD = 1.01$	$\alpha = .88, M = 5.50, SD = 1.01$	
STEM career motivation	$\alpha = .81, M = 5.91, SD = 1.01$		$\alpha = .87, M = 5.86, SD = 1.11$

Note. Shaded areas represent specific timepoints at which variables were measured and included in the primary analytic models. Perceived cultural awareness of faculty mentor was rated on a scale from 1-5; research lab atmosphere was rated on a scale from 1-4, and both science identity and STEM career motivation were measured on 1-7 scales.

Supplemental Analyses

Figure 1SM

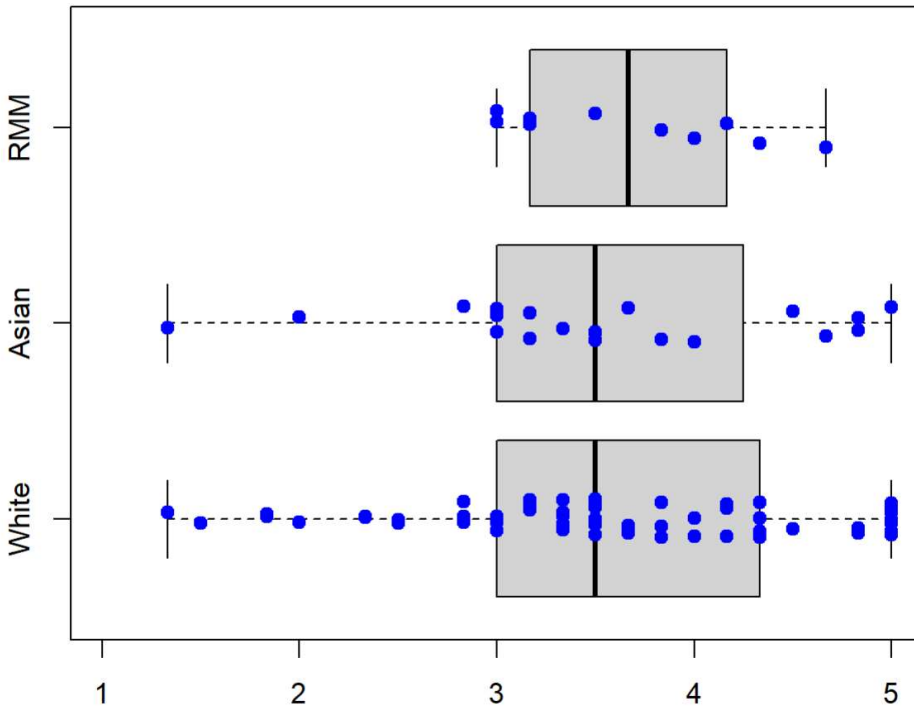
Box and Whisker Plot Summarizing Students' Perceptions of Their Faculty Research Mentors' Cultural Awareness Across Life Sciences, Physical Sciences, and Engineering/Computer Science Disciplines



Note. Students reported their perceptions of their faculty research mentors' cultural awareness on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Figure 1SM was created using the 'ggplot2' package in Rv4.3.2 (Wickham, 2016) – unfilled circles indicate suspected outliers, filled circles indicate known outliers.

Figure 2SM

Box and Whisker Plot Summarizing Students’ Perceptions of Their Faculty Research Mentors’ Cultural Awareness Across White, Asian, and RMM Faculty Research Mentors



Note. Students reported their perceptions of their faculty research mentors’ cultural awareness on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). See more descriptive statistics in Table 2SM.

Table 2SM

Descriptive Statistics Summarizing Students’ Perceptions of Their Faculty Research Mentors’ Cultural Awareness Across White, Asian, and RMM Faculty Research Mentors

Faculty race	Mean	Median	Standard deviation	Minimum scale score	Maximum scale score
White	3.58	3.50	0.93	1.33	5.00
Asian	3.53	3.50	0.94	1.33	5.00
RMM	3.68	3.67	0.60	3.00	4.67

Measures

Perceived cultural awareness of faculty mentor

Items rated on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale; Byars-Winston & Butz, 2021

- 1) My faculty supervisor created opportunities for students in the lab to bring up issues of race/ethnicity as they arose.
- 2) My faculty supervisor encouraged students in the lab to think about how the research relates to their own lived experience.
- 3) My faculty supervisor reflected upon how the research experience might differ for students in the lab from different racial/ethnic groups.
- 4) My faculty supervisor raised the topic of race/ethnicity in their research mentoring relationships when it was relevant.
- 5) My faculty supervisor implemented specific strategies to address racial/ethnic diversity in their research mentoring relationships.
- 6) My faculty supervisor approached the topic of race/ethnicity with their students in the lab in a respectful manner.

Research lab atmosphere

Items rated on a 1 (*the atmosphere is not at all that way*) to 4 (*the atmosphere is very much that way*) scale; Deci et al., 1989

“Please indicate the extent to which these descriptions capture the atmosphere of your research team as a whole?”

- 1) Cooperative
- 2) Supportive
- 3) Fair
- 4) Trusting
- 5) Unbiased
- 6) In general, I am extremely satisfied with the culture of my research team.

Science identity

Items rated on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale; Estrada et al., 2011

- 1) In general, being a scientist is an important part of my self-image.
- 2) I have a strong sense of belonging to the community of scientists.
- 3) I derive great personal satisfaction from working on a team that is doing important scientific work.
- 4) I have come to think of myself as a 'scientist'.
- 5) I feel like I belong in the field of science.
- 6) The daily work of a scientist is appealing to me.

STEM career motivation

Items rated on 1 (*not at all*) to 7 (*extremely*) scale; Chemers et al., 2011

“We are interested in how you think about your future education and career possibilities in STEM. Please answer the following questions about your future in science (or engineering -- whatever is most relevant to your field) according to how you feel at the present moment.”

- 1) How important is it for you to have a career in some field in science or engineering?
- 2) Could you see yourself building a career as a scientist (or engineer)?
- 3) Do you intend to pursue a career in science (or engineering)?
- 4) How committed are you to a career in science (or engineering)?
- 5) How difficult would it be to imagine yourself being happy in another career after leaving science (or engineering)?

References

- Byars-Winston, A., & Butz, A. R. (2021). Measuring research mentors' cultural diversity awareness for race/ethnicity in STEM: Validity evidence for a new scale. *CBE—Life Sciences Education*, 20(2), ar15.
- Chemers, M. M., Zurbriggen, E. L., Syed, M., Goza, B. K., & Bearman, S. (2011). The role of efficacy and identity in science career commitment among underrepresented minority students. *Journal of Social Issues*, 67(3), 469–491. <https://doi.org/10.1111/j.1540-4560.2011.01710.x>
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