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Faculty Collaboration and Equity: UMass ADVANCE Report on the 2022 Survey

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Faculty Collaboration and Equity: UMass ADVANCE Report on the 2022 Survey

December 2023

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Executive Summary

Research Questions

Research collaboration is closely related to research productivity and career development. The UMass ADVANCE program is funded by the National Science Foundation (NSF). It aims to transform the UMass campus through the power of collaboration, and advance women faculty in STEM, including women faculty who are diverse by race/ethnicity, nationality, sexuality and other measures. Through analyzing data collected in a faculty survey at UMass Amherst, this report examines faculty experiences on three crucial topics: **research collaboration, inclusive community, and departmental decision-making**, with a focus on STEM faculty. This report further considers how the COVID-19 pandemic has shaped faculty experiences. Ultimately, informed by **the ADVANCE R3 model⁴ for supporting faculty collaboration (centering on resources, relationships and recognition)**, we seek to understand if there is equity in allocating necessary resources, accessing relationships with colleagues, receiving recognition for their work among faculty with diverse identities and from different fields. What are the positive and negative experiences among faculty? What needs to be improved?

Methods

In Fall 2022, all UMass Amherst faculty were invited to participate in a survey by the UMass ADVANCE team. This is a follow-up survey of the initial ADVANCE faculty survey that was administered in the fall and winter of 2018. The aim of both surveys is to understand UMass faculty members' experiences in collaborative work with their colleagues, and whether and how their experiences vary by different identity groups. In 2022, 453 UMass faculty responded to our survey, and 273 of them are STEM faculty. Survey findings help guide policies, priorities and distribution of resources as we plan for future ADVANCE efforts at the UMass campus.

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Summary of Findings

In terms of research collaboration, we do not observe statistically significant gender differences in collaboration experiences and satisfaction towards collaboration resources, which is a clear progress compared to what we knew based on the 2018 survey. However, we observe gender differences in feelings of inclusion. Women faculty feel significantly less accepted by their colleagues and less connected to their department. They are also less likely to feel valued for their research and teaching. In terms of decision-making, women faculty are significantly less likely to report that departmental decision-making is fair, and much less likely to believe that the tenure and promotion to full criteria clear or consistently applied, especially for women faculty from the underrepresented groups.

Implications for Intervention

The pandemic has impacted faculty collaborations in a number of different ways. It is possible that both the pandemic and the interventions of the ADVANCE team have led to fewer gender differences in collaboration experiences at the university when comparing the 2022 survey to the 2018 survey. Yet, clearly, there remain important challenges to collaboration on campus, that require continued intervention. ADVANCE has developed important [interventions and tools](#) available on our website for how to create equitable collaborations.

During the pandemic, there have been fewer opportunities for faculty members to interact professionally and socially. ADVANCE will continue to promote [tools](#) aimed at creating solutions for more inclusive, cohesive, and engaged departmental cultures, especially in promoting women's research and helping make their contributions to campus more visible.

Meaningful interactions among faculty are critical to creating democratic decision-making. ADVANCE provides [tools](#) around how to make decisions fairly, including considering different approaches to bylaws and voting, and will continue to promote these resources with an aim to strengthening decision-making on campus. ADVANCE also provides [tools](#) for inclusive mentoring, inclusive evaluation, and inclusive leadership.

Acknowledgements: Thanks for helpful input from members of the UMass ADVANCE Leadership Team including Joya Misra, Laurel Smith-Doerr, James Allan, Donna Baron, Sergio Breña, Buju Dasgupta, Jennifer Normanly. This research was funded by NSF ADVANCE-IT Award #1824090, "Collaboration and Equity: The Resources, Relationships, and Recognition (R3) Model for Advancing Women and Underrepresented Faculty in Science and Engineering." All findings and opinions are the author's and do not necessarily represent those of the National Science Foundation (NSF).

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Introduction

Throughout their schooling, girls and women are discouraged from pursuing science and math, which restricts their preparation and career options in related disciplines⁵. Although the percentage of women in the fields of science, technology, engineering, and math (STEM) has been increasing over time, from 8% of the workforce in 1970 to 27% in 2019, women are still underrepresented in the STEM workforce⁶. For STEM faculty, research collaboration is closely related to research productivity and career development. Compared to men STEM faculty, it is harder for women STEM faculty to gain access to resources for collaborative research⁷, and they are also more concerned about receiving recognition in collaborative research, which further restrict their career satisfaction and career development⁸.

UMass ADVANCE program is funded by the National Science Foundation (NSF). It aims to transform the UMass campus through the power of collaboration, and advance women faculty in STEM, including women faculty who are diverse by race/ethnicity, nationality, sexuality and other measures.

In Fall 2022, all UMass Amherst faculty were invited to participate in an ADVANCE Faculty Survey by the UMass ADVANCE team. This is a follow-up survey of the initial ADVANCE faculty survey that was administered in the fall and winter of 2018. The aim of both surveys is to understand UMass faculty's experiences in collaborative work with their colleagues, and whether and how their experiences vary by different identity groups. The findings of this survey help guide policies, priorities and distribution of resources as we plan for future ADVANCE efforts at the UMass campus.

We designed survey questions focusing on three topics: research collaboration, inclusive community, and departmental decision-making. More specifically, the survey asks about faculty's experiences in research collaboration; the department climate for inclusion and decision-making, including the clarity and transparency of personnel decisions; an evaluation of faculty mentoring; and job satisfaction. The 2022 survey also incorporates a number of measures around the negative and positive impacts of the COVID-19 pandemic, which allows the ADVANCE team to further consider how the pandemic has shaped faculty experiences. At the end of the survey, we also ask questions about identity including gender, sexuality, race, ethnicity, nationality, rank and caregiving status.

⁵ The stem gap: Women and girls in Science, Technology, engineering and Mathematics. AAUW. (2023, August 29). <https://www.aauw.org/resources/research/the-stem-gap/>

⁶ Martinez, A., & Christnacht, C. (2021, October 8). Women are nearly half of U.S. workforce but only 27% of STEM workers. Census.gov. <https://census.gov/library/stories/2021/01/women-making-gains-in-stem-occupations-but-still-underrepresented.html>

⁷ Corley, E., & Gaughan, M. (2005). Scientists' participation in university research centers: What are the gender differences?. *The Journal of Technology Transfer*, 30(4), 371-381.

⁸ Misra, J., Smith-Doerr, L., Dasgupta, N., Weaver, G., & Normanly, J. (2017). Collaboration and Gender Equity among Academic Scientists. *Social Sciences*, 6(1), 25.

Methods and Data

Survey Procedures

The data was collected from October 2022 to January 2023 through Qualtrics. An invitation to participate in the survey was sent to all UMass faculty through email. The initial recruitment emails included endorsements emphasizing the importance of the survey in supporting faculty from the Chancellor along with the Vice Chancellor for Equity and Inclusion, as well as from the Provost. We also reached out to Deans, Department Chairs and Heads, and ADVANCE Faculty Fellows and asked for their help in encouraging their colleagues to participate in the survey. The effects of multiple years of the COVID-19 pandemic along with additional workloads might have depressed survey responses: the response rate is 23.3% in general, and 25.4% among tenure-track faculty. It is worth noting that the population of our survey includes both tenure-track and non-tenure-track faculty, as well as visiting faculty and faculty with other short-term appointments at UMass. The response rate is slightly higher among STEM faculty: 27.2%. To maximize survey participation, we sent out four follow-up email reminders to those who had not yet responded through Qualtrics.

On average, it took 10 minutes for participants to respond to the whole survey. We have ensured confidentiality for our participants by only sharing survey findings at the aggregate level. At the end of the survey, faculty were given the choice to share their email address for a chance to participate in a prize drawing. These email addresses for the drawing were collected and saved separately from the original survey responses. We also received approvals on all research procedures from the Institutional Review Board for Human Subjects Research at the University of Massachusetts Amherst.

Who are our Survey Respondents?

Overall, 453 UMass faculty responded to the ADVANCE survey. In this report, we focus our attention on findings based on 273 UMass faculty respondents from 32 STEM departments in the College of Engineering, College of Information and Computer Sciences, College of Natural Sciences, or College of Social and Behavioral Sciences, or in the departments of Management in the Isenberg School of Management and Linguistics in the College of Humanities and Fine Arts, due to NSF ADVANCE program's focus on equity in the STEM field. However, we also compare faculty experiences by STEM and non-STEM faculty, at the end of this research report.

Table 1. Demographic Information of STEM Faculty Respondents

	N	%
Gender		
Men	129	47.3%
Women	124	45.4%
Non-binary/Transgender/Non-conforming	4	1.5%
Not reported	16	5.9%

Race/Ethnicity		
White	189	69.2%
Asian or Pacific Islander	25	9.2%
Hispanic or Latinx	19	7.0%
Black or African American	12	4.4%
Multi-racial	1	0.4%
American Indian or Alaska Native	0	0.0%
Other/Not reported	27	9.9%
Nationality		
U.S.-born	190	69.6%
Foreign-born	75	27.5%
Not reported	8	2.9%
Rank		
Professor	96	35.2%
Associate professor	39	14.3%
Assistant professor	48	17.6%
Non-tenure-track faculty	63	23.1%
Not reported	27	9.9%
Sexual Orientation		
Heterosexual	208	76.2%
LGBTQIA+	18	6.6%
Not reported	47	17.2%
Caregiving Status		
Primary caregivers	145	53.1%
Not primary caregivers	101	37.0%
Not reported	27	9.9%

Demographic characteristics for the STEM faculty respondents are reported in Table 1. Among respondents in the STEM field, 47.3% are men (n = 129), 45.4% are women (n = 124), and 1.5% are gender non-binary, transgender or gender non-conforming (n=4). As for race and ethnicity, 69.2% are White (n = 189), 9.2% are Asian or Pacific Islander (n = 25), 7.0% are Hispanic or Latinx (n = 19), 4.4% are African American or Black (n = 12), and 0.4% is multiracial (n = 1). Among the survey respondents, 11.7% (n=32) of them identify as members of underrepresented racial/ethnic minority groups (Black, Hispanic or Latinx, Native American or American Indian, or multiracial). In terms of nationality, 69.6% (n = 190) of respondents are US-born, and 27.5% (n = 175) of respondents are foreign-born faculty.

As for rank, 35.2% of survey respondents are Professors (n = 96), 14.3% are Associate professors (n = 39), 17.6% are Assistant professors (n = 48), and 23.1% are non-tenure-track faculty (n = 63, including adjuncts, lecturers, research professors and extension professors). Among survey respondents, 6.6% of them identify as Lesbian, Gay, Bisexual, or Queer (n = 18) and 76.2% heterosexual (n = 208). In terms of caregiving status, 53.1% of respondents (n = 145) report that they are a primary caregiver for children or adult family member(s).

When comparing the demographic characteristics of our STEM survey respondents to our target population, all UMass STEM faculty, we find a slight underrepresentation of the following groups: men faculty (47.3% of the STEM respondents versus 63.4% of STEM faculty), White faculty (69.2% of STEM respondents versus 75.1% of STEM faculty), and US-born faculty (69.6% of STEM respondents versus 92.3% of STEM faculty).

Collaboration, Inclusion & Decision-Making

Based on the UMass ADVANCE program goals, we chose to report measures centering research collaboration, inclusive community and decision-making in our survey. Table 2 shows the descriptive statistics of key measures among STEM faculty. The measures included in Table 2 were collected using 5-point Likert scales. In this report, those measures were recoded as dichotomous variables (1=yes and 0=no). The Appendix provides a list of full question texts.

Table 2. Descriptive Statistics of Key Measures

	N	Mean	SD
Collaboration			
Enjoy collaboration	235	0.86	0.35
Often have collaboration opportunities with UMass faculty	251	0.4	0.49
Satisfied with amount of collaboration opportunities at UMass	255	0.46	0.5
Satisfied with collaboration resources			
Internal grants for your own research	244	0.28	0.45
Internal grants for collaborative research	239	0.29	0.46
Access to graduate students	247	0.38	0.49
Factors facilitating collaborations with UMass colleagues			
Research topic similarity	254	0.69	0.46
Research complementarity	254	0.73	0.44
Shared external funding	254	0.47	0.5
Shared internal funding	254	0.26	0.44
Physical resources on campus	254	0.24	0.43
Graduate student in common	254	0.41	0.49
Physical proximity of offices/labs	254	0.35	0.48
Physical proximity of social spaces	254	0.13	0.34
Teaching			
Shared committee service	254	0.19	0.4
Social connections	254	0.35	0.48
Referral by someone else	254	0.19	0.4
Zoom meetings	254	0.2	0.4
Something else	254	0.12	0.32

Inclusive Community			
Feel connected to department	270	0.51	0.5
Feel accepted by colleagues in department	268	0.63	0.48
Feel valued for research	253	0.43	0.5
Feel valued for teaching	260	0.53	0.5
Feel valued for service	262	0.52	0.5
Satisfied with professional interactions	268	0.47	0.5
Satisfied with social interactions	265	0.4	0.49
Feel demands associated with their identity group have negative effect on their pursuit of career goals	258	0.47	0.5
Feel demands associated with their identity group have positive effect on their pursuit of career goals	258	0.14	0.34
Believe men and women faculty receive equal treatment in department/program	220	0.44	0.5
Believe white and racial minority faculty receive equal treatment in department/program	169	0.53	0.5
Believe domestic and immigrant faculty receive equal treatment in department/program	164	0.73	0.45
Believe LGBTQ+ and straight faculty receive equal treatment in department/program	136	0.82	0.38
Campus climate ratings			
Contentious vs. collegial	273	0.65	0.48
Disrespectful vs. respectful	273	0.67	0.47
Individualistic vs. collaborative	273	0.38	0.49
Competitive vs. cooperative	273	0.53	0.5
Unsupportive vs. supportive	273	0.63	0.48
Inequitable vs. equitable	273	0.46	0.5
Unfair vs. fair	273	0.55	0.5
Isolating vs. inclusive	273	0.49	0.5
Rating of campus climate (average score)	273	0.54	0.37
Decision-Making			
Department chair/head consults my opinion in decision-making	245	0.43	0.5
Department chair/head values my opinion in decision-making	219	0.54	0.5
Often communicate concerns about decisions to chair/head	240	0.47	0.5
Colleagues value my opinion in departmental decision-making	228	0.43	0.5
Departmental decision-making processes are fair	263	0.63	0.48
Departmental decision-making processes are transparent	248	0.52	0.5
Tenure & promotion criteria and decision-making process is clear	246	0.54	0.5
Tenure & promotion criteria are consistently applied	180	0.71	0.45
Promotion to Professor criteria and decision-making process is clear	185	0.31	0.46
Promotion to Professor criteria are consistently applied	131	0.6	0.49
Frequently asked to take on departmental leadership roles	259	0.46	0.5

Pandemic Impacts

Table 3 shows the descriptive statistics of a number of measures around the negative and positive impacts of the COVID-19 pandemic among STEM faculty. Incorporating these measures allows the ADVANCE team to further consider how the pandemic has shaped faculty experiences. In fact, only 7% of our survey respondents reported that they experienced no negative impacts of the pandemic.

Table 3. Descriptive Statistics of Pandemic Impact Measures

	N	Mean	SD
Positive Impacts			
I experienced no positive impacts on my productivity	247	0.29	0.45
Developed opportunities for new pandemic-related research/creative projects	247	0.15	0.36
Acquired new funding via pandemic-related opportunities	247	0.06	0.24
Technology and digital online communications facilitated collaborations	247	0.4	0.49
Greater access to research materials (e.g., new materials put online)	247	0.06	0.24
More opportunities to connect with collaborators	247	0.06	0.24
More technology to support collaboration	247	0.19	0.39
More time for research	247	0.04	0.21
New teaching or service opportunities	247	0.1	0.3
More opportunities to engage in community research synergies	247	0.04	0.21
Opportunities to take course releases/receive sabbatical credit	247	0.15	0.35
More accessibility for teaching, research, service, or creative work	247	0.05	0.22
Ability to recruit speakers and connect with colleagues that may otherwise be limited in-person	247	0.27	0.45
More time for research or creative activity due to work related cancellations	247	0.06	0.24
Greater holistic recognition of colleagues and students	247	0.11	0.31
Received more advice and/or mentoring	261	0.02	0.14
My colleagues have been more responsive	261	0.02	0.14
Felt more connected to my colleagues	261	0.03	0.18
Do not have a comparison	261	0.08	0.28
Negative Impacts			
I experienced no negative impacts	257	0.07	0.26
Limited access to research sites, archives, or creative sites	257	0.4	0.49
Unable to conduct human subjects research	257	0.23	0.42
Unable to conduct research on other living organisms	257	0.07	0.26
Problems accessing supplies for research or creative work	257	0.23	0.42
Challenges securing PPE for research or creative work	257	0.12	0.33
Inability to conduct work while still paying for personnel	257	0.28	0.45
Lacked access to technology to conduct research or creative work	257	0.1	0.3
Longitudinal projects disrupted	257	0.17	0.37
Disruptions to sabbatical or research leaves	257	0.2	0.4

Cancellation of conferences, seminars, performances, and other opportunities	257	0.67	0.47
Unable to access or spend out time-limited grant funds	257	0.14	0.35
Challenges hiring staff due to university limits and shortages	257	0.29	0.45
Challenges recruiting graduate students due to issues with visas	257	0.18	0.38
Challenges working with staff and students given COVID protocols	257	0.35	0.48
Less opportunities to connect with collaborators	257	0.55	0.5
Prohibited from travel necessary for research or creative work	257	0.32	0.47
Delays in peer review impacted my publication trajectory	257	0.19	0.39
Extra teaching demands	257	0.48	0.5
Extra service demands	257	0.42	0.5
Extra mentoring demands	257	0.37	0.48
Extra work demands limited my ability/time to work on research or creative work	257	0.46	0.5
Community or activist work limited my ability/time	257	0.07	0.25
Personal health issues limited my ability/time	257	0.11	0.32
Family or care demands limited my ability to work on research or creative work	257	0.44	0.5
received less advice and/or mentoring	261	0.38	0.49
My colleagues can offer less helpful advice because they do not have past experience navigating a pandemic	261	0.12	0.32
less likely to get impromptu feedback	261	0.5	0.5
I have felt less connected to my colleagues	261	0.62	0.49
My colleagues have been less responsive to requests for help or feedback	261	0.11	0.31
less likely to reach out for help or feedback	261	0.29	0.46
Feel less connected in the department/program	218	0.57	0.5
Departmental decision-making has become less transparent/democratic	216	0.1	0.3
Chair/head consults with me about department matters less often	186	0.16	0.37

Data Analysis

In this report, we mainly focus on analyzing how faculty's experiences on research collaboration, inclusion, and decision-making change vary by different social identities. All the measures analyzed in this report were collected using 5-point Likert scales. To present findings in a more straightforward way, we recoded these measures to dichotomous variables (1=yes and 0=no).

Our reports emphasize our commitment to intersectionality. UMass ADVANCE program, as its primary goal, concentrates on developing systematic programs and tools to promote gender equality in STEM fields. It also considers the intersection of gender and other social identities, such as race, sexuality, nationality, and rank. Intersectionality theory⁹ provides a framework that recognizes individuals

⁹ Collins, P. H., & Bilge, S. (2020). Intersectionality. John Wiley & Sons.

experiences are shaped by multiple intersecting identities, such as gender, race, class etc., especially during the pandemic¹⁰.

First, we prioritized the analysis on how experiences of collaboration, inclusion, and decision-making vary by gender because ADVANCE's goal of promoting gender equality in STEM. We used t-tests to test if there are significant gender differences in each measure.

Second, building on gender differences, we also reported our findings based on intersectional analyses. We examined how experiences in those three areas vary by gender and race, nationality, sexuality, rank, and new hires (whether they joined UMass before or since 2019, given the impact of the pandemic on faculty life) among STEM faculty. To capture intersectional differences, we created new categorical variables to capture two identities in one measure. For example, to understand differences by race and gender, we created a new measure with 6 categories: White men, White women, Asian men, Asian women, men from the underrepresented groups, and women from the underrepresented group. For intersectional analysis, we focused on reporting the high-level patterns and used chi-square tests to test if there are significant differences by groups (e.g., by gender and race). The goal is to draw conclusions on overall patterns rather than focus on any pairwise comparisons (e.g., between Asian men and Asian women). When analyzing the intersectional differences by gender and sexuality, we did not have a sufficient sample size of LGBTQIA+ faculty to conduct a comprehensive analysis of their experiences. However, we are committed to addressing this gap. We recognize the importance of understanding the unique experiences and needs of LGBTQIA+ faculty at UMass. To achieve this, we plan to expand our efforts beyond survey data collection to gain a more comprehensive understanding of LGBTQIA+ experiences and to better serve their needs.

Lastly, we present analyses comparing STEM and non-STEM faculty at UMass.

¹⁰ Max Jordan, N. T., & Browne, A. (2023). How race, sex and age interact in association with COVID-19 outcomes over time: An analysis of Michigan data. *PLoS One*, 18(8). <https://doi.org/10.1371/journal.pone.0288383>

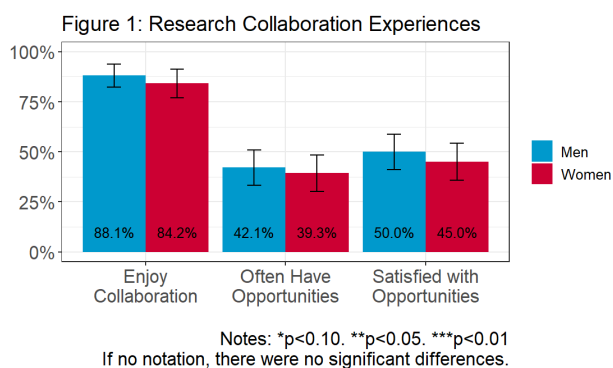
UMass ADVANCE Faculty Survey Research Collaboration Findings

Research collaboration, including working together on grant proposals, papers, patents, or other outputs, is critical to 21st century STEM faculty careers. Collaboration drives funding and productivity for many STEM researchers. Yet, most research finds that collaboration patterns differ by race and gender, in ways that disadvantage women and members of racially minoritized groups. In addition, the pandemic has interrupted opportunities to connect with colleagues. How do STEM researchers at UMass see collaboration in the current moment?



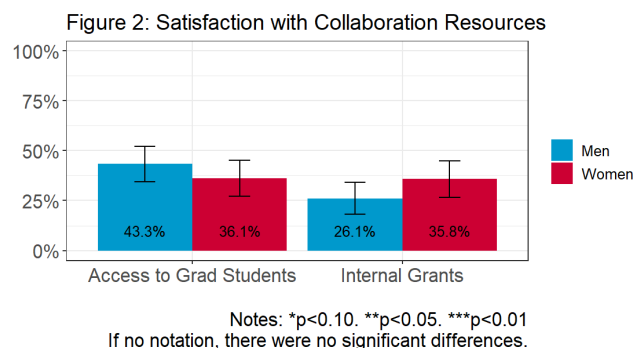
In the 2022 ADVANCE survey, 273 UMass faculty from 32 STEM departments in CICS, CNS, College of Engineering, and CSBS responded. In this research brief, we describe some of the key findings from this survey, focusing on patterns among STEM faculty by gender.

We explored differences by college, and found that there are not many differences among colleges around research collaboration. However, CICS faculty enjoy collaboration most and are most satisfied with their collaboration opportunities, though they report that they are less likely to have frequent opportunities for collaboration. Engineering faculty are more likely to report that they often have opportunities to collaborate with colleagues. By rank, we found that the differences in collaboration experiences are driven by the differences between non-tenure-track faculty and tenure-track faculty. There are no substantial differences among tenure-track faculty. In addition, we also compare experiences faculty who joined before and since 2019. We observe that faculty joining since 2019 report fewer collaboration opportunities and less access to graduate students, likely due to the pandemic.



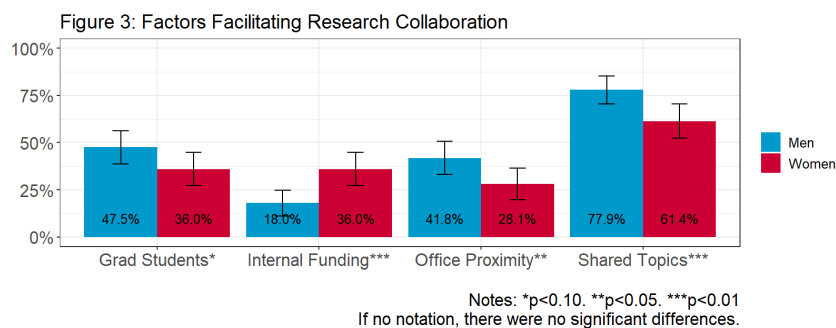
Most UMass STEM faculty members enjoy research collaborations with others. As shown in Figure 1, both women and men **enjoy collaborating** with their colleagues. However, they are less satisfied with opportunities to collaborate. Yet, the good news is that we do not observe statistically significant gender differences in experiences with research collaboration, clear progress since the 2018 survey.

The survey also asks whether faculty are satisfied with the resources for collaboration. As shown in Figure 2, there are no significant gender differences in satisfaction levels. However, both women and men show relatively **low satisfaction** levels regarding collaboration resources, especially opportunities for **internal grants** to fund collaborative research and **access to graduate students**.



UMass ADVANCE Faculty Survey Research Collaboration Findings

Further, the survey asked UMass faculty to identify factors facilitating research collaborations with their colleagues. There are no significant gender differences in most factors. For example, both women and men believe that collaborations are facilitated by complementarity in research topic (73%). Shared external funding (47%), social connections (35%), referrals by colleagues (19%), shared teaching (17%), or committee service (19%), play a relatively smaller role. Physical proximity of social spaces, physical resources on campus, or Zoom meetings also do not appear to operate differently by gender.



Yet, as shown in Figure 3, some factors appear to facilitate collaboration differently by gender. For example, **men are significantly more likely to consider shared research topics ($p<0.05$) and physical proximity of offices and lab spaces ($p<0.05$) as factors**

facilitating collaborations with colleagues on campus. In comparison, **shared internal funding plays a significantly more important role in facilitating women's collaboration ($p<0.05$)**, although there are no significant gender differences in satisfaction towards internal funding (as shown in Figure 2). Furthermore, even though both women and men report low satisfaction in access to grad students, **men are marginally more likely to see shared graduate students as a factor to facilitate collaboration.**

Implications for Intervention: The pandemic has impacted faculty collaborations in a number of ways. It is possible that both the pandemic and the interventions of the ADVANCE team have led to fewer gender differences in collaboration experiences at the university when comparing the 2022 survey to the 2018 survey. Yet, clearly, there remain important challenges to collaboration on campus, that require continued intervention. Thus, key interventions might include helping facilitate intellectual connections among faculty that can lead to collaboration, as well as providing additional opportunities for internal funding, particularly because women appear to benefit from internal funding. ADVANCE has developed important [interventions and tools](#) available on our website for how to create equitable collaborations. Collaborative relationships require continuing assessment and attention to equity.

Through the power of collaboration UMass ADVANCE provides knowledge driven research and solutions for faculty equity. ADVANCE cultivates faculty equity, inclusion and success by providing the resources, recognition and relationship building that are critical for equitable and successful collaboration in the 21st century academy. UMass ADVANCE is funded by the National Science Foundation (NSF), which is advancing gender and racial equity for faculty in science and engineering. For more information on UMass ADVANCE go to: <https://www.umass.edu/advance/home>

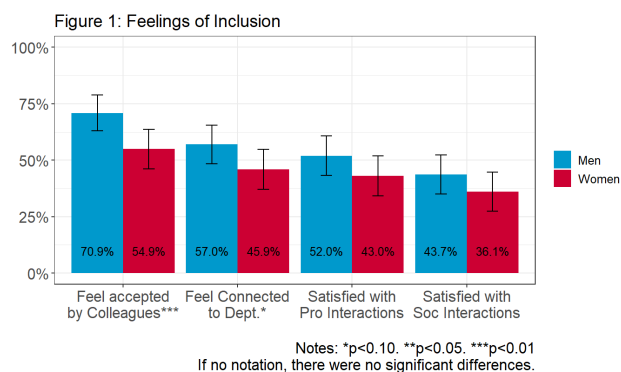
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UMass ADVANCE Faculty Survey Inclusive Community Findings

Inclusion refers to faculty members feeling connected, valued, respected, and heard in their departments and the larger UMass community. The pandemic has had a dramatic impact on feelings of inclusion, as many people have spent months or years primarily working from home, with fewer opportunities to meet and connect with colleagues.

In the 2022 ADVANCE survey, 273 UMass faculty from 32 STEM departments in CICS, CNS, COE, and CSBS responded. In this research brief, we describe some of the key findings from this survey, focusing on patterns among STEM faculty by gender.

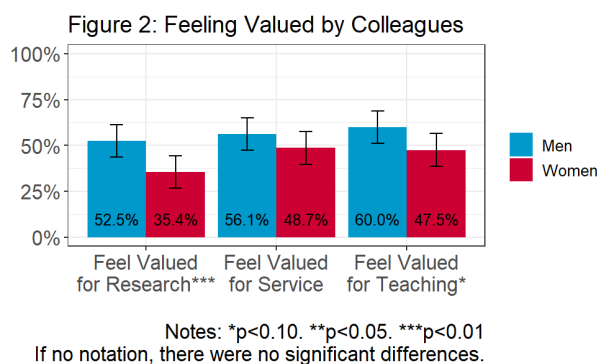
We also explored any differences by college and found that there are not many differences by college around inclusive community. Overall, CICS faculty rate their department climate most highly and consider their unit more inclusive. However, faculty in the college of engineering report high levels of feeling accepted by colleagues. By rank, there are significant differences between non-tenure-track and tenure track faculty, but fewer differences between assistant professor and tenured professors. We do not observe many differences based on year of hire.



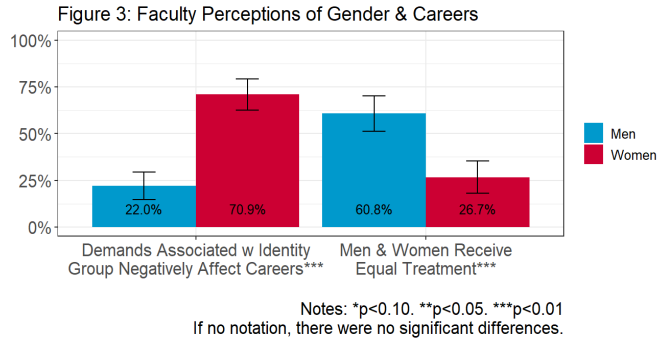
Overall, feelings of inclusion have gone down on campus since the 2018 survey, likely as a result of the disruptive impact of the pandemic. Men who are UMass STEM faculty are more likely to report feeling accepted by their department colleagues and connected to their departments, as shown in Figure 1. **Women feel significantly less accepted by their colleagues ($p<0.05$) and significantly less connected to their departments ($p<0.1$).** There are no gender differences in satisfaction with professional and social interactions. However,

compared to feelings of being accepted or connected, both men and women reported **lower levels of satisfaction towards interactions**. This reflects how the pandemic has interrupted professional and social interactions.

On average, UMass STEM faculty feel “somewhat valued” to “valued” by their department colleagues, in terms of research, service, and teaching. The gender differences in these measures are worth noting. Compared to men, women feel significantly less valued by colleagues for their research ($p<0.01$). This is a critical measure at a research-intensive university and suggests that women do not feel seen for their research in the ways that men are. Women are also marginally less likely to feel valued for teaching ($p<0.1$). We do not observe significant gender differences in the measure of feeling valued for service, but Figure 2 suggests that there may be some gender differences.



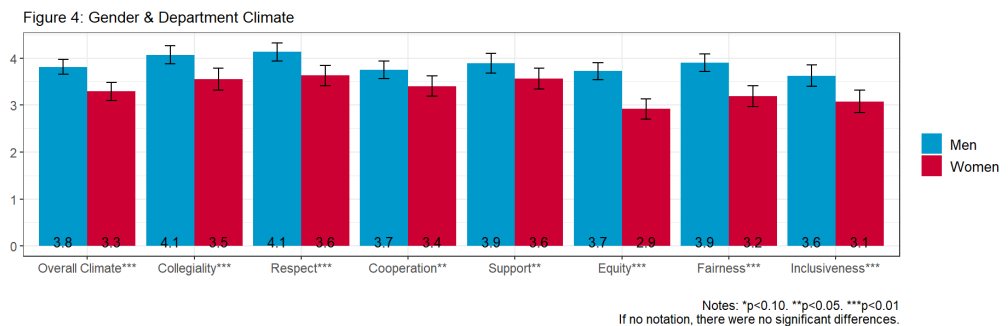
UMass ADVANCE Faculty Survey Inclusive Community Findings



We also asked UMass faculty how gender might affect their careers. As shown in Figure 3, women and men have substantially different perceptions: **women are significantly more likely to report that their careers are negatively affected by the demands or expectations associated with their identity (p<0.01)**. Indeed, more than two-thirds of STEM women experience these negative effects, while less than one quarter of STEM men report negative

effects. **In addition, women are much less likely to believe that women and men receive equal treatment in their departments/programs (p<0.01)**. The disjuncture here suggests that many men do not recognize the challenges women in STEM face.

The survey also asked faculty to rate their departments on a series of climate dimensions. On average, both men and women faculty rate the climate of their department somewhat positively,



but the climate ratings are still significantly gendered. As showed in Figure 4, women give significantly fewer positive ratings on many climate measures, suggesting **women STEM faculty consider their departments to be less collegial, respectful, cooperative, supportive, equitable, fair, and inclusive than their male colleagues**.

Implications for interventions: After the onset of the COVID-19 pandemic, many relationships became more tenuous, as more and more activities moved online, and there have been fewer opportunities for faculty members to interact professionally and socially. ADVANCE will continue to promote [tools](#) aimed at creating solutions for more inclusive, cohesive, and engaged departmental cultures. ADVANCE also has a role to play in promoting women's research and helping make their contributions to campus more visible. Yet this recognition work also needs to be taken up more broadly at the university.

Through the power of collaboration UMass ADVANCE provides knowledge driven research and solutions for faculty equity. ADVANCE cultivates faculty equity, inclusion and success by providing the resources, recognition and relationship building that are critical for equitable and successful collaboration in the 21st century academy. UMass ADVANCE is funded by the National Science Foundation (NSF), which is advancing gender and racial equity for faculty in science and engineering. For more information on UMass ADVANCE go to: <https://www.umass.edu/advance/home>

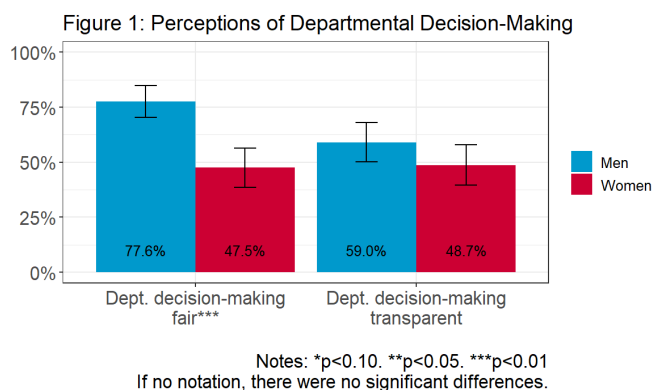
Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: Inclusive Community Findings."

UMass ADVANCE Faculty Survey Shared Decision-Making Findings

Shared decision-making refers to faculty having opportunities to engage in discussions, voice their opinions, and have those opinions recognized as departments make decisions. While the university has a long history of faculty-led governance, there has always been substantial variability between departments. In addition, the pandemic has depressed opportunities for faculty to work together to make formal and informal decisions.

In 2022, 273 UMass faculty from 32 STEM departments in CICS, CNS, College of Engineering, and CSBS responded to the ADVANCE survey. In this research brief, we describe some of the key findings from this survey, focusing on patterns among STEM faculty by gender. We also explored college level data and found that there are not many differences by college. CICS faculty, who engage in weekly faculty meetings, rate the fairness and transparency of their departmental decision-making relatively higher than faculty in other colleges. CICS faculty are also more likely to believe their tenure and promotion processes are clear and consistent.

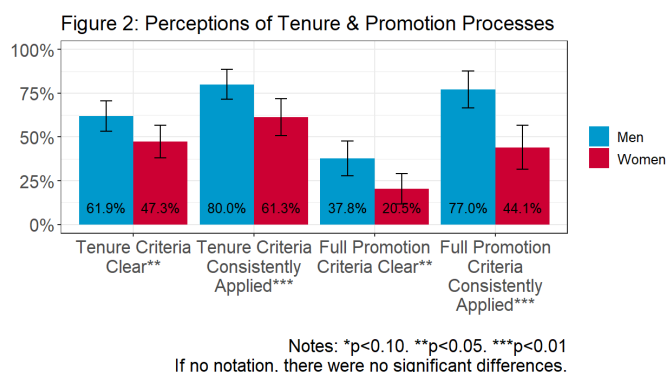
By faculty career stage, we found that **rank plays an important role in shaping the perceptions of departmental decision-making**. Junior faculty believe that departmental decision-making is less transparent to them, and the tenure and promotion processes are less clear and transparent. Non-tenure track faculty are also less likely to see decision-making in the department as fair and transparent. Yet, whether faculty joined UMass before or since 2019 does not shape their experiences around decision-making.



making is fair, as compared to 77.6% of men ($p<0.01$). We also observe marginal gender differences in decision-making transparency ($p<0.1$).

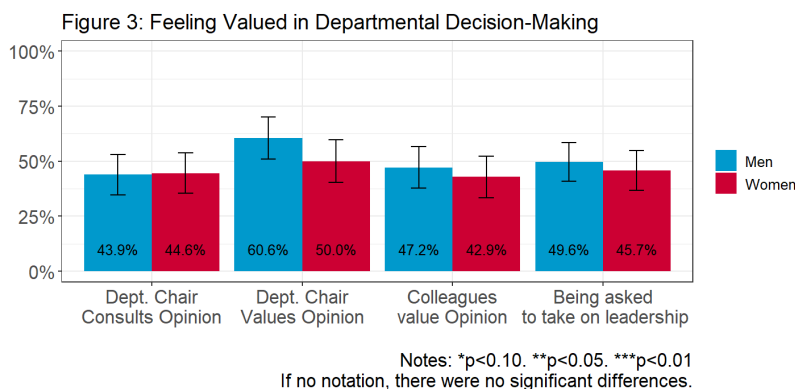
The survey also asked faculty about their perceptions on specific personnel procedures in their departments and programs, including tenure and promotion to Full Professor. Figure 2 suggests significant gender differences in the perceptions of promotion processes. **Women STEM faculty are significantly less likely than men to believe that the tenure criteria is clear** ($p<0.05$), and **they are also significantly less confident that the tenure criteria are applied consistently** ($p<0.01$). In terms of promotion to

Figure 1 summarizes faculty members' perceptions of departmental decision-making processes. The majority (63%) of STEM faculty believe that the decision-making process in their department is fair, but fewer (52%) think that these processes are transparent. Thus, while many believe that the department works to make decisions fairly, how those decisions are made is not always clear. Gender significantly affects these perceptions: **47.5% of women STEM faculty report that departmental decision-**



UMass ADVANCE Faculty Survey Shared Decision-Making Findings

Full Professor, women associate professors and full professors are significantly less clear on the criteria ($p < 0.05$), and they are significantly less likely to believe that these criteria are consistently applied ($p < 0.01$), compared to men associate and full professors. Overall, we observe **substantial gender differences in the perceptions of consistent tenure and promotion criteria and gender plays a significant role in how faculty feel about decision-making processes** for departmental personnel procedures.



The survey also includes measures of how engaged faculty feel in departmental decision-making processes, based on their interactions with department chairs/heads and colleagues. The good news is that, as shown in Figure 3, we do not see significant gender differences in feeling valued in decision-making. On average, 54% of STEM faculty report that their chairs value their

opinion while only 43% of them report that their chairs actually consult their opinion. Similarly, only 43% of STEM faculty report that their colleagues value their opinion for departmental decision-making. Lastly, around 46% of STEM faculty report that they are asked to take on leadership roles. We suspect that these numbers reflect how the lack of interaction among faculty, due to changes in response to the pandemic, has made decision-making processes less consultative.

Implications for interventions: Meaningful interactions among faculty are critical to creating democratic decision-making. ADVANCE provides [tools](#) around how to make decisions fairly, including considering different approaches to bylaws and voting, and will continue to promote these resources with an aim to strengthening decision-making on campus. ADVANCE also provides [tools](#) for inclusive mentoring, which plays a key role in ensuring that faculty understand how personnel decisions are made, as well as [tools](#) for inclusive evaluation, which plays a key role in ensuring that personnel decisions are made fairly. ADVANCE will continue to provide support to leaders, to ensure that they have tools to engage in inclusive leadership.

Through the power of collaboration UMass ADVANCE provides knowledge driven research and solutions for faculty equity. ADVANCE cultivates faculty equity, inclusion and success by providing the resources, recognition and relationship building that are critical for equitable and successful collaboration in the 21st century academy. UMass ADVANCE is funded by the National Science Foundation (NSF), which is advancing gender and racial equity for faculty in science and engineering. For more information on UMass ADVANCE go to: <https://www.umass.edu/advance/home>

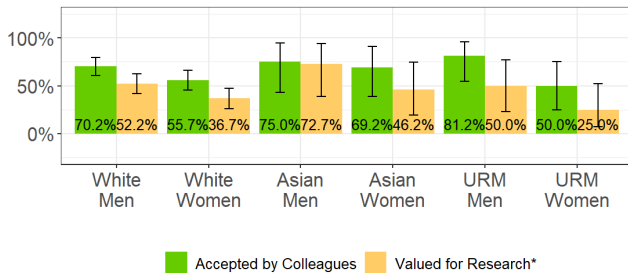
Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: Decision-Making Findings."

STEM Faculty Experiences by Gender and Race

The UMass ADVANCE program is working to ensure greater equity among faculty through the power of collaboration. In the 2022 ADVANCE survey, 273 UMass faculty from 32 STEM departments in CICS, CNS, College of Engineering, and SBS responded. In this research brief, we describe some of the key findings from this survey, focusing on patterns among STEM faculty by **gender** and **race**¹¹. We explore whether and how the intersection of gender and race affect STEM faculty inclusion, shared decision-making, and research collaboration.



Figure 1: Feelings of Inclusion



Notes: *p<0.10. **p<0.05. ***p<0.01
If no notation, there were no significant differences.

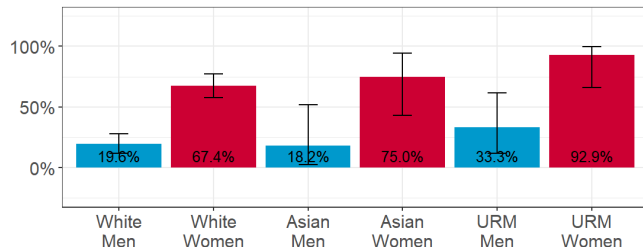
URM groups feel especially undervalued for their own research, with only 25% feeling valued.

Similarly, Figure 2 shows that White and Asian men are least likely to report that their careers are negatively affected by demands associated with their identity groups. **Women across all racial groups** are much more likely to report that their careers are **negatively affected by demands** associated with their identity groups. Men from underrepresented groups are also more likely than white and Asian men to report that their careers are negatively impacted by these demands, but their experience is still substantially better than

Feelings of

inclusion among STEM faculty are shaped by both gender and race. As Figure 1 shows, men and Asian faculty are most likely to report feeling accepted by colleagues and valued for their research. Women from underrepresented minority (URM) groups and white women feel least accepted by colleagues and the least valued for their research. Asian women are more likely than other women to feel accepted by colleagues but are less likely than men to feel valued for their research. **Among all groups, women from URM groups feel especially undervalued for their own research, with only 25% feeling valued.**

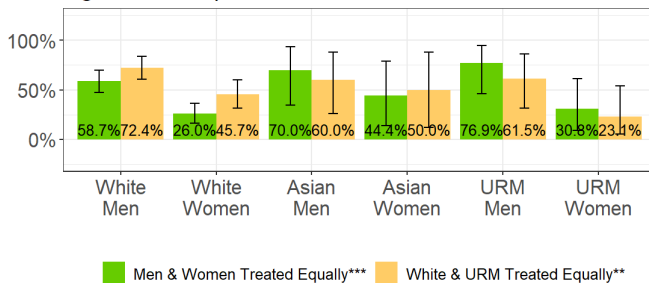
Figure 2: Demands Associated with Identity Group Have a Negative Effect on Career Goals***



Notes: *p<0.10. **p<0.05. ***p<0.01
If no notation, there were no significant differences.

women from URM groups.

Figure 3: Perceptions of Treatment



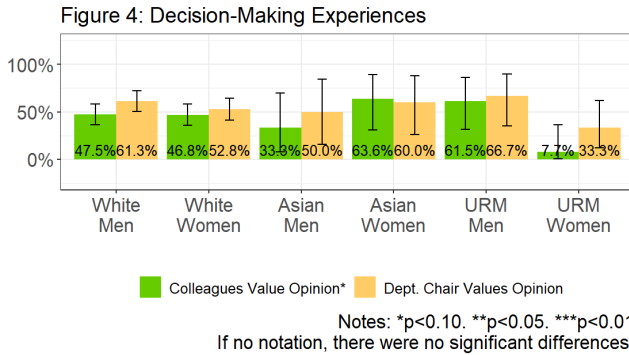
Notes: *p<0.10. **p<0.05. ***p<0.01
If no notation, there were no significant differences.

As shown in Figure 3, women are also less likely to believe that men and women are treated equally, or that white and racial minority faculty are treated equally. **Among all groups, women from URM groups, followed by white women, are most likely to perceive treatment as unequal.** Yet men of all groups are more likely to see men and women being treated equally,

¹¹ Faculty are grouped by white men (n=95), white women (n=89), Asian men (n=12), Asian women (n=13), men from underrepresented racial minority (URM) groups (n=16) and women from URM groups (n=16). URM includes the categories "American Indian or Alaskan Native", "Black", "Hispanic or Latino origin", and anyone who chose "Multi-Racial" or "Other" and provided a response indicating they were a member of a traditionally underrepresented community.

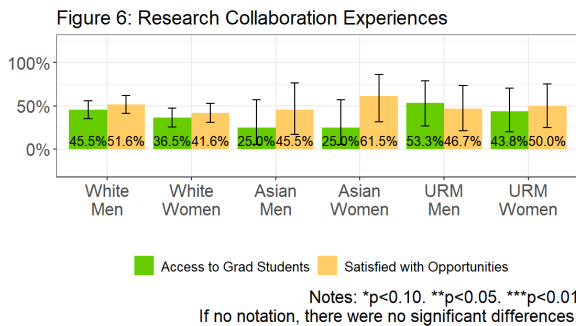
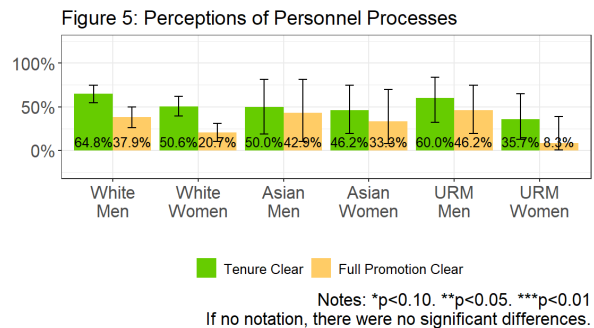
STEM Faculty Experiences by Gender and Race

while also more likely to think that white and URM faculty are treated equally.



As for experiences with decision-making, STEM faculty generally report that their opinions are valued by departmental chairs/heads and colleagues, though for most groups, they are more likely to see their chair/head as valuing their opinion. However, as Figure 4 shows, women faculty from URM groups feel much less valued than other groups in decision-making. They especially feel less valued by their colleagues. Asian men also feel considerably less likely to think that their colleagues value their opinion.

Figure 5 shows perceptions towards the tenure and promotion processes. Men across all racial groups are more likely to report that they perceive tenure & promotion processes as clear than women. **Only 36% of women STEM faculty from underrepresented groups feel that tenure & promotion processes are clear, while only 8% of women associate and full professors from underrepresented groups believe that promotion to full processes are clear.** White and Asian women report more clarity on tenure than women from underrepresented groups, but tenured white women also show very low levels of clarity on promotion to full. Men from underrepresented groups and white men faculty are more likely to report that the tenure processes are clear, compared to Asian men, and URM men and Asian men are more likely to report that full promotion processes are clear.



In the context of research collaboration, on average, UMass STEM faculty report that they are “somewhat dissatisfied” or “neither satisfied or dissatisfied” with opportunities for collaboration; however, collaboration opportunities vary by gender and race. As Figure 6 shows, **both men and women STEM faculty from Asian groups are the least satisfied with access to graduate students.** In terms of groups who report the highest satisfaction, men STEM faculty from URM groups are the most satisfied with access to graduate students of

any group, while Asian women are the most satisfied with their collaboration opportunities. These findings underline the importance of looking at intersections of gender *and* race to understand faculty collaboration experiences.

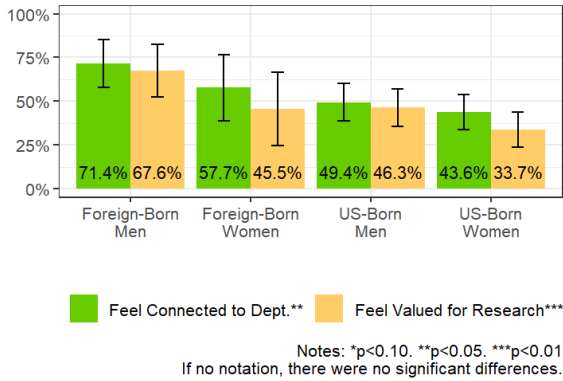
Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: STEM Faculty Experiences by Gender and Race."

STEM Faculty Experiences by Gender and Nationality

The UMass ADVANCE program is working to ensure greater equity among faculty through the power of collaboration. In the 2022 ADVANCE survey, 273 UMass faculty from 32 STEM departments in CICS, CNS, College of Engineering, and SBS responded. In this research brief, we describe some of the key findings from this survey, focusing on patterns among STEM faculty by **gender** and **nationality**¹². We explore whether and how the intersection of gender and nationality affect STEM faculty inclusion, shared decision-making, and research collaboration.

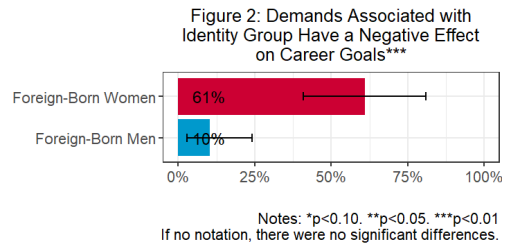


Figure 1: Feelings of Inclusion



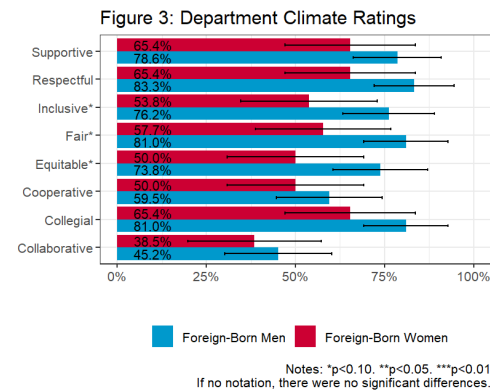
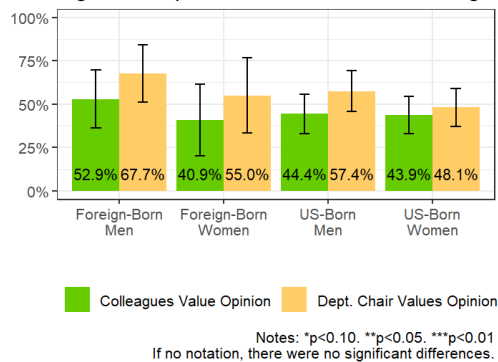
Feelings of inclusion among STEM faculty are reflect both nationality and gender. As Figure 1 shows, foreign-born faculty and men faculty are more likely to report that they feel connected to their department and feel valued for their research. **US-born women faculty are the least likely to feel this way:** only 43.6% of them report feeling connected to department and only 33.7% of them report feeling valued for research. This reflects a change since our 2018 survey, in which foreign-born women were the least likely to report feeling connected to the department or valued for their research. This may reflect pandemic effects on US born STEM women.

Figures 2 and 3 focus on differences among foreign-born faculty. Foreign-born women faculty are six times as likely to report that the demands associated with their identity group have a negative effect on their career goals, and they rate their department climate lower than foreign-born men, although there is some overlap in the confidence intervals.



Figures 4 and 5 examine experiences with decision-making and perceptions of personnel processes among STEM faculty. We do not see significant differences in decision-making experiences by gender and nationality in Figure 4.

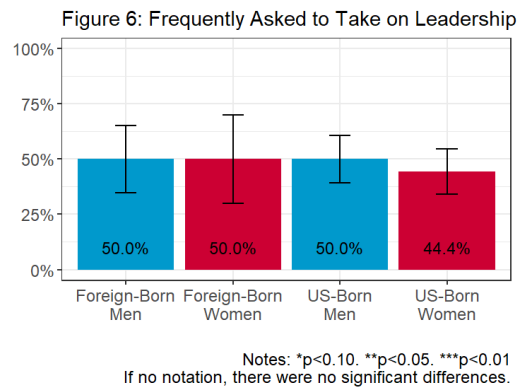
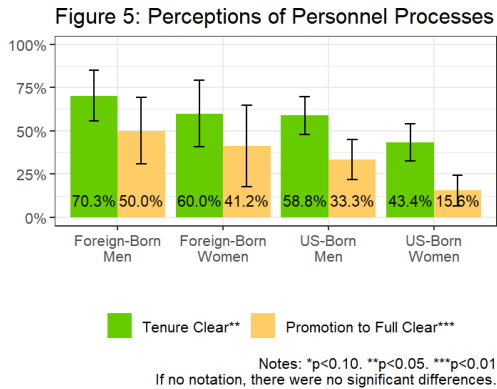
Figure 4: Experiences with Decision-Making



In terms of personnel processes, foreign-born faculty and men faculty are more likely to believe that the tenure and promotion criteria are clear. US-born women faculty are least likely to perceive promotion to full criteria as clear.

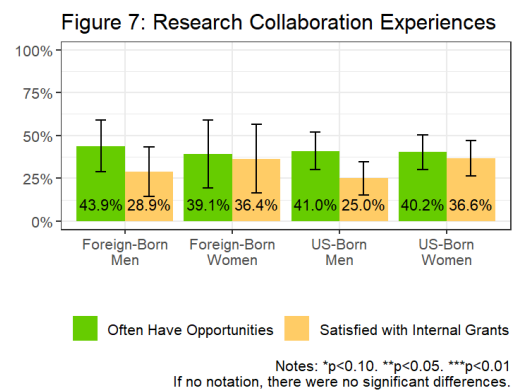
¹² 27.3% of STEM survey respondents were born outside of the US. Faculty are grouped by foreign-born men (n=42), foreign-born women (n=26), US-born men (n=85), and US-born women (n=96).

STEM Faculty Experiences by Gender and Nationality



We also examined another measure of decision-making (Figure 6). In the 2018 survey foreign-born faculty, especially foreign-born women faculty, were less frequently asked to take on leadership roles. The good news is that based on our 2022 survey, we no longer see significant differences by gender and nationality anymore. This suggests that the university has made progress on bringing more faculty into leadership opportunities.

In terms of research collaboration experiences (Figure 7), **we also no longer see significant differences by gender and nationality, based on the 2022 survey.** The findings based on the 2018-2019 survey pointed out the disadvantaged situations of foreign-born women faculty that need to be addressed by interventions. In 2022, foreign-born faculty are more comparable with US born faculty in terms of collaboration opportunities. Both foreign-born women and US born women are somewhat more satisfied with internal grants. This suggests that interventions into creating more diverse and equitable collaborations, including by UMass ADVANCE, have been successful.

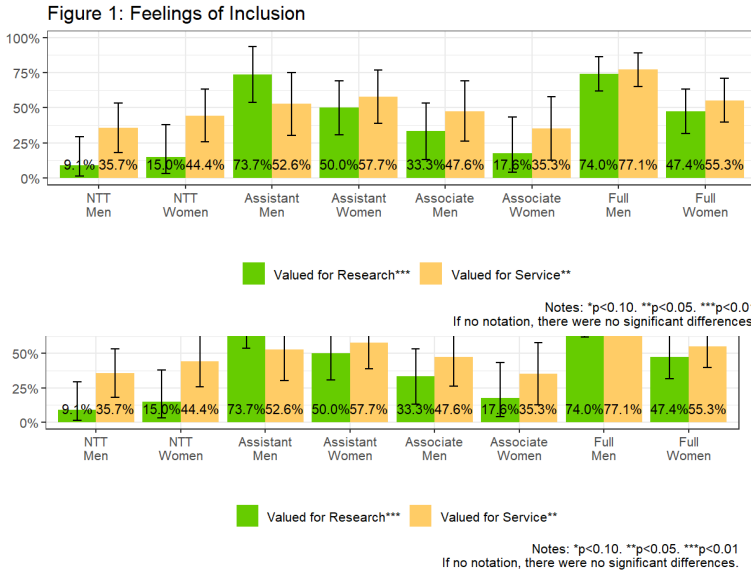


Next Steps: It appears that some of the most dramatic differences between US born and foreign-born faculty have been mitigated between 2018 and 2022, either due to interventions on campus, or through the leveling effect of the pandemic. Foreign born faculty now feel a greater sense of inclusion, but in the wake of the pandemic, there remains work to do to make all faculty feel more connected and included. Foreign-born faculty women particularly feel the impact of their identity group on career goals, and feel less included than foreign-born faculty men, which requires intervention. Interventions around decision-making, leadership, and collaboration have been more effective, and should be continued.

Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: STEM Faculty Experiences by Nationality and Gender."

STEM Faculty Experiences by Gender and Rank

The UMass ADVANCE program is working to ensure greater equity among faculty through the power of collaboration. In the 2022 ADVANCE survey, 273 UMass faculty from 32 STEM departments in CICS, CNS, College of Engineering, and SBS responded. In this research brief, we describe some of the key findings from this survey, focusing on patterns among STEM

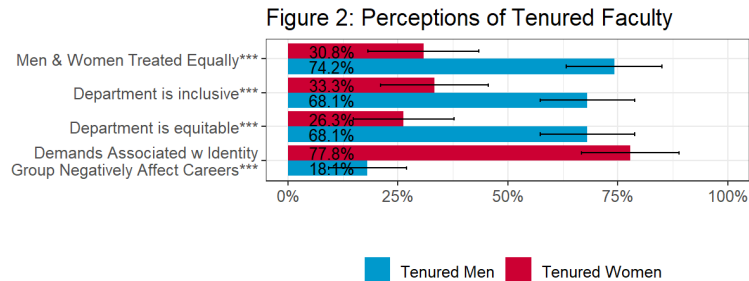


faculty by **gender and rank**¹³. We explore whether and how the intersection of gender and rank affect STEM faculty inclusion, shared decision-making, and research collaboration.

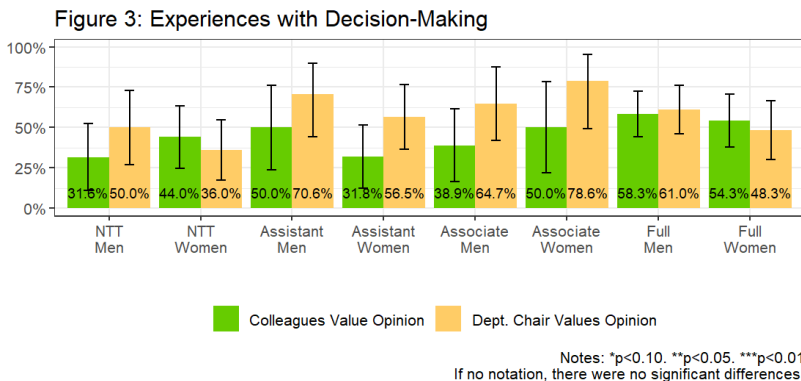
Feelings of inclusion are shaped by gender and rank, as shown in Figure 1. **Women across ranks feel less valued for their research than men at the same rank, except for non-tenure-track faculty.** Assistant and Full Professor men faculty feel the most valued for their research. **For service, men Full Professors feel most valued (77.1%) while women Associate Professors feel**

least valued (35.3%).

Figure 2 compares tenured faculty using four measures of perceptions of campus climate and reveals substantial gender differences. Among tenured professors, **only 18.1% of men compared to 77.8% of women report that demands associated with their identity group negatively affects their careers.** Women tenured professors are also significantly less likely to report men and women are treated equally, and their department as inclusive and



equitable.



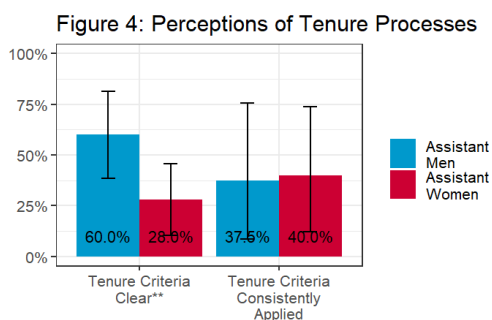
In the context of decision-making, there is more convergence among STEM faculty who report that their opinions valued by their department chair and heads, **with the exception of non-tenure-track women (36%) and women Full Professors (48.3%),** as shown in Figure 3. As for experiences with colleagues in general, **women**

¹³ In this brief, faculty are grouped by non-tenure-track men (n=29), non-tenure-track women (n=29), Assistant professor men (n=20), Assistant women (n=26), Associate men (n=21), Associate women (n=17), Full men (n=51), and Full women (n=40).

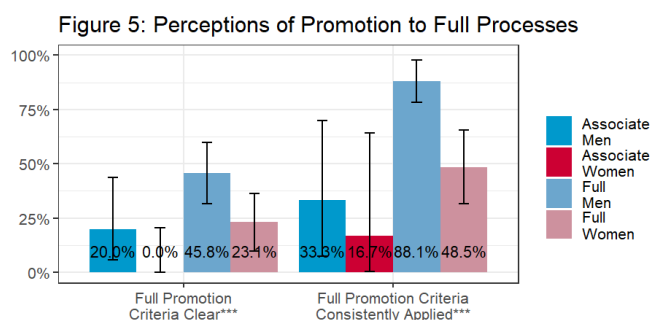
STEM Faculty Experiences by Gender and Rank

Assistant Professors and non-tenure-track men faculty feel the least valued by their colleagues in decision-making, followed by men Associate Professors, compared to other groups.

Figures 4 and 5 examined perceptions of personnel processes. Among Assistant Professors, **women faculty are much less likely than men faculty to report that the tenure criteria are clear ($p < 0.05$)**. The good news is that there are larger percentages of Assistant Professors reporting tenure criteria are clear, compared to what we found in the 2018-2019 survey. Among tenured faculty, we also see significant differences by gender and rank. Women are much less likely to report that promotion to Professor is clear and that criteria are applied consistently, either at the Associate-level or the Full-Professor-level. Women Associate Professors are in the most disadvantaged position among all tenured faculty: none of them believe the promotion to Full criteria are clear and only 16.7% of them believe the criteria are consistently applied.

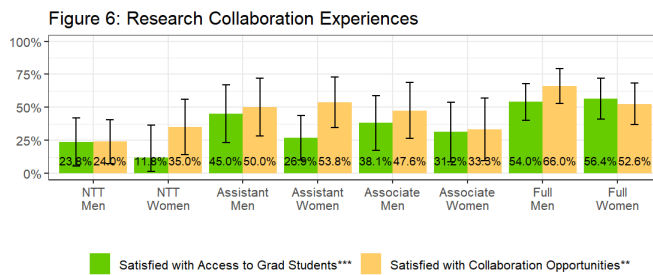


Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
If no notation, there were no significant differences.



Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
If no notation, there were no significant differences.

In the context of research collaboration experiences, we observe significant differences by gender and rank. **Among tenure-track faculty, women Assistant Professors are the least satisfied with access to graduate students and women Associate Professors are the least satisfied with collaboration opportunities. In addition, the satisfaction levels of collaboration among women do not necessarily improve or improve much after they are tenured, although they are higher among Full Professor women.**



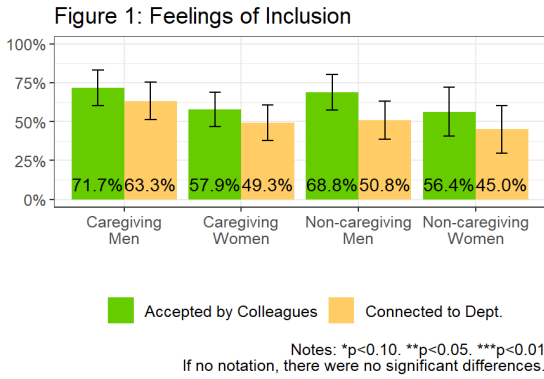
Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
If no notation, there were no significant differences.

Next Steps: These data make clear that there remain a number of important differences among faculty by rank and gender. Overall, faculty who are not on tenure-track, both men and women, feel disregarded for their research, see their opinions as less valued in decision-making, and are less satisfied with collaboration opportunities. For tenure-track faculty, there are substantial gender differences, with men assistant and full professors generally feeling more valued than women assistant and full professors. Both associate men and women feel less valued for research and service – but associate women report feeling particularly devalued. Most troubling is that women, including tenured women, are less likely to report their departments as inclusive and equitable, and are less likely to see tenure and promotion criteria as clear and consistently applied. ADVANCE work must focus on creating more equitable department environments, highlighting the research contributions of women faculty, and ensuring that tenure and promotion criteria are clear to all faculty. [UMass ADVANCE tools](#) on equitable evaluation practices, and on crediting collaborative work equitably may provide a starting point to address these issues.

Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: STEM Faculty Experiences by Gender and Rank."

STEM Faculty Experiences by Gender and Caregiving Status

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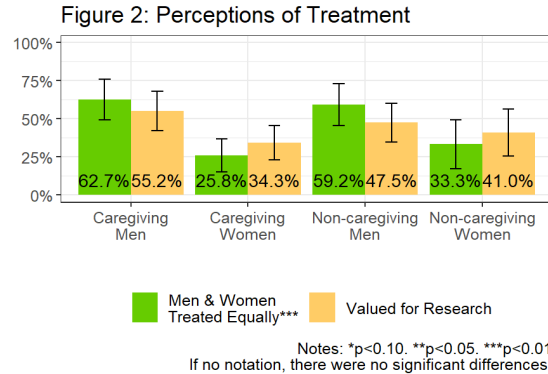
the intersection of gender and caregiving status affect

STEM faculty inclusion, shared decision-making, and research collaboration.

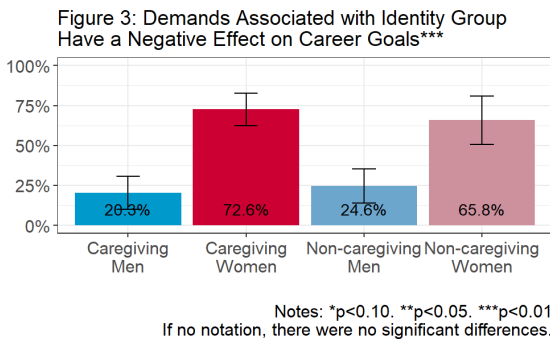
Feelings of inclusion among STEM faculty are shaped by both caregiving status and gender. Overall, men feel more accepted and connected than women, but there are further differences by caregiver status. In 2018, caregiving men and women felt less accepted and connected to their

departments than non-caregiving men and women; yet in the 2022 survey, non-caregiving men and women report feeling less connected to their departments. As a result, non-caregiving women feel the least accepted by colleagues and connected. This shift may reflect the isolating effect of the pandemic on some faculty members.

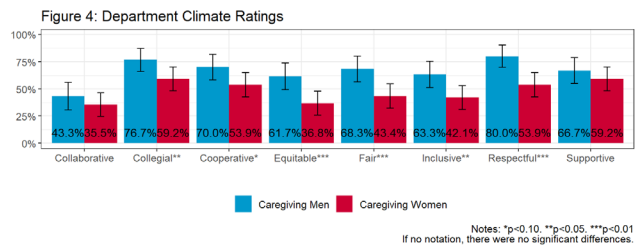
As shown in Figure 2, **caregiving shapes perceptions of treatment in a more gendered way**. We can see that caregiving men’s perceptions of treatment are relatively comparable to non-caregiving men, but this is not the case for women faculty. **Caregiving women feel the least valued for their research and are the least likely to report that men and women are treated equally (shown in Figure 2)**. In addition, **caregiving women are the most likely to report that demands associated with identity group have a negative effect on career goals (Figure 3)**. These data are comparable with data from 2018. When only comparing caregiving men and women, Figure 4 shows that **caregiving women rate their department climate significantly lower than caregiving men on most of the climate measures**. There is a significant difference in how caregiving women and men rate their departments in terms of collegiality, cooperativeness,



and cooperativeness, equity, fairness, inclusivity, and respect.

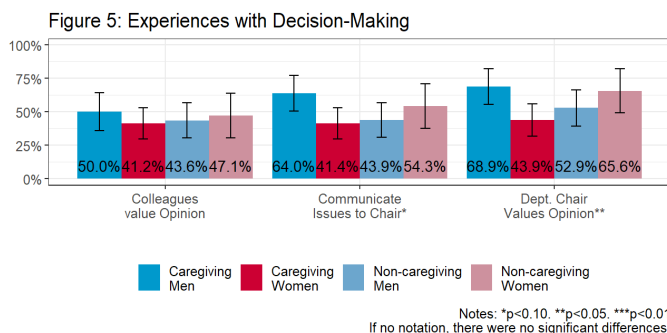


equity, fairness, inclusivity, and respect.



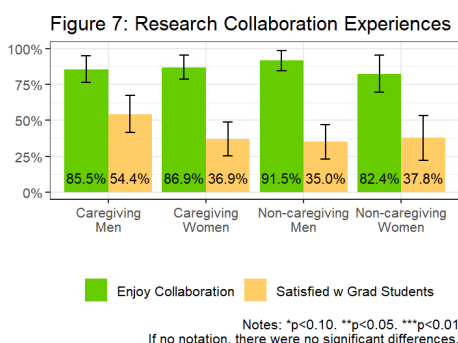
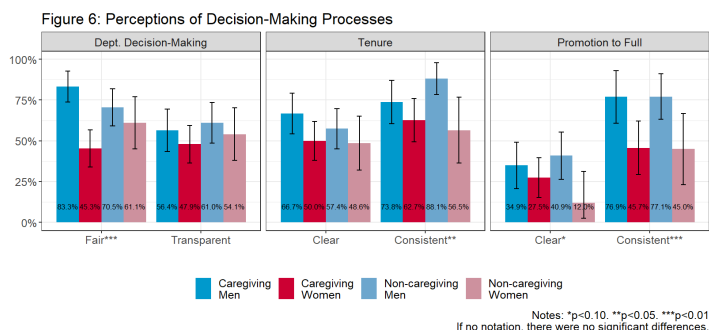
¹⁴ 52.9% of STEM survey respondents identified as primary caregivers of either children or adults. In this brief, STEM faculty are grouped by caregiving men (n=60), caregiving women (n=76), non-caregiving men (n=65), and non-caregiving women (n=41),

STEM Faculty Experiences by Gender and Caregiving Status



Experiences with decision-making are also shaped by gender and caregiving status, as shown in Figure 5. Among all four groups, caregiving men, followed by non-caregiving women, report communicating issues to their chair most frequently, and report feeling valued in decision-making. In comparison, caregiving women communicate issues to their chair least frequently, and they feel the least valued.

According to Figure 6, there is a clear gendered pattern in the perceptions of general decision-making processes and the personnel processes. Men are most likely to see these processes as fair, transparent, clear, and consistent, with caregiving men somewhat more positive. Differences among caregiving and non-caregiving women are less clear, although non-caregiving women tend to see department decision making as fairer than caregiving women.



In the context of research collaborations (as shown in Figure 7), STEM faculty across all groups enjoy collaborations very much. **Caregiving men are the most satisfied with their access to graduate students.** But in general, STEM faculty are not satisfied with their access to graduate students.

Next Steps: Caregiving was a central cut point among faculty during the pandemic, as many faculty had substantial caregiving responsibilities. In the wake of the pandemic, it is important to develop opportunities for faculty to reconnect, including those who did not have caregiving responsibilities and may have been most isolated. At the same time, caregiving women continue to feel demands related to their identity groups and find their departments less inclusive than caregiving men. Caregiving men report better experiences around decision-making and collaboration, suggesting the need for a focus on ensuring other groups also have opportunities in these realms.

Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: STEM Faculty Experiences by Gender and Caregiving Status.

Comparing STEM and Non-STEM Faculty Experiences

The UMass ADVANCE program works to ensure greater equity among faculty through the power of collaboration. In the 2022 ADVANCE survey, 453 UMass faculty responded and 273 of them are STEM faculty. We define STEM following NSF practices as faculty from College of Information and Computer Sciences, College of Natural Sciences, College of Social & Behavioral Sciences, and College of Engineering. All other faculty are coded as “non-STEM.”



In this research brief, we focus on **patterns between STEM faculty and non-STEM faculty by gender**¹⁵ in the areas of inclusion, shared decision-making, and research collaboration. While the findings in this brief indicate similar patterns for women faculty in both STEM and non-STEM fields, there are some differences between these fields. UMass ADVANCE interventions develop systemic and sustainable approaches to equity and inclusion in STEM, particularly for women, but interventions support greater equity across campus.

Figure 1: Feelings of Inclusion

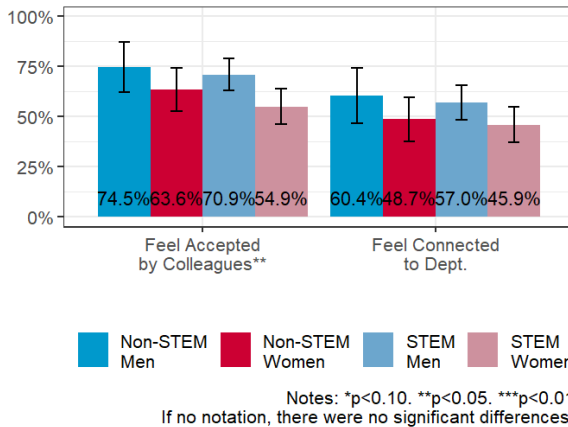
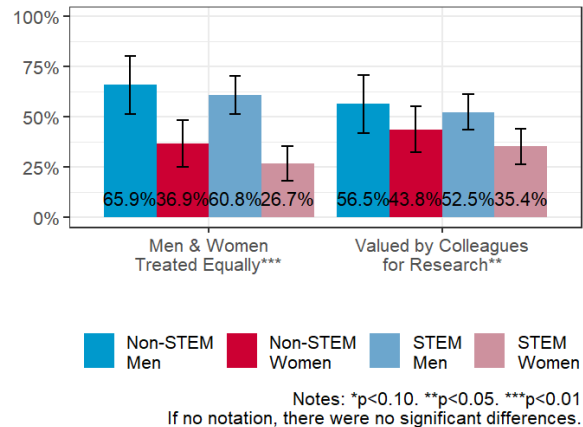
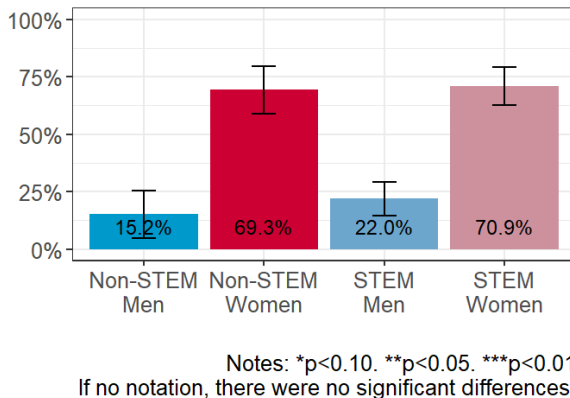


Figure 2: Perceptions of Treatment



Feelings of inclusion and perceptions of treatment among UMass faculty are shaped by gender and field. **Compared to men faculty, women faculty in both STEM and non-STEM fields feel less accepted by their colleagues, less connected to their department (as shown in Figure 1), and less valued by their colleagues (as shown in Figure 2).** In addition, women are less likely to perceive men and women as being treated equally. Among all groups, women from STEM fields are the least likely to perceive acceptance connection, and equal treatment.

Figure 3: Demands Associated with Identity Have a Negative Effect on Career Goals***

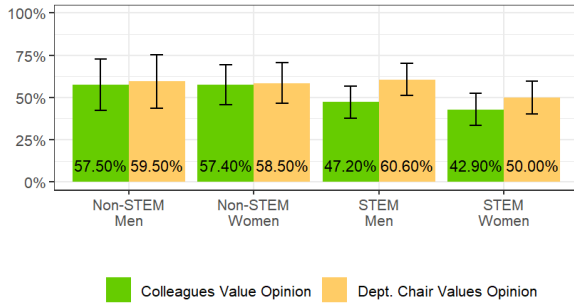


Women faculty are also much more likely to report experiencing negative effects on their career goals because of demands related to their identity than men faculty, as shown in Figure 3, though here non-STEM and STEM women are more comparable, while men in STEM report greater negative effects than men outside of STEM. Overall, we found gendered feelings of inclusion across different fields on campus.

¹⁵ 60.3% of survey respondents are in STEM disciplines. Faculty are grouped by non-STEM men (n=48), non-STEM women (n=78), STEM men (n=129) and STEM women (n=124).

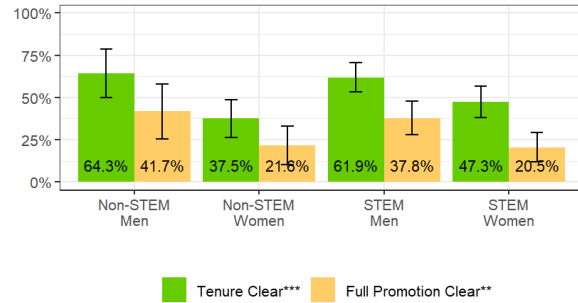
Comparing STEM and Non-STEM Faculty Experiences

Figure 4: Experiences with Decision-Making



Notes: *p<0.10. **p<0.05. ***p<0.01
If no notation, there were no significant differences.

Figure 5: Perceptions of Personnel Processes

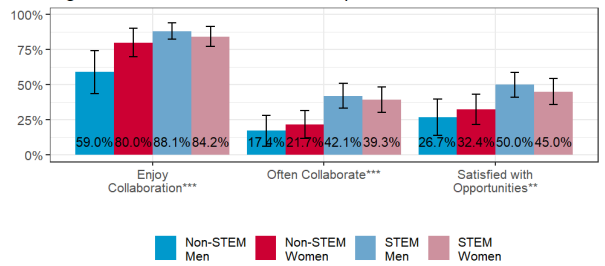


Notes: *p<0.10. **p<0.05. ***p<0.01
If no notation, there were no significant differences.

We do not find significant differences in decision-making experiences by gender and field, as shown in Figure 4. However, **STEM women report that their opinions are least valued by their colleagues (42.9%) and chairs (50%)**. In Figure 5, we also examine group differences in perceptions of personnel processes. **Again, we find the gendered perceptions across disciplines: compared to men, fewer assistant women find the tenure processes clear, and even fewer tenured women find promotion to Full processes clear.** Women from non-STEM fields are the least clear on tenure. As for the promotion to Full Professors processes, only a small percentage of women believe that those processes are clear: 21.6% of women from non-STEM fields and 20.5% of women from STEM fields.

In the context of research collaboration, UMass faculty across disciplines report enjoying collaborations in general, though this is least true for men outside of STEM. **However, non-STEM faculty collaborate less frequently and are less satisfied with collaboration opportunities, compared to STEM faculty.** Among all groups, non-STEM men are least likely to report enjoying collaboration, often collaborating, and are least satisfied with collaboration opportunities.

Figure 6: Research Collaboration Experiences



Notes: *p<0.10. **p<0.05. ***p<0.01
If no notation, there were no significant differences.

Next steps: There are many gender differences in the data, suggesting that ADVANCE's work on intersectional gender equity remains critical to campus, including for both STEM and non-STEM faculty. There is important work needed aimed at creating more equitable and inclusive department climates, and reducing the negative impacts of identity demands on women faculty. At the same time, women faculty at all ranks need better information about tenure and promotion expectations. Finally, helping create a more open environment for collaboration is also important. [UMass ADVANCE tools](#) on equitable practices in research collaboration, faculty governance and inclusive communities can provide a place to start for faculty and leaders who want to address these key issues for faculty equity.

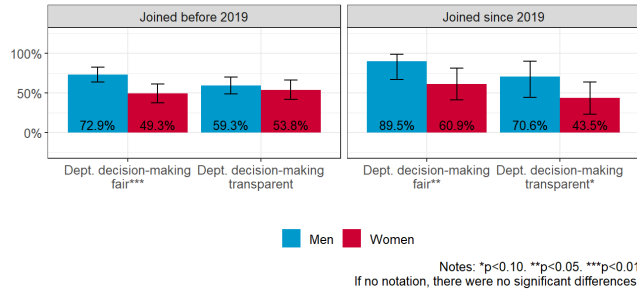
Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: Comparing STEM and Non-STEM Faculty Experiences."

Pandemic Effects by Gender and Time of Hire

The UMass ADVANCE program is working to ensure greater equity among faculty through the power of collaboration. In the 2022 ADVANCE survey, 273 UMass faculty from 32 STEM departments in CICS, CNS, College of Engineering, and SBS responded. In this research brief, we describe some of the key findings from this survey, focusing on patterns among STEM faculty by **gender** and **new hires (whether they joined UMass before or since 2019, given the impact of the pandemic on faculty life)**. We explore whether and how the intersection of gender and time of hire affect STEM faculty decision-making, feelings of inclusion, and research collaboration.



Figure 1: Perceptions of Departmental Decision-Making



How STEM faculty perceive decision-making processes in their department varies by gender and time of hire. As Figure 1 shows, a higher percentage of faculty who joined since 2019 believe that the decision-making process in their department is fair, compared to faculty who joined UMass before the pandemic. However, we notice **larger gender differences in fairness perceptions for newer hires**. Similarly, we do not see significant gender differences among faculty who joined before the pandemic for faculty's perceptions on whether decision-making is transparent, but we see **substantial gender differences among newer faculty** ($p<0.1$). Overall, among new hires, women are less likely than men to see decision-making as fair and transparent, which suggests that recent women hires are more “out of the loop” than men.

Overall, among new hires, women are less likely than men to see decision-making as fair and transparent, which suggests that recent women hires are more “out of the loop” than men.

We also compared faculty on their perceptions on tenure processes. As shown in Figure 2, for new faculty, there are statistically significant and substantial gender differences in the perceptions of tenure criteria clarity ($p<0.01$): only 38% of women STEM faculty believe that tenure criteria are clear, compared to 80% of men STEM faculty. Yet, in terms of the perceptions towards tenure criteria being consistently applied, we do not see gender differences for new hires. Overall, newly hired women are less certain of tenure criteria, and require mentoring on this topic.

Figure 2: Perceptions of Tenure & Promotion Processes

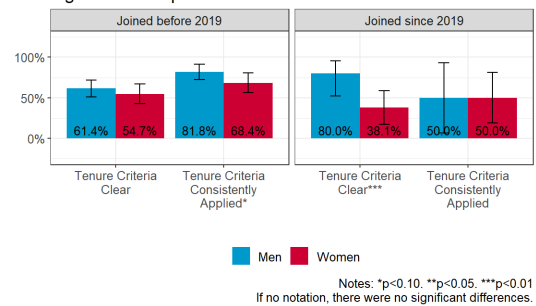
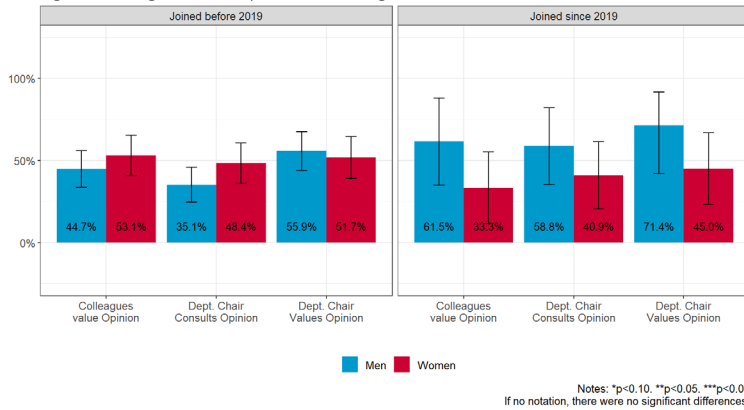


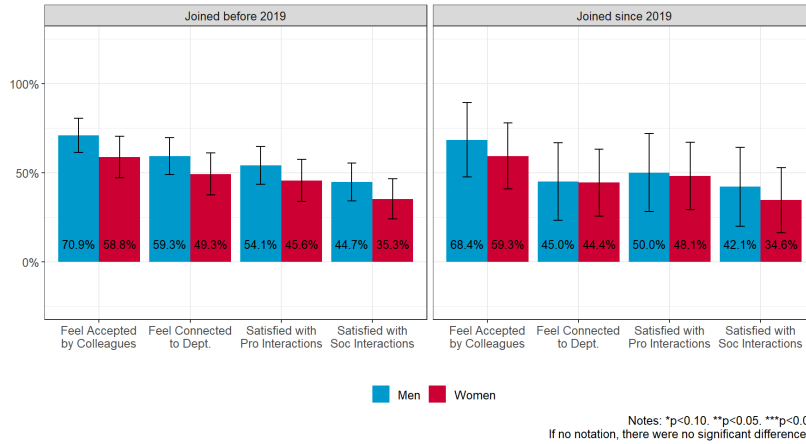
Figure 3: Feeling Valued in Dept. Decision-Making



In terms of how engaged faculty feel in decision-making, we see a trend of larger gender differences among new faculty, with women faculty feeling less valued in Figure 3, even though the gender differences are not statistically significant (likely due to the small sample size of faculty joining since 2019). Yet, importantly newly hired women are less likely than newly hired men to feel that their colleagues and department chair value their opinions and consult.

Pandemic Effects by Gender and Time of Hire

Figure 4: Feelings of Inclusion

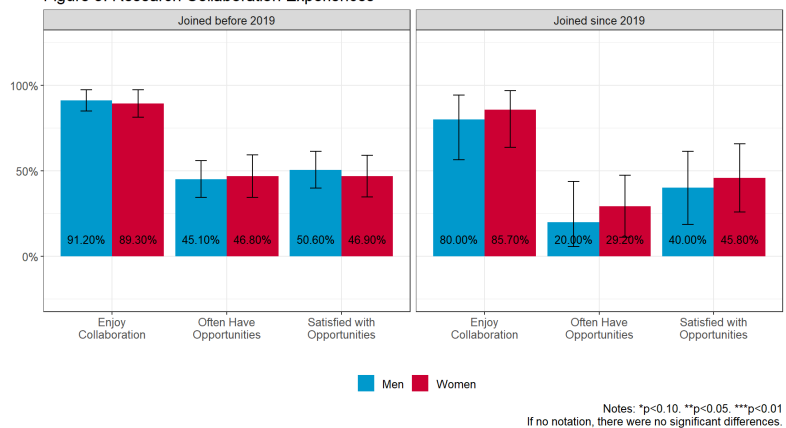


Next, we examine faculty's feelings of inclusion, as shown in Figure 4. **The good news is that based on our 2022 survey, we no longer see significant or substantial gender differences across multiple measures of feelings of inclusion, for faculty joining before and since 2019. However, in comparison to faculty's feelings reported in the 2018 survey, faculty now feel less included in general:** in particular, faculty feel less accepted by their colleagues (decreasing from 71% in

2018 to 63% in 2022), less connected to their department (decreasing from 62% to 51%), less satisfied with their professional interactions with colleagues (decreasing from 63% to 47%), and also less satisfied with social interactions with colleagues (decreasing from 53% to 40%). Thus, while gender differences are smaller, the pandemic has clearly had an impact on all faculty member's feelings of inclusion.

Lastly, in the context of research collaboration, we also do not see significant gender differences in collaboration experiences for both groups (new faculty and faculty joining before the pandemic), as shown in Figure 5. However, new faculty joining since 2019 have fewer collaboration opportunities ($p<0.1$), and they are less satisfied with those opportunities, compared to pre-2019 faculty. Thus, it is important to help engage new faculty in opportunities to collaborate with colleagues.

Figure 5: Research Collaboration Experiences



Recommendations: To support new faculty, especially women faculty, hired during the COVID-19 pandemic period, our data show that university leaders, departments, and other units can help by creating greater transparency in shared decision-making. See our [UMass ADVANCE tools](#) on equitable decision-making practices, which includes the research-based suggestion that pre-tenure faculty serve once on the departmental personnel committee to increase transparency and inclusion in shared governance. For inclusion, while newly hired faculty are more similar to their colleagues, feelings of inclusion have been dampened by the pandemic. We encourage departments to return to in-person faculty meeting, social events (including those held outside, in parks and other family-friendly environments), and draw upon our tools aimed at creating [inclusive departments](#). Finally, to support all newly hired faculty in research collaboration opportunities, see our [UMass ADVANCE tools](#) on creating equitable research collaborations, and setting up seed funding programs equitably.

Recommend Citation: Liu, Shuyin, Joya Misra, and Laurel Smith-Doerr. 2023. "UMass ADVANCE Faculty Survey Report: Pandemic Effects by Gender and Time of Hire."

APPENDIX: Survey Questions

Unless otherwise noted, measures were reported on 5-point Likert scales and, for the purpose of this report, were recoded as dummy variables (0=no, 1=yes).

Collaboration

- Do you like collaborating with faculty at UMass Amherst on research?
- How often do you have opportunities to collaborate with other faculty at UMass Amherst on research?
- How satisfied are you with the amount of opportunities for research collaborations with faculty at UMass?
- How satisfied are you with your access to graduate students for research collaborations?
- How satisfied are you with your access to Internal grants to support your collaborative research at UMass?
- Which of the following factors facilitate your research collaborations with other colleagues at UMass (select all that apply)?
 - Research topic similarity
 - Research complementarity
 - Shared external funding
 - Shared internal funding at UMass
 - Physical resources on campus
 - Graduate student in common
 - Physical proximity of offices/labs
 - Physical proximity of social spaces
 - Teaching
 - Shared committee service
 - Social connections
 - Referral by someone else
 - Shared internal research funding at UMass
 - Zoom meetings
 - Something else

Inclusion

- Do you feel connected to your department or program?
- Do you feel accepted by colleagues in your department or program?
- How valued do you feel by colleagues in your department/program for your research?
- How valued do you feel by colleagues in your department/program for your teaching?
- How valued do you feel by colleagues in your department/program for your service?
- How satisfied are you with the amount of professional interaction you experience with other faculty in your department or program?
- How satisfied are you with the amount of social interaction you experience with other faculty in your department or program?
- Do you feel demands or expectations associated with your identity group have had an effect on your pursuit of career goals?
- Please rate your department/program on the following dimensions
 - Contentious to collegial
 - Disrespectful to respectful
 - Individualistic to collaborative
 - Competitive to cooperative

- Unsupportive to supportive
- Inequitable to Equitable
- Unfair to Fair
- Isolating to Inclusive
- In your opinion, do men and women faculty in your department/program receive equal treatment in areas of recruitment, promotion, and resources?
- In your opinion, do racial minority faculty and White faculty in your department/program receive equal treatment in areas of recruitment, promotion, and resources?
- In your opinion, do immigrant and domestic faculty in your department/program receive equal treatment in areas of recruitment, promotion, career advice, and resources?

Decision-Making

- How consultative is your department head or chair in making decisions?
- In the decision-making process in your department, how much does your department head or chair value your opinion?
- If you have any concerns about departmental issues how often do you communicate these to your Head or Chair?
- In the decision-making process in your department how much do your colleagues value your opinion?
- Is the process by which decisions are made in your department/program fair?
- How transparent are the decision-making processes about policies, procedures, and personnel actions in your department/program?
- How clear are the criteria for tenure and promotion and the process by which this decision is made at UMass?
- How consistently are the criteria for tenure and promotion applied to all candidates?
- How clear are the criteria for promotion to Professor and the process by which this decision is made?
- How consistently are the criteria for promotion to Professor applied to all candidates?
- How often are you asked to take on a leadership role in important committees or initiatives in your department/program?

Positive Impacts: which positive impacts, if any, did you experience on your research productivity or creative activity because of the COVID-19 pandemic since it began?

- I experienced no positive impacts on my productivity
- Developed opportunities for new pandemic-related research/creative projects
- Acquired new funding via pandemic-related opportunities
- Technology and digital online communications facilitated collaborations
- Greater access to research materials (e.g., new materials put online)
- More opportunities to connect with collaborators
- More technology to support collaboration
- More time for research
- New teaching or service opportunities
- More opportunities to engage in community research synergies
- Opportunities to take course releases/receive sabbatical credit
- More accessibility for teaching, research, service, or creative work
- Ability to recruit speakers and connect with colleagues that may otherwise be limited in-person
- More time for research or creative activity due to work related cancellations

- Greater holistic recognition of colleagues and students
- Other

Negative Impacts: Which negative impacts, if any, did you experience on your research productivity or creative activity because of the COVID-19 pandemic since it began in 2020? Please check all that apply.

- I experienced no negative impacts
- Limited access to research sites, archives, or creative sites
- Unable to conduct human subjects research
- Unable to conduct research on other living organisms
- Problems accessing supplies for research or creative work
- Challenges securing PPE for research or creative work
- Inability to conduct work while still paying for personnel
- Lacked access to technology to conduct research or creative work
- Longitudinal projects disrupted
- Disruptions to sabbatical or research leaves
- Cancellation of conferences, seminars, performances, and other opportunities
- Unable to access or spend out time-limited grant funds
- Challenges hiring staff due to university limits and shortages
- Challenges recruiting graduate students due to issues with visas
- Challenges working with staff and students given COVID protocols
- Less opportunities to connect with collaborators
- Prohibited from travel necessary for research or creative work
- Delays in peer review impacted my publication trajectory
- Extra teaching demands
- Extra service demands
- Extra mentoring demands
- Extra work demands limited my ability/time to work on research or creative work
- Community or activist work limited my ability/time
- Personal health issues limited my ability/time
- Family or care demands limited my ability to work on research or creative work
- Other

Mentoring impacts: How has the COVID-19 pandemic impacted the advice and/or mentoring you have received from colleagues at UMass? Please check all that apply.

- I have received less advice and/or mentoring from colleagues
- My colleagues can offer less helpful advice because they do not have past experience navigating a pandemic
- I have been less likely to get impromptu feedback by running into people in hallways or chatting during meetings
- I have felt less connected to my colleagues
- My colleagues have been less responsive to requests for help or feedback
- I have been less likely to reach out for help or feedback
- I have received more advice and/or mentoring from colleagues
- My colleagues have been more responsive to me
- I have felt more connected to my colleagues
- Because I have been hired recently, I do not have a comparison
- It has had no impact on advice and/or mentoring