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## Navigating academic careers: personal and institutional experiences of women faculty

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Women faculty remain underrepresented in chemistry, reflecting persistent challenges in recruitment, retention, and career advancement. While much of the existing research has centered on the experiences of graduate students and trainees, comparatively less attention has been given to the perspectives of those already in faculty roles. This study examines the systemic barriers and supports that influence the retention, advancement, and success of women faculty in academia. Using qualitative data from in-depth interviews, the analysis identifies eight key themes: (1) formative influences and early motivations, (2) career entry and evolution: decisions and turning points, (3) navigating academic pathways: personal decisions and reflections, (4) mentorship as a double-edged sword, (5) work-life integration and care responsibilities, (6) institutional barriers and systemic inequities, (7) policy awareness and implementation gaps, and (8) supports enabling career sustainability. These themes reveal a complex interplay of personal agency, structural barriers, and institutional supports. While participants described persistent challenges such as inequitable policies, caregiving burdens, and limited advancement opportunities, they also highlighted the importance of mentorship, flexibility, and supportive networks. The findings suggest that meaningful progress toward gender equity in academia requires institutions to address systemic gaps while strengthening mechanisms that sustain women faculty throughout their careers.

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### Introduction

Systemic inequities continue to hinder the full participation, advancement, and retention of women faculty in academia, particularly in the chemical sciences (Lippincott, 1975; Rosser and Lane, 2002; D'Andola, 2016; Iyer *et al.*, 2018a, 2018b; Hofstra *et al.*, 2020; National Academies of Sciences, Engineering, and Medicine, 2020; Norton and Palermo, 2021; Howe *et al.*, 2022b; Wilcox, 2023). Although women have made significant strides in earning advanced degrees in chemistry, their representation in tenured and tenure-track positions remains disproportionately low, especially in research-intensive institutions (Greene *et al.*, 2010; Grunert, 2010; Committee on Challenges in Chemistry Graduate Education *et al.*, 2012; Stockard *et al.*, 2018; National Center for Science and Engineering Statistics, 2021; Howe *et al.*, 2022a; Wapman *et al.*, 2022). This underrepresentation reflects deeper systemic issues that hinder women's professional experiences and opportunities, despite the increasing number of women pursuing graduate studies (Greene *et al.*, 2010; Grunert, 2010; Committee on Challenges in Chemistry Graduate Education *et al.*, 2012; Iyer *et al.*, 2018a,

2018b; Stockard *et al.*, 2018; National Center for Science and Engineering Statistics, 2021; Survey of Doctorate Recipients (SDR) 2021|NSF – National Science Foundation; Howe 2022a; Wapman *et al.*, 2022). From 1979–2000, for instance, women earned 24% of doctorates at NRC-50 (top 50 chemistry departments as ranked by the National Research Council) but held only 16% of faculty positions, revealing underrepresentation (Nolan *et al.*, 2004). This underrepresentation gap highlights structural barriers, including biases in hiring and promotion processes, lower application rates, and unequal access to resources among others (Rosser and Lane, 2002; Newsome, 2008; Grunert, 2010; Grunert and Bodner, 2011; Moss-Racusin *et al.*, 2012; Williams, 2015; National Academies of Sciences, Engineering, and Medicine, 2020; Norton and Palermo, 2021; Stockard *et al.*, 2021). Adding to this, implicit biases related to gender and race can affect the evaluation of women's research, teaching, and leadership potential, further perpetuating these inequities (Williams and Dempsey, 2014; Williams, 2015; Mitchneck *et al.*, 2016; Howe *et al.*, 2022b). Also, research on women experiences in the workplace often places the burden on individuals to navigate systemic challenges, rather than addressing the structural issues themselves (Eddy and Ward, 2015; Mueller, 2022).

Over time, these compounding challenges create environments that contribute to career stagnation, burnout, and higher

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attrition rates. Prior studies highlights that women faculty are 44% more likely than men to leave academia before attaining senior ranks (Benckert and Staberg, 2000; Ackerman-Barger *et al.*, 2020; Lee *et al.*, 2020; National Academies of Sciences, Engineering, and Medicine, 2020; Wilson-Kennedy *et al.*, 2020; Stockard *et al.*, 2021; Spoon *et al.*, 2023; Wilcox, 2023). When women exit academia, institutions not only lose valuable talent but also the diverse perspectives essential for scientific innovation. In response to closing the underrepresentation gap, some universities have introduced measures such as mentorship programs, family leave policies, and other equity-driven initiatives (National Academies of Sciences, Engineering, and Medicine, 2020). However, the impact of these interventions has often been limited by challenges in their adoption and effectiveness (Nolan *et al.*, 2004; Grunert, 2010; National Academies of Sciences, Engineering, and Medicine, 2020; Stockard *et al.*, 2021; Howe *et al.*, 2022b). Moreover, such policies rarely address the deeper structural issues like persistent bias in hiring and promotion that underlie these disparities (Nolan *et al.*, 2004).

While some existing research emphasizes barriers to women's academic success, less attention has been given to the supports, both institutional and personal, that sustain women's persistence in academia over time (Packard, 2002; Bodner and Grunert, 2011; Grunert and Bodner, 2011; Avargil *et al.*, 2020; National Academies of Sciences, Engineering, and Medicine, 2020; Stockard *et al.*, 2021; Howe *et al.*, 2022a, 2022b; Rohlfing *et al.*, 2022; Zhang, 2024). Informal networks (such as peer networks, collaborative relationships with colleagues), mentorship, sponsorship, and professional recognition have been shown to play critical roles in promoting women's career satisfaction and resilience (Ooms *et al.*, 2019; Deng *et al.*, 2024). Yet, a research gap remains in understanding how these supports function for women faculty, particularly in chemistry. This gap means the complex interplay of personal, cultural, and institutional factors that shape their career pathways is still not fully understood. Existing studies have focused largely on early-career stages, offering valuable insights into the challenges faced by women graduate students in chemistry (Grunert, 2010; Stockard *et al.*, 2021; Howe *et al.*, 2022b). While these contributions are important, less attention has been given to the experiences of current women faculty, particularly in understanding how they identify and sustain their career amid ongoing systemic obstacles. To emphasize the effects these obstacles present, we use the term 'marginalized' *versus* 'minoritized' to describe certain populations throughout this paper (Kayumova and Dou, 2022).

## Purpose of study

The overall purpose of this study is to investigate the systemic barriers and supports that influence the career pathways of women faculty in chemistry. In this study, the term women faculty refers to those who hold tenured or tenure-track positions. The study aims to understand how institutional structures such as policies, workplace practices, and organizational

culture interact with personal factors, including personal inputs, background and environmental influences to shape women's persistence and advancement in academia. Understanding how women faculty navigate academic careers amid systemic challenges is essential for identifying the structural and personal factors that impact long-term success. Hence, in this study, the research question addressed is: What barriers and supports do women faculty experience in academia, and what measures do they view as essential for their retention and advancement?

## Theoretical framework: social cognitive career theory

This study examines the experiences of women faculty through the lens of social cognitive career theory (SCCT), a comprehensive framework for understanding how individuals make career decisions, sustain motivation, and navigate challenges (Lent *et al.*, 2002; Lent and Brown, 2006; Avargil *et al.*, 2020; Howe *et al.*, 2022a, 2022b). SCCT emphasizes the dynamic interaction between personal attributes, social influences, and environmental factors, offering insights into the career pathways of marginalized groups, such as women faculty in chemistry (Lent *et al.*, 2005; Lent and Brown, 2006). While acknowledging the comprehensive scope of SCCT, this study intentionally focuses on three constructs: background and environmental influences, person inputs, and supports and barriers (see Fig. 1). These constructs provide a lens for understanding how women faculty navigate their careers, while other SCCT constructs, such as learning experiences, self-efficacy, outcome expectations, interest, career choice, career actions, and performance domain/attainment, are reserved for future investigation (Lent *et al.*, 2000; Zeldin and Pajares, 2000; Lent and Brown, 2006; Zeldin *et al.*, 2008).

A foundational component of SCCT is the role of background and environmental influences, which shape the context in which career decisions are made. These include institutional policies, workplace culture, and access to resources, as well as personal factors such as family background, first-generation status, and early exposure to mentors. SCCT also highlights the importance of person inputs, such as race, ethnicity, and gender. These identity factors influence how individuals experience the academic environment, often contributing to either challenges (such as unequal opportunities) or supports. For example, inclusive policies and robust networks can promote advancement, while exclusionary practices or the absence of mentorship may hinder progress. These variables are particularly important in understanding the proximal supports and barriers that influence women's career development (Lent *et al.*, 2000; Lent and Brown, 2006). Applying SCCT to the career development of chemistry women faculty highlights the complex interplay between individual agency and structural conditions. Their persistence in academia reflects not only personal ambition and resilience but also the influence of institutional support and systemic barriers. Through this lens,



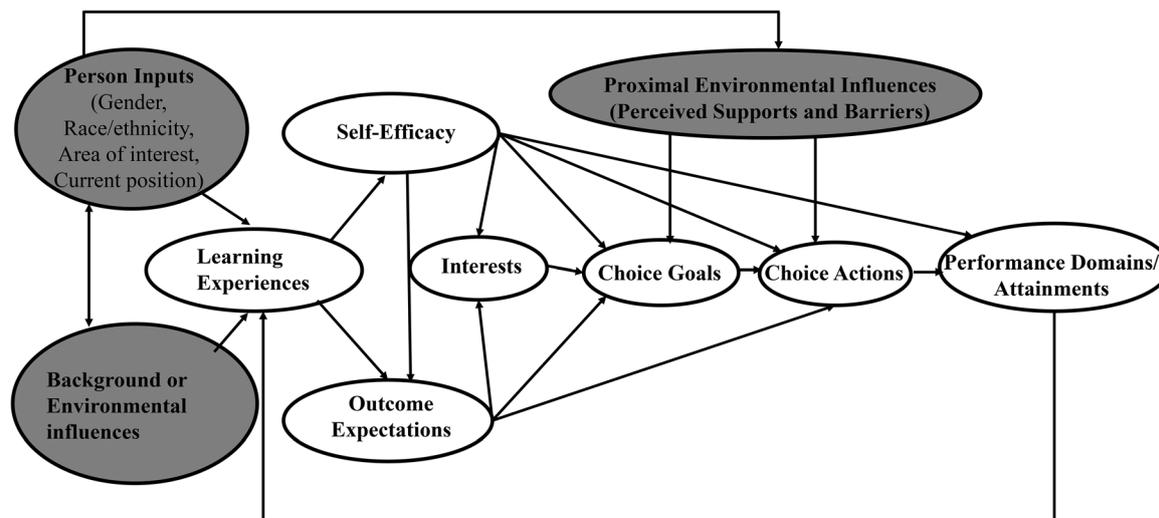


Fig. 1 Key constructs of social cognitive career theory.

the study highlights actionable areas for improving equity, strengthening mentorship, and enhancing institutional policies to better support the career pathways and long-term success of women in academia.

## Methods

### Participant selection

Academic profiles were obtained from the Diversify Chemistry website (Diversify Chemistry Academic Directory). The dataset was refined to retain pre- and post-tenured women faculty affiliated with institutions in the United States. Email addresses of other pre- and post-tenured women faculty from randomly selected institutions (from a previously compiled list of 202 chemistry doctoral universities) (Donkor *et al.*, 2024, 2025) across the U.S. were added to the list. An invitation email containing a survey link was sent to these faculty members. All faculty members who identified as women and expressed interest in the study were sent consent forms, and only those who signed and returned them were interviewed. Given the underrepresentation of historically marginalized groups (HMGs) by race/ethnicity in prior studies, this study aimed to oversample participants from these groups (Lent *et al.*, 2000, 2002; Lent and Brown, 2006; Ooms *et al.*, 2019; Howe *et al.*, 2022a, 2022b). However, only a limited number of faculty identifying as HMGs in terms of race/ethnicity expressed interest in participating (see Table 1). Ultimately, a total of 20 women faculty participated in this study from 17 institutions across the US (see Appendix A in SI for details). All participants were affiliated with Carnegie classified R1 institutions, except for three: two from primarily undergraduate institutions (PUIs) and one from an R2 institution (see Table S1). Notably, all the participants identified their current faculty position as research intensive (50% or greater research assignment).

Table 1 Personal and academic demographics of participants

Demographic	No.
<b>Race/ethnicity</b>	
White	15
Hispanic/Latine	1
Native American	1
Black/African American	4
Asian Pacific/Asian Indian	1
<b>Current rank (years in rank)</b>	
Assistant professor (< 5)	7
Assistant professor (6–10)	2
<i>Total assistant professor</i>	9
Associate professor (< 5)	1
Associate professor (6–10)	4
<i>Total associate professor</i>	5
Professor (≤ 5)	1
Professor (> 15)	5
<i>Total professor</i>	6
<b>Field of interest</b>	
Analytical	4
Organic	4
Physical	3
Inorganic	3
Chemical education	3
Biochemistry	2
Computational/theoretical	1

### Interview protocol development

The initial interview protocol was developed by BD using the SCCT framework as a guide. It was informed by two prior SCCT-based protocols, one exploring women's perceptions of faculty careers and the other examining self-efficacy beliefs of women and men in STEM (Zeldin *et al.*, 2008; Howe *et al.*, 2022a). JH reviewed the protocol to ensure that all relevant constructs of the framework were addressed. Questions were designed to align with the eight SCCT constructs of learning experiences, self-efficacy, outcome expectations, choice goals, choice actions,



interests, and contextual supports and barriers, while also incorporating background questions to situate participants' career trajectories. This process ensured that the final protocol captured both individual experiences and systemic factors shaping women's entry into and persistence in research-intensive faculty careers in chemistry. Details of the interview protocol can be found in the SI (Appendix B).

### Codebook development/data analysis

The codebook was developed by initially conducting deductive coding of the first five interview transcripts, aligning the interview questions with constructs from the SCCT framework. Based on this process, deductive codes and their definitions were generated. Three of the five initial transcripts were given to two chemistry education researchers to independently code the interview questions and responses into the deductive codes, guided by their definitions. Through collaborative discussion with the two researchers, consensus was reached on the appropriate categorization of each question. Following this process, the remaining participants' transcripts were coded and a more detailed analysis performed to generate inductive codes within each deductive code by BD, thereby refining the codebook (see Table S2). Four participants' transcripts were independently coded by a chemistry education researcher using the refined codebook developed by BD. Interrater reliability (IRR) was assessed using two metrics: percent agreement (0.998) (Krippendorff, 2004), and Cohen's kappa: 0.938 (McHugh, 2012; Watts and Finkstaedt-Quinn, 2021; Rodriguez *et al.*, 2023), indicating a high level of coding consistency between raters. Themes were generated through a combination of *a priori* coding based on the SCCT constructs and inductive coding derived from participants' narratives (see Table S3). A-priori codes provided a guiding framework for organizing experiences into broad categories such as background influences or supports and barriers, while inductive codes captured the nuanced and context-specific aspects of participants' accounts. The integration of these approaches allowed for the identification of eight themes that reflect both theoretically grounded constructs and emergent patterns from the data. This process ensured that the themes were both conceptually robust and empirically grounded. It should be noted that during the interviews, informal member checking was used by restating participants' responses to them whenever clarification was needed (Bretz, 2008).

### Limitations

In an effort to gather a diverse sample of women faculty, we solicited faculty from different races and ethnicities, faculty ranks, number of years in current position, and primary area of interest. However, full proportional representation across all demographics, particularly in terms of race and ethnicity was not achieved. This discrepancy can be attributed to the voluntary nature of faculty participation, combined with the small number of racially marginalized groups (Kayumova and Dou, 2022) or the limited representation of diverse racial and ethnic backgrounds in STEM fields (National Academies of Sciences, Engineering, and Medicine, 2020). As a result,

the perspectives and experiences captured in the study may not fully reflect the diversity of this group, and those who chose to participate may differ in meaningful ways from those who did not. When interviewing faculty who are part of the tenure system, it is important to consider the implications of power dynamics and systemic inequality, as these factors can introduce additional complexity to the discussion. This led to the opting out of some potential participants due to fear of future consequences as evidenced by prior research (Collini *et al.*, 2025). Participants self-identified their gender as either female or woman. We recognize that gender identity is a complex construct and may include a range of experiences beyond those captured in this study. Because we did not collect information on whether participants were cisgender or transgender, the findings may not be fully generalizable to all women.

## Results and discussion

The results and discussion of this study addresses one component of a larger study. Specifically, it focuses on examining the systemic barriers and institutional supports that women faculty in chemistry experience or have experienced, and how these factors have influenced their career progression. This part of the research emphasizes the interaction of person inputs, background and environmental influences, and supports and barriers in shaping persistence and advancement in academia. Participants in this study identified as female and others identified as women in terms of gender identity. For clarity and consistency in discussing systemic barriers and supports, we describe the participants broadly as women.

Eight themes were generated in relation to the research question (see Table 2), which also guided the discussion of the study's results due to the interconnected nature of participants' experiences and perspectives. Some themes naturally address multiple facets of this question, capturing the complex interplay of supports, barriers, and institutional factors that influence the retention and advancement of women faculty in academia.

### Research question: What barriers and supports do women faculty experience in academia, and what measures do they view as essential for their retention and advancement?

Eight key themes were identified in regard to the research question, reflecting the complex and interconnected experiences of women faculty in academia. These themes include: (1) formative influences and early motivations; (2) career entry and evolution: decisions and turning points; (3) navigating academic pathways: personal decisions and reflections; (4) mentorship as a double-edged sword; (5) work-life integration and care responsibilities; (6) institutional barriers and systemic inequities; (7) policy awareness and implementation gaps; and (8) supports enabling career sustainability. Together, these themes offer a comprehensive view of the personal, structural, and institutional factors shaping women's academic careers. The themes collectively provide an in-depth understanding



Table 2 Themes, descriptions of themes and their underlying ideas

Theme	Description	Underlying ideas
Formative influences and early motivations (1)	Early personal, educational, and family experiences that shape interest in academia and science.	Exposure to science and education at key stages, influence of mentors and family, the role of curiosity and identity development in shaping aspirations
Career entry and evolution: decisions and turning points (2)	Critical choices and transitions during entry into and advancement through academic careers	Job market constraints, recruitment practices, personal decision-making, and dual-career navigation
Navigating academic pathways: personal decisions and reflections (3)	Internal reflections and values shaping one's academic journey, including personal choices, challenges, and evolving self-concept	Passion for academic work, psychological resilience, autonomy, and self-awareness influencing career choices
Mentorship as a double-edged sword (4)	Mentorship can either facilitate or hinder academic success, depending on its quality and availability	Dual nature of mentorship – its potential as a support system or a structural gap; relational power dynamics in academia
Work-life integration and care responsibilities (5)	Struggles and strategies in managing personal care responsibilities alongside academic duties.	Tension between professional obligations and caregiving roles; inadequate support for caregiving in academia
Institutional barriers and systemic inequities (6)	Challenges from within academic institutions that disproportionately affect marginalized groups	Structural discrimination, resource inequality, systemic bias, and cultural climate affecting equity and belonging
Policy awareness and implementation gaps (7)	Gap between existing policies and their actual impact or enforcement within institutions	Lack of awareness or accountability in implementing equity-promoting policies; symbolic <i>versus</i> substantive change
Supports enabling career sustainability (8)	Institutional and community-based resources that help retain academics over time	Importance of support systems, fair policies, recognition, and structural accommodations for long-term career growth

of the supports and barriers experienced by women faculty and detail of each theme is discussed below.

### Theme 1: formative influences and early motivations

The academic pathways of women faculty are profoundly shaped by formative influences that lay the groundwork for both their future successes and the barriers they encounter. Early exposure to science, whether through school, family, or extracurricular experiences, often sparks an initial curiosity that evolves into a deeper academic identity (Jackson and Suizzo, 2015). This exposure is highlighted by Participant 10 who said:

*“.....my father is an academic. Yeah. So, I was always interested in the teaching aspect of this job.....”*

For some, positive reinforcement from teachers, engaging educational experiences, or encouragement from family members helps build the confidence and motivation necessary to pursue academic careers. In this regard, Participant 7 recalled how her first-grade teacher (woman) positively influenced her decision in choosing an academic career. Also, participant 16 expressed how the support of her mentor encouraged her to choose the faculty career path:

*“I think the support from my mentor, my PhD advisor..... he believed in me. He encouraged me, told me that I could do it, I was capable of doing it, so it felt like I was in control at that point of what I wanted to do and I didn't have to settle for a different job if I didn't want it.”*

This emphasizes the fact that the presence of mentors or role models during elementary, undergraduate, graduate, or postdoctoral stages can serve as crucial sources of guidance towards academic careers, consistent with previous research (Estrada *et al.*, 2018; National Academies of Sciences, Engineering, and Medicine, 2020; Stockard *et al.*, 2021; Deng *et al.*,

2024). These experiences reinforce a sense of belonging in academic spaces that are statistically more populated by males.

However, the absence of these formative supports can constitute significant early barriers as revealed by Participant 13:

*“I was first generation, so besides being a woman in STEM, I was also first generation and have no role models in my family for going to college or what you do after college or applying for jobs or getting jobs or graduate school. So, I guess I just make decisions on the fly and just whatever's available at the time, that's what I'm looking at and applying for.”*

This highlights that women who are first-generation or who lack access to mentors may enter academia at a disadvantage aligning with prior research that found that first-generation college students without strong mentorship often face significant hurdles in research and career planning (Jones *et al.*, 2025b). They may not have had opportunities for professional socialization, information sharing, and encouragement. This can lead to gaps in confidence and preparation, increasing vulnerability to challenges such as imposter syndrome, self-doubt, or difficulty navigating academic norms aligning with prior research (Vue, 2021; Holden *et al.*, 2024; Bechard and Gragg, 2020). The lack of early role models who share similar backgrounds can further reinforce feelings of isolation and marginalization, even as women advance in their careers (Gardner, 2013; Charleston *et al.*, 2014; Vue, 2021).

### Theme 2: career entry and evolution: decisions and turning points

Equitable faculty hiring practices are important for creating an inclusive academic environment and supporting the advancement of faculty. An example of early-stage institutional support highlighted by participants was equitable hiring. Related to transparent hiring practices, Participant 2 noted that their department uses rubric and open discussions in faculty hiring



to help recognize and address biases through more structured and reflective processes. These practices not only promote fairness in decision-making but also encourage a culture of transparency and continual improvement. This aligns with research showing that well-designed rubrics clarify expectations and support consistent evaluation in faculty hiring, though poorly designed rubrics may still reinforce bias (Culpepper *et al.*, 2023).

In addition, some participants highlighted that their departments had clear and consistent procedure regarding tenure. An example of this experience was shared by Participant 4:

*“I mean, I think, the fact that the institution that I got tenure on had very sort of well documented rules and regulations to tenure was beneficial. Because you knew sort of what you were being evaluated against.”*

Institutions that provided well-defined procedures for tenure helped reduce uncertainty and enabled faculty to make informed decisions about their career paths consistent with a prior study (Diascro, 2019). Women faculty particularly valued environments where expectations were not only transparent but also accompanied by active support for achieving professional milestones. These measures contributed to a sense of stability and trust, reinforcing their commitment to academic careers. Institutional investment in long-term career development was also noted. Participants expressed a preference for universities that offered structured opportunities for mentoring, promotions, and professional development. Faculty were more likely to remain at institutions that demonstrated an ongoing commitment to their growth and well-being.

### Theme 3: navigating academic pathways: personal decisions and reflections

Navigating academic pathways involves a complex interaction of personal motivations and challenges that women faculty experience in academia. A strong passion for teaching, research, or service often drives many women to pursue and remain in academic careers. This sentiment was expressed by Participant 3:

*“I loved academia. . . . I enjoyed research, I enjoyed going to conferences, I enjoyed doing lab work, and I was working in a lab full of people who were engaged in what they were doing. It just kind of happened. I just enjoyed what I was doing and thought, well, let's just keep going.”*

Similarly, Participant 6 expressed liking teaching and research. This intrinsic motivation provides a sense of fulfilment and purpose, serving as a key source of encouragement and professional satisfaction throughout their careers. However, these positive motivations are sometimes accompanied by internal challenges that can act as significant obstacles, supporting previous research that suggests that cultivating a passion for research or confidence in one's abilities alone is not enough to sustain or increase interest in pursuing an academic career (Kenneth and Kimberly, 2013). For example, Participant 10 initially chose academia because of her passion for research, but she later revealed that:

*“...there were a lot of times I had a lot of very strong self-doubt, . . . . I definitely had a confidence issue that I think*

*especially, at the end of my postdoc and as I was even starting my faculty position, were a big challenge.”*

Even though the participant continued to pursue an academic career, this illustrates how enthusiasm for the field can coexist with personal struggles that impact career progression. Negative self-view and persistent doubts about one's abilities can undermine confidence and limit engagement with academic roles (van Schie *et al.*, 2024). These internalized struggles may lead to hesitation in pursuing leadership positions, applying for recognition, or seeking career advancement.

In addition to internal challenges, women faculty reported mental toll including stress and burnout due to the demanding expectations of academic work and negativity from students. In this regard, Participant 20 said:

*“...teaching can also take a mental toll on you as well. Just interactions with students can sometimes be very draining or be, depending on the students. There can be a lot of, when there's negativity from students that can weigh on you and that can weigh on me more than I would like. . . .”*

The pressure to perform exceptionally in research, teaching, and service creates demanding workload that affects mental health and contributes to emotional exhaustion consistent with prior research that highlights the demanding nature of faculty jobs (Kenneth and Kimberly, 2013; Esplin *et al.*, 2025). Likewise, an earlier report highlighted that research culture is taking a toll on researchers' well-being, contributing to stress, anxiety, and mental health challenges (Learning, 2020). These challenges present a substantial barrier to maintaining long-term academic engagement. In this regard, Participant 15 highlighted that people retire or quit academia because of burnout, especially those observing very low student engagement. Nevertheless, in response to these pressures, participants mentioned adopting strategies that promote well-being, such as negotiating flexible work arrangements or engaging in reflective practices that help them clarify their professional goals and align their responsibilities with personal values.

The role of mentoring also holds significant importance within this context. Many women faculty describe mentoring as both a meaningful personal commitment and an essential source of satisfaction. Participant 6 shared this sentiment saying:

*“...I really like mentoring. And there's this deep satisfaction I get working with grad students in labs. . . . It's just really fun to be able to see people get a skill . . . . It's really cool to watch people develop to where they can form their own research ideas . . . .”*

They get satisfaction, build relationships that offer emotional support, professional guidance, and a sense of community by mentoring students and/or junior colleagues. These mentoring experiences enhance their sense of purpose and contribute to a more inclusive and supportive academic environment. Being a mentor also helps counter feelings of isolation by fostering connections and a shared sense of belonging. This aligns with previous research highlighting the additional support marginalized women need through representation, as role models who share their identities can enhance their sense of belonging (Jones *et al.*, 2025b).



#### Theme 4: mentorship as a double-edged sword

Mentorship plays a complex and influential role in shaping the academic experiences of women faculty. For many, access to effective mentorship serves as a significant source of support. Participants often described supportive mentors as individuals who were approachable, encouraging, and genuinely invested in their professional development, a sentiment shared by Participant 11:

*“... I had a faculty mentor in the department besides my advisor. And this person was also very supportive, not in my branch of chemistry at all, but he would still read my stuff for clarity ... the group that I was in during my postdoc was a very big group. There were like three PIs who worked on similar things. We formed kind of this cohort and so the more senior PI in that group was also very supportive with me and wrote me reference letters and that kind of stuff. ...”*

In such cases, mentorship functioned as a critical resource that enabled professional growth as mentors provided guidance, helped build confidence, and contributed to a stronger sense of direction in navigating academic careers.

Participants also identified well-structured mentoring or informal mentoring practices as essential for women faculty to succeed and sustain their careers in academia. Participant 4 recommended both formal and informal mentoring stating:

*“... I would recommend both of them. Because I think you get something a little bit different from each. So, I think if you're formally assigned a mentor then you're not going to sort of fall through the cracks of sort of standard professional development. But at the same time that formal mentor, there may be things that you're not comfortable asking them and having an informal mentor that you feel comfortable, you know, asking any questions to you, that you chose rather than was assigned to you, has some great advantages as well. ...”*

These mentoring practices provide guidance, professional development, and a sense of community that helps women navigate the complex academic landscape (Biehle *et al.*, 2021; Rosenberg *et al.*, 2024; Zhang, 2024).

Having mentors or role models with the same or similar identity may provide important benefits for women faculty. Some participants described positive influences from mentors who shared key attributes. Participant 7 recalled:

*“... my first-grade teacher, I feel like she doesn't understand how much of a role she's played in my life, but the way she taught, I remember her very clearly like in our class, just guiding us through ... she facilitated our teaching. And so, I think that definitely influenced me.”*

Others noted the scarcity of role models who shared both gender and racial identity. In regard to this, Participant 7 said:

*“... So, there aren't a lot of Black female research-intensive people in [field of interest]. And so, seeing females in the field, I feel, so I would go to conferences. And see females not necessarily Black females, but I'm like, so I think two things. It was first, she's a female. She's doing it. Maybe I can do it.”*

Similarly, Participant 5 reflected:

*“... I don't know of another Native American female at an R1 institution. So, I had no role models for that. I had to look at what the men were doing. ...”*

However, some participants noted that shared identity alone did not eliminate structural challenges. For instance, Participant 17 noted being a woman of a particular racial identity and feeling uncertain about how to protect students with similar identities from systemic disadvantages. These experiences suggest that mentorship from individuals with shared identities can offer important support but may not fully address the broader challenges faced by women faculty. Therefore, mentors with different identities can play a complementary role, offering additional perspectives, strategies, and support that same-identity mentors may not be positioned to provide. Also, the limited availability of mentors who share same or similar identities highlights the value of diverse mentoring networks that combine the benefits of same-identity mentorship with the unique contributions of cross-identity mentorship.

At the same time, the absence of mentorship or the presence of ineffective mentoring relationships created barriers. This was exemplified by Participant 19 who said:

*“we don't have a formal mentoring system, which I do wish that we did, so I don't have an assigned mentor as a new faculty member, I think that would be very helpful, but we don't currently have that.”*

Some women faculty reported having mentors who discouraged their academic ambitions, failed to offer constructive feedback, or created environments that felt unwelcoming or even hostile. Participant 9's experience reflects this, stating:

*“Well, like I said, in college, things were a little rougher because, for instance, my advisor, my academic advisor in college told me I wouldn't really amount to much, things like that. So, there were some things that were not so inspiring, let's put it, that could have been discouraging. And it was frustrating to have people think those things or say those things. But I always felt like they didn't have the whole story when they said those things, because, I knew me and I knew my abilities, and I knew my determination, and I figured I could do it, or at least, give it a good shot.”*

This experience aligns with a previous report's finding that poor research culture can foster feelings of isolation and loneliness, as the lack of support and discouraging feedback from an advisor reflects an unsupportive environment that can leave individuals feeling undervalued and disconnected (Learning, 2020).

Others described feeling unable to speak openly with their mentors due to fear of being judged or misunderstood. Illustrating this experience, Participant 8 said:

*“I had a mentor who was assigned to me when I started the job. ... I didn't feel that I could talk to him about stuff like that because I was like, oh, these are the people who are going to be evaluating me for my tenure and stuff and I can't really show weakness.”*

These experiences may lead to mistrust, isolation, and missed opportunities for development. For women lacking any form of mentorship, the absence of guidance during key stages of their careers left them without access to essential knowledge or information, networks, or institutional navigation processes. This aligns with a previous study that suggested



that limited exposure to the tenure and grant processes contributes to fear and uncertainty, especially given the high-stakes nature of these milestones (Howe *et al.*, 2022b). These faculty accounts reveal a wide variation in the quality and availability of mentoring across academic institutions. While positive mentorship can be one of the most impactful forms of support, inconsistent or poor mentoring practices can create significant barriers. This is supported by previous report, which highlights the lack of mentorship as a persistent challenge in the chemistry field (National Academies of Sciences, Engineering, and Medicine, 2020). The variability in mentoring experiences reflects broader institutional challenges related to equity and access. Without reliable and structured support systems, many women faculty may rely on informal or inconsistent mentoring arrangements that may not adequately meet their needs.

### Theme 5: work-life integration and care responsibilities

Work-life integration was identified as a significant challenge for many women faculty, particularly for those with caregiving responsibilities. Participants described numerous structural barriers that hinder their ability to balance personal and professional obligations. This is consistent with a previous study, which found that faculty positions are particularly difficult to balance with personal and family priorities compared to other chemistry-related careers (Howe *et al.*, 2022b). Inadequate parental leave policies, limited or no access to affordable or on-campus childcare, and inflexible work expectations were commonly cited. Participant 3's viewpoint reflected this:

*"This is my third year. And we have no childcare on campus, just none. This did not affect me, but it definitely affects women at, and men, quite frankly, who have young families. There's no childcare and it's just crazy. So that bothers me tremendously. And I've worked really hard on the issue and not gotten anywhere. And I'm not the first one. There's just been a history of planned childcare centers that keep being planned and not materializing...."*

While the participant was not personally affected, they expressed deep frustration on behalf of colleagues, particularly women (including men with young families), who face additional burdens balancing academic responsibilities with caregiving, highlighting a systemic barrier to support work-life integration in academia.

Cultural expectations within academia further intensified these difficulties. Participants noted that academic environments often reward constant availability and overwork. This culture placed pressure on women to conceal their family responsibilities or to work through periods when personal care was needed as shared by Participant 18:

*"... So, two weeks after I had my son, I just started teaching again. And I couldn't even like walk in from where we park our car to the building. So, my husband had to like drop me at the back of the building so I could walk to the elevator. I would take the elevator up, with the baby strapped to me...."*

Some faculty expressed experiencing guilt for prioritizing their families. This gives the impression that caregiving is incompatible with an academic career. The absence of/limited

structural support for managing both career and caregiving was consistently identified as a major barrier to career advancement and long-term satisfaction. Participants expressed that academic institutions lack policies and practices that acknowledge the full scope of faculty responsibilities outside the workplace. The lack of these policies created conditions that were especially difficult for faculty with young children.

In describing the challenges participants' face, they offered clear and specific suggestions for institutional supports that would improve work-life balance for women faculty. Commonly cited needs included access to affordable, high-quality on-campus childcare and subsidized options that alleviate the financial burden of caregiving. Many participants also called for more flexible work schedules that allow faculty to adjust their teaching, research, and service responsibilities in ways that accommodate caregiving demands. Another widely supported recommendation was the creation of formal institutional support for parenting during professional travel, such as funding for childcare or the ability to bring a caregiver when attending conferences as exemplified in Participant 20's statement:

*"It's very hard to go to conferences because who's gonna take care of the kids. So, I think that there has to be more done in that regard, just providing support, figuring out how to make these things equitable. So, women are able to leave their families and go to the same meetings that their male colleagues go to so that they can also advance their careers and they can network and they can meet people and they can socialize."*

Women faculty emphasized the need for clearly articulated family leave policies. They expressed concern that existing family/parental leave structures are often vague, inconsistently applied, or insufficient in addressing the realities of caregiving. This concern is echoed in recent studies, which reveal that academic leave policies often lack clarity, vary widely across institutions, and fail to provide adequate support for faculty caregivers (Gunn *et al.*, 2014; Fox and Gaughan, 2021; Moors *et al.*, 2022; Slostad *et al.*, 2023). Participants stressed that these policies must be well-publicized, accessible, and standardized across departments to ensure equitable implementation.

Beyond policy, many participants advocated for a deeper cultural shift within academia to normalize caregiving as a legitimate and visible part of faculty life. This would require institutions to explicitly recognize caregiving responsibilities in performance evaluations, promotion reviews, and workload distribution. Faculty expressed the importance of fostering a work environment in which caregiving is not seen as a personal weakness or liability but rather as a normal and respected aspect of life that should be supported. Notably, participants emphasized that caregiving responsibilities affect not only women but also men with young families. Ultimately, participants conveyed a desire for institutions to reform the structural and cultural barriers that make balancing academic work and personal responsibilities difficult, especially for women.

At the same time, participants noted the importance of supportive measures when available. Access to family leave, flexible scheduling, and departmental understanding made a



significant difference in managing the demands of an academic career. However, sometimes, these supports were often inconsistent and dependent on individual departments or supervisors rather than formalized institutional policies. Despite these inconsistencies, participants indicated that broader efforts to create inclusive and supportive academic communities played a critical role in strengthening women's commitment to their careers.

Participant 8 described a departmental culture that values work-life balance and personal well-being, emphasizing the importance of rest, family time, and understanding among colleagues:

*“So, for example, my department. . . I go [home] for the holidays for a few weeks or whatever. And it's never, no one thinks twice about it, even though in the beginning, I was quite nervous about stuff like that, but like just kind of everyone understanding that people need family time. They need time to rejuvenate or something. I think that's useful. And there are women in my department who have children and stuff like that. And I think that's been. . . That environment is helpful. Well, there are also men with kids, and I think that's also been very helpful environment.”*

This kind of environment is important for women and faculty with caregiving responsibilities consistent with a prior study that highlights the importance of supportive environment (Jones *et al.*, 2025b). When departments normalize the need for personal time and family commitments, they not only reduce stress but also foster a culture of empathy and mutual respect. This flexibility and understanding help faculty maintain their personal identities and well-being alongside professional advancement, making it more feasible and appealing for them to stay and grow within academia.

### Theme 6: institutional barriers and systemic inequities

Women faculty reported frequently encountering institutional barriers that are deeply rooted in structural inequities. These barriers often took the form of implicit bias, gender bias, unequal workloads, and limited access to leadership roles. Many women reported being disproportionately assigned to service responsibilities, which are often time-consuming but less valued in promotion and tenure decisions. This experience was expressed by Participant 16 who said:

*“Service work for the university and for outside of the university, I never knew how time-consuming that could be, things like that. I did not expect.”*

This experience aligns with previous research indicating that inequitable workloads pose a significant barrier to success on the tenure track (Nyunt *et al.*, 2024; Zhang, 2024; Esplin *et al.*, 2025). Building on this, Participant 5 reflects concerns about gender-based disparities within their departmental environment, pointing to broader systemic and institutional issues:

*“One thing that I might mention is that our department is having a lot of problems. A lot of women have left. Just the women are leaving, men aren't leaving, just the women. That should tell you something. And I don't think anything I do will be able to help them.”*

This quote highlights a pattern of gender imbalance, suggesting that the department may be fostering a climate that is unsupportive or even hostile to women. The participant's observation highlights systemic barriers that disproportionately affect women, while the expressed helplessness suggests a lack of institutional mechanisms for meaningful change or accountability. Others also shared experiences of being mistaken for administrative or support staff, excluded from important decision-making processes, or overlooked for recognition and advancement opportunities. For example, Participant 10 shared her experience saying:

*“And I think the other thing that's been hard is I frequently get mistaken for a secretary or an administrative assistant. . . or a graduate student. And that's just like, come on. . . .”*

These experiences contribute to a sense of marginalization and reinforce existing hierarchies within academic institutions (McGee, 2020; Rojo, 2021; Kozłowski *et al.*, 2024; Zhang, 2024; Jones *et al.*, 2025a).

Financial disparities were another common concern. Participants described receiving lower salaries and smaller start-up packages compared to male colleagues consistent with previous findings (Sege *et al.*, 2015; Oliveira *et al.*, 2019). Access to internal resources, such as research funding and professional development opportunities, was also reported as inequitable. Such disparities signal to women faculty that their work may be undervalued by their institutions. The tenure and promotion processes were also perceived as problematic. Many women expressed frustration over vague expectations, inconsistent evaluation standards, and a general lack of transparency in how decisions are made. These concerns led to uncertainty and stress, particularly for those navigating tenure without clear guidance or support. Reflecting this sentiment, Participant 18 said:

*“... You want something that like you can quantify. I think those are tough conversations for departments to have. And I think it's not just at my one school. That if you put a fixed number of publications for promotion or a dollar amount for grants, someone you like might not meet them. And then if you make an exception for one but not for others, that's a problem. But **having a vague policy can be really stressful for a junior person. . .**”*

This aligns with prior research showing that unclear or non-transparent tenure criteria contribute to heightened stress and uncertainty among faculty (Cate *et al.*, 2022; Nyunt *et al.*, 2024). Similarly, Participant 17 echoed this experience, stating the need for structure and transparency:

*“I think there needs to be structure and transparency around expectations. And I think people like to keep it vague so that way, they can pull out if necessary or require more if not. But I think the expectations for. . . It's like the mastering curriculum. If you're going to pass or get a B in this class, you do these things. If you want the A, you need to do these additional things. Like it's transparent what you need to do to get that grade. Don't understand why this career isn't that transparent.”*

Together, these structural and procedural inequities create an academic environment that undermines fairness and limits opportunities for advancement.



Participants' emphasis on unmet needs highlighted how the lack of adequate support and resources can serve as a barrier and reflect deeper systemic inequities similar to a previous finding (Esplin *et al.*, 2025). For instance, they stated the need for fair and manageable workload distribution as women are asked to do more than their male colleagues, especially with service. This over-service was highlighted by Participant 13. Similarly, in regard to women being asked to do more, Participant 1 highlighted the need for implicit bias training stating:

*"Training the faculty in implicit bias, because, women a lot of times are asked to do so much other weird things that they'd never ask a man to do. You end up on a committee and they're like, "Oh, will you take the notes?" Being observant of what it is you're always asking a woman to do, versus whether or not you would ask a man to do it."*

Fair and manageable workload distribution in institutions may contribute to the prevention of burnout and allow faculty to balance research, teaching, and service responsibilities effectively. Moreover, formal recognition for contributions in teaching, service, and research was viewed as a powerful motivator and a sign of institutional respect for the diverse roles women fulfill.

Participants emphasized the need for empowerment, highlighting that women must be provided with meaningful opportunities to express their opinions and contribute to decision-making processes without fear of judgement. Participant 14 shared an experience of feeling silenced in their departments, where advice from a colleague (woman) to "keep their heads down" discouraged her from speaking up in faculty meeting even though she was an outspoken person. There could be a fundamental rationale for this advice even though not revealed in this interview. This lack of encouragement not only diminishes women's confidence but also limits their influence in shaping departmental policies and culture, highlighting the importance of creating supportive environments that actively promote women's empowerment. When women feel heard and valued, they are more likely to remain engaged and motivated, which supports long-term career growth and resilience.

### Theme 7: policy awareness and implementation gaps

Although many academic institutions have developed formal policies aimed at supporting faculty, participants consistently expressed frustration with how these policies are communicated and implemented. Several women shared that they only learned about key policies, such as teaching relief during parental leave or tenure clock extensions for caregiving responsibilities, after the period in which they could have used them had already passed. This reflection was shared by Participant 4:

*"So, per university policy, I would technically get no teaching relief when I was on maternity leave. But the department had an additional policy on top of that. Although it was very hard to find that information, but like I could not find that information until I, well, was already pregnant and therefore telling people. . . ."*

This lack of proactive communication left many without access to support structures that could have eased the demands of balancing academic and personal obligations.

In addition to this communication gap, institutional policies themselves can unintentionally disadvantage individuals, particularly those with limited financial flexibility. Participant 17 highlighted a key example regarding reimbursement procedures, stating,

*" . . . .but one of the things that I see as problematic is the idea of reimbursements, when you go to grants or travel, you have to put the money up first in order to get reimbursed. But if you don't have the money to put it up, that's a problem. If you put it up on credit, but the reimbursement process takes so long that you accrue interest on this, and then you get paid back the actual amount, but not the interest, now you're at a loss . . . So, I think that is something that needs to be re-evaluated."*

Participants also noted that the application of policies was frequently inconsistent across departments or heavily dependent on individual administrators' discretion. Such inconsistencies created confusion and inequities, particularly for women who relied on these supports to manage caregiving responsibilities or to navigate periods of personal transition. The absence of clear, standardized procedures often resulted in unequal access to essential resources and contributed to heightened stress and a sense of institutional mistrust. Feelings of guilt for prioritizing family, as discussed above, also intersected with concerns about how policies are implemented or perceived. When Participant 9 was asked:

*"So does that mean there are sometimes policies in place, but they aren't implemented effectively?"*

The participant responded:

*"Yeah, sometimes. But even sometimes, it's just the recognition that, well, how come I don't see you at seminars all the time? They just don't think about it because it's not something that they need to think about. And you feel bad, right? I do feel bad that I don't attend very many seminars and all of this because I have to leave, you know? And so just the recognition of stuff like that, right, helps a lot, that it won't be held against you because you have to do this. . . I have one colleague who actually did attend, his kids are older now, but he did attend, right? And he would always run out, at the very end of the seminar, he would be the first to leave because he was trying to beat it. And his kid almost got kicked out of the afterschool program because if you're late a certain number of times, they'll kick your kid out."*

This response illustrates that beyond the existence of family-friendly policies, there is often a lack of cultural recognition or institutional understanding of why faculty may not fully engage in all aspects of academic life. The participant highlights how implicit expectations such as attending seminars can create guilt, despite personal responsibilities. The anecdote about a colleague rushing to avoid penalties at child's afterschool program further emphasizes that without flexible structures or awareness, policies alone are insufficient. True support requires not only written policies but also cultural shifts that normalize and accommodate caregiving obligations.

Previous research has found that ambiguous leave policies, inconsistent implementation, and over-reliance on informal negotiation create significant barriers to access, aligning with the experiences of women faculty in this study (Gunn *et al.*, 2014;



Moors *et al.*, 2022). This is consistent with participants in this study who stressed that policies must be clearly communicated, made readily accessible, and enforced uniformly. Without such measures, policies risk being symbolic rather than substantive, failing to deliver real support to those who need it most. Ensuring that policies are not only written but also effectively enacted would help create a more equitable academic environment, allowing women faculty to engage more fully in their work and sustain long-term academic careers.

Participants pointed to several institutional commitments that exemplify how policy implementation can either advance or hinder equity efforts when not thoughtfully resourced or applied. Transparent hiring practices help promote fairness and reduce bias during recruitment. Policies such as tenure clock extensions acknowledge the realities of caregiving and other life events, providing necessary flexibility without penalizing career progression. Accommodations for dual-career couples were also seen as important, given the challenge many women face balancing personal and professional lives. Importantly, participants emphasized that these supports must be viewed not as optional perks but as essential components of an equitable academic environment that enables long-term engagement and career growth.

While many institutions offer tenure clock extensions to accommodate major life events or disruptions, these policies often operate under the assumption that time alone is a sufficient remedy. Participant 10 challenges this notion by emphasizing that time without resources does not adequately address the real productivity challenges faculty face during these periods. She stated that for tenure clock extensions to be effective, it should come with additional financial support, either through increased startup funds or compensation for reduced grant productivity, to relieve pressure and allow the faculty to focus without the added stress of immediate deadlines. This approach acknowledges that time alone does not offset the challenges faculty face during periods of disrupted productivity and that without adequate resources, the pressure to maintain research output remains. Consistent with this, previous research has shown that policy changes such as tenure clock extensions are insufficient on their own (Reese *et al.*, 2021). The same study emphasizes that to effectively retain women science faculty, institutions must also invest in childcare, transitional and bridge funding, and other forms of resource support. Building on this, integrating financial support in addition to tenure clock extension allows institutions to alleviate stress, encourage more equitable conditions, and build an environment where faculty can dedicate themselves to producing quality work.

### Theme 8: supports enabling career sustainability

One of the key supports enabling career sustainability for faculty women in academia is the presence of strong institutional and community-based support systems. Participants highlighted the significance of being part of collaborative and nurturing professional networks where they can exchange

ideas, seek advice, and find encouragement. Participant 6 emphasized the value of supportive professional network:

*"I think there are a lot of women in this department. There are not all physical chemists, but there are a fair number of women. We have formed a network that is supportive, and we can talk to each other."*

These networks, whether formal networks or organizations, peer support groups, or informal mentorship circles, help cultivate a sense of belonging and solidarity. This connection with others facing similar challenges and opportunities strengthens resilience and motivation, which are vital for sustaining long-term engagement in academic careers.

Access to financial resources, including grants and funding, is also crucial in supporting career longevity. When asked what encourages them in their current career, Participant 3 shared:

*"Well, every time I get a grant funded, that is always encouraging."*

Funding opportunities empower faculty women to pursue innovative research, participate in conferences, and enhance their professional visibility. For some participants, the availability or lack of financial support directly influences their capacity to maintain momentum and avoid career stagnation. Participant 12 expressed frustration with the constant demand to secure funding, noting:

*"I dislike how to have sufficient funds to run a group of the size that I want to run you basically constantly have to write grants and that that's definitely hard. And then when you don't get them, it's unpleasant."*

This ongoing pressure to secure grants not only drains time and energy but can also impede growth when funding falls through. This is consistent with recent studies showing that the intense pressure to obtain grants not only drains researchers' time and emotional resources but also impedes career growth when funding falls through, causing setbacks that can hinder academic progress (Borgstrom *et al.*, 2024). Alongside financial resources, ongoing professional development options such as workshops, training programs, and certifications are essential. These opportunities help women keep their skills current and adaptable in rapidly evolving academic fields, supporting both confidence and career progression.

In addition to structural supports, interpersonal factors significantly impact career sustainability. Positive recognition and feedback from supervisors, peers, and students boost morale and clarify areas for growth, reinforcing sense of competence and value. Participant 10 reflected on how external recognition of her scientific work contributes significantly to her sense of fulfillment. She emphasizes receiving positive feedback and knowing her research is valued by others. This highlights the important role that validation and professional success play in shaping a positive academic experience.

Participants also identified a range of institutional practices that positively influenced their ability to remain in and succeed within academic careers. Among the supports mentioned were transparent and well-communicated tenure and promotion processes. Participant 2 expressed the need for transparency in the tenure and promotion process. This participant elaborated on



this by explaining that the tenure and promotion process in their institution is transparent and well-structured, with clear milestones and opportunities for accelerated advancement based on performance, making it easy to track progress and plan for early promotion. She also emphasized that the system includes regular review cycles tied to pay raises and career development, providing ongoing motivation and clarity for faculty advancement. This structured and transparent approach to tenure and promotion highlights the institution's commitment to fairness and professional growth, aligning with a previous study that emphasized the importance of clear institutional policies for women (Jones *et al.*, 2025b). Clear benchmarks and regular review cycles, linked to tangible outcomes such as pay raises and title advancements may provide faculty with clear guidance and meaningful motivation to pursue career growth proactively. The possibility of early promotion based on performance rather than time served reinforces a merit-based culture, which can be particularly motivating for high-achieving individuals. However, this emphasis on accelerated advancement may unintentionally create pressure for those who follow a slower, yet still strong, trajectory, raising concerns about how different paces of progress are perceived within the system. The predictability of the process, nonetheless, contributes to a more structured and goal-oriented academic environment.

When academic communities were inclusive and supportive, women felt more committed to their careers. Participant 15 noted this saying:

*“Most of the starting conferences for faculty members, when you get back from break and you start the semester, we have something called faculty opening conference. During the last few years after or starting 2020, the topics or the focus are diversity, equity, inclusion, sense of belonging. And I know it's not just here, but yeah, you can again see it nationwide that there are those workshops and that's to make sure that we better accept, be welcoming, be inclusive, not just to faculty members, to students, to everyone, to the community.”*

This consistent emphasis on diversity and inclusion at the institutional level helps foster a sense of belonging, which is particularly important for women balancing work-life. Such efforts create an environment where women faculty, feel supported, valued, and more likely to remain committed to their academic careers.

## Conclusions and implications

This study reveals that women faculty in academia navigate a complex array of supports and barriers that begin as early as their formative educational experiences and persist throughout their careers. While early exposure to science, encouragement from family, and access to strong mentorship can play a crucial role in sparking academic interest and building confidence, many women enter academic careers without these early advantages. As their careers progress, intrinsic motivations such as a passion for teaching, research, and public engagement often serve as sustaining forces. However, these motivations are

frequently challenged by internal struggles like self-doubt, imposter syndrome, and mental health concerns. External expectations for excellence in every area of academic life add further pressure, increasing emotional strain and heightening the risk of burnout.

Our results include recommended activities that, when implemented in compliance with local and federal laws, support all faculty within departments. Mentorship was identified as one of the most influential supports in women faculty's experiences. Understanding the dual nature of mentorship as both a potential support and a barrier is essential for addressing the experiences of women in academia. Institutions that prioritize the development of intentional, inclusive, and well-resourced mentoring programs can reduce disparities and promote more equitable outcomes. Ensuring that all faculty have access to quality mentorship is a key step in fostering academic environments where women can thrive and succeed. Effective mentorship provides professional guidance, emotional encouragement, and access to essential networks. When these relationships are lacking or negative, they become barriers that restrict advancement and reinforce inequities. In many cases, women faculty navigate academic systems with little structured guidance, which can increase isolation and limit their career development.

Structural inequities within academic institutions also persist as significant barriers to retention and success. Participants described unequal access to opportunities, unclear tenure and promotion processes, and inequitable workloads as ongoing challenges. Even when equity-focused policies exist, their inconsistent implementation weakens their impact. Policies such as teaching relief, tenure clock extensions, and parental leave were often poorly communicated or unevenly applied, leading to confusion and distrust. Faculty frequently had to rely on informal channels or self-advocacy to access resources that should have been standard. Also, the well-being of faculty should be prioritized through mental health resources, reasonable workload expectations, and acknowledgment of the emotional demands of academic work. Equity-focused policies must be clearly communicated, consistently enforced, and subject to regular evaluation. Training for department heads and administrators on equitable leadership and policy implementation is essential for building trust and accountability.

Despite these challenges, the study also identified specific institutional practices that effectively support the retention and success of women faculty. Transparent hiring and promotion practices, dual-career supports, structured mentoring programs, and clear communication of expectations were seen as meaningful contributors to faculty satisfaction. Decisions to enter or remain in academia were strongly influenced by institutional practices encountered at key turning points. Factors such as relocation assistance, clearly defined tenure criteria, and visible institutional commitment to work-life balance played a major role in shaping career decisions. Participants felt more confident committing to institutions that demonstrated genuine investment in their long-term success.



Institutions must take intentional action to address the barriers identified in this study. Understanding the foundational nature of formative influences reveals how deeply they are connected to the support and barriers women faculty experience throughout their careers. It reveals the need for institutions to design interventions that reach women early in their academic paths, such as during undergraduate or graduate training. These interventions must be sensitive to the diverse experiences that shape women's entry into academia. Institutions can better support women faculty by addressing the roots of systemic inequity in the early stages of their careers, helping them navigate current challenges and structural barriers that exist long before they enter faculty roles. Hence, establishing structured, inclusive mentorship programs can provide critical guidance and support from the earliest stages of academic careers. Ideally, we recommend institutions to eliminate these barriers so that women do not have to face them at all, promoting more equitable career advancement for women faculty. In addition, supporting work-life integration requires meaningful cultural change. Therefore, institutions should adopt flexible work arrangements, formal caregiving support, and policies that recognize caregiving as a valid and valued part of academic life. Care responsibilities must be reflected in performance evaluations and promotion decisions to ensure that all faculty are evaluated fairly.

## Ethical considerations

This paper has followed the ethical guidelines for human subject's research in line with the approved IRB (Auburn University) for this study.

## Author contributions

Author BD was involved in all CRediT roles but Funding acquisition while JH was involved in funding acquisition, supervision, and writing – reviewing and editing.

## Conflicts of interest

The authors declare no competing financial interest.

## Data availability

Per the IRB approval process, interview transcripts and resulting analyses are not made publicly available.

Supplementary information (SI) including participant's institution type (Table S.1), a full codebook (Table S.2), additional methods details (Appendix A), and the interview protocol (Appendix B) is available. See DOI: <https://doi.org/10.1039/d5rp00388a>.

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