Perceptual Facilitators for and Barriers to Career Progression: A Qualitative Study With Female Early Stage Investigators in Health Sciences

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Abstract

Purpose

Despite efforts to increase the representation of women in the national scientific workforce, results still lag. While women's representation in health-related sciences has increased substantially, women remain underrepresented in senior leadership roles. This study was conducted to elucidate influences at the individual, interpersonal, organizational, and societal levels that present as barriers to and facilitators for advancement in research careers for women, with the goal of promoting and retaining a more diverse leadership.

Method

The authors conducted individual, 1-hour, in-depth, semistructured interviews with 15 female early stage investigators pursuing careers in health sciences research at a large minority-serving institution in Florida in 2018. Interview guides were designed by using a social ecological framework to understand the influence of multilevel systems. Employing a qualitative approach, drawing from a phenomenological orientation, 2 researchers independently coded transcripts and synthesized codes into broad themes.

Results

Barriers and facilitators were reported at all ecological levels explored. Illustrative quotations reflect the unequal distribution of familial responsibilities that compete with career advancement, family members' lack of understanding of the demands of a research career, the importance of female mentors, perceived differences in the roles and expectations of female and male faculty at institutions, and normative upheld values that influence early career progression.

Conclusions

Achieving pervasive and sustained changes that move toward gender equity in research requires solutions that address multilevel, explicit and implicit influences on women's advancement in science. Suggestions include shifting familial and institutional norms, creating support systems for women with female mentors, and enforcing consistent policies regarding the roles and expectations of faculty. Findings shed light on the influence of gender on career progression by providing context for the experiences of women and underscore the importance of addressing pervasive societal and structural systems that maintain inequities hindering women's progress in the scientific workforce.

Despite longstanding recognition that women are underrepresented among senior investigators in the national behavioral and biomedical scientific workforce, efforts to achieve diversification have had limited success. While the proportion of women who obtain advanced degrees in the health sciences has increased substantially, women continue to be underrepresented in senior leadership roles in research universities.[1] Women comprise only 34% of senior research grant investigators,[2]

despite success similar to that of men in obtaining advanced doctoral degrees in biomedical and behavioral sciences.[3]

Women's underrepresentation in science, in the United States and internationally, is pervasive and persistent throughout various stages of career advancement.[4] International research shows that gender disparities continue to exist at all stages of academic careers.[5] Much of the literature in this area focuses on the drop-off of underrepresented gender, racial, and ethnic minority groups that occurs well before candidates obtain doctoral degrees and reach the eligible principal investigator level of a federal research project grant. Disparities include those in the science, technology, engineering, and mathematics majors at undergraduate and graduate levels.[6] Moreover, even at the eligible principal investigator level for federal research grant projects, disparities in funding persist.[7,8] In a study that compared the pool of individuals funded by the National

Institutes of Health (NIH) with the relevant labor market (e.g., individuals with advanced degrees), researchers found that women and researchers from minority groups were overrepresented in training and mentoring awards and were underrepresented in independent research awards.[8]

The support for diverse scientific teams is widespread. There is ample evidence to suggest that more diverse teams improve research contributions, particularly in areas such as health sciences and health disparities research, in which increased representation of senior researchers from underrepresented gender, racial, and ethnic minority groups is needed for culturally appropriate solutions and partnerships with marginalized communities.[9] Nonetheless, the achievement and maintenance of a diverse workforce are far more complex and elusive than recognized or discussed. Previous literature has attempted to explain why some groups, particularly

women, are less likely to reach the senior investigator level in an academic setting, despite having the necessary qualifications.[10] While overt gender discrimination and bias in recruitment and selection committees likely play a role, it is also postulated that less overt differences in demands, opportunities, and expectations, both societal and institutional, contribute to or hinder a woman's career progression.[11]

The social ecological framework proposes that systems, ranging from micro (i.e., immediate) to macro (i.e., societal), reciprocally influence each other and, together, influence an individual's behavior.[12] Previous studies have used a social ecological framework to understand women's career advancement across various fields including HIV/AIDS research,[13] computer engineering,[14] and career counseling[15] and mentoring[16] in academic medicine. Another study used the framework to explore the opinions of professors and associate professors about programs addressing the gender climate

in medical schools.[17] We have used the social ecological framework in this study to explore the perspective of female early stage investigators (i.e., those who are within 10 years of the terminal degree and have not yet competed successfully for a substantial NIH research grant)[18] who are pursuing careers in health science research at a minority-serving institution (1) to comprehensively assess their perceptions on influences at the individual, interpersonal, organizational, and societal levels that present as barriers to or facilitators for their career advancement and (2) to delineate necessary components of viable interventions. See Figure 1 for a conceptualization of the social ecological framework used in our study.

Method

We used a phenomenological orientation to guide our study. Phenomenology is typically used to describe the universal or shared experiences around a phenomenon for a group of individuals (typically between 5 and 25 people).[19]

This approach is particularly appropriate for understanding individuals' experiences in situations in which researchers believe underlying structures influence the individuals' experiences and have implications for shaping practices or policies.[20] Phenomenological studies generally revolve around answering 2 broad questions of what individuals experience and how they experience it.[20] Thus, we used this approach as an orientation to guide our understanding of women's shared, yet subtle, experiences of career advancement and to provide a structural description of these experiences to guide our interpretations.

Participants and study site

The study site was a large minority-serving institution in South Florida. "Minority-serving institution" is a federal designation given to institutions whose enrollment is primarily students from minority backgrounds. The research faculty at minority-serving institutions commonly face numerous institutional barriers, including historical classification
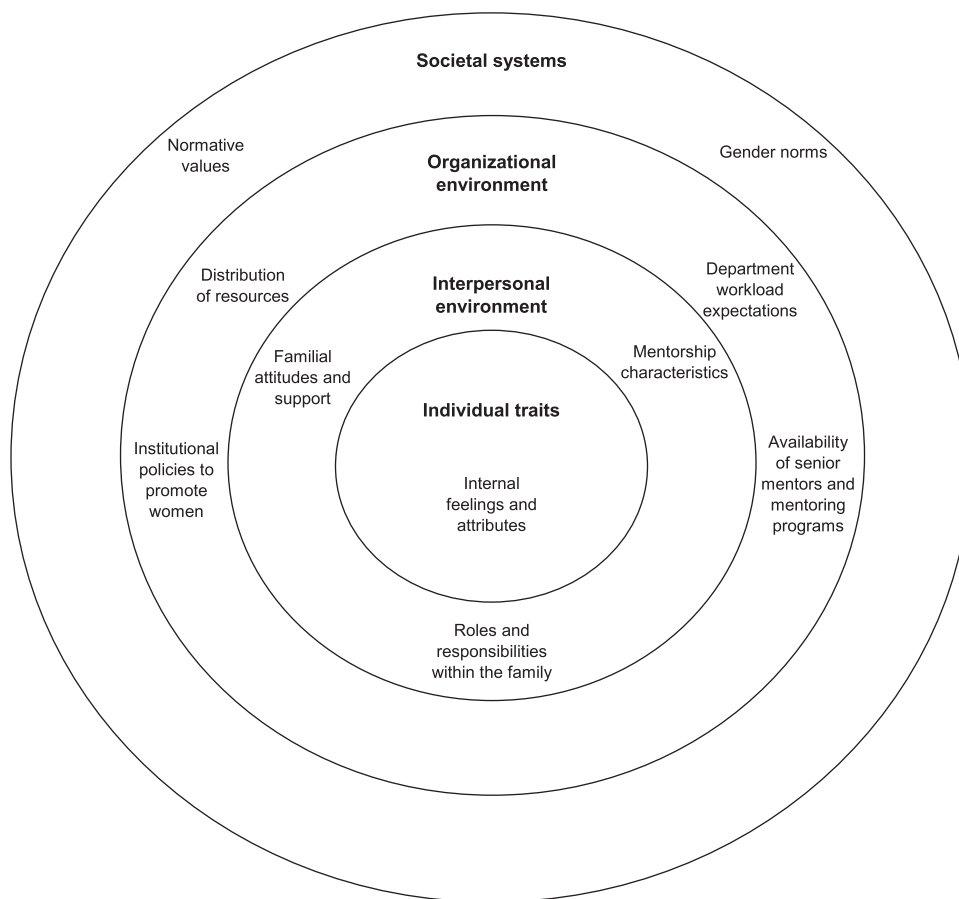

Figure 1 Social ecological framework used to understand experiences around career advancement for female early stage investigators pursuing health sciences research. Source: Adapted from Glanz.[34]

as a teaching institution, emerging policies on research, infrastructure limitations, isolation, and limited numbers of researchers, including limited numbers of mentors.[21] In 2018, none of the top 30 NIH-funded institutions were minority-serving institutions.[22]

We used purposive sampling to ensure inclusion of participants on the basis of early career rank (postdoctoral associates and assistant professors) and track (any health-related science). Because we were interested in exploring perceptions of female early stage investigators who were pursuing research careers in the health sciences but had not yet obtained any independent research awards, participants could not be tenured or the principal investigator of a current or previous NIH R01 grant (a well-funded, multiyear grant awarded to independent investigators). We used the NIH definition of early stage investigator,[18] being within 10 years of the terminal degree and having not yet competed successfully for a substantial NIH research grant, to form our inclusion criteria. Our participant pool included both postdoctoral research and tenure-track faculty. After consideration, we decided to exclude teaching faculty (faculty who teach and do not conduct research) because the demands on teaching faculty are substantially different from those on tenure-track and postdoctoral research faculty at the study's institution.

We recruited throughout September 2018. We obtained a list of faculty members from the university's registrar office, along with each person's rank, gender, and department, and sent invitations to all those who were eligible. We asked interested faculty members to reply to an email invitation to be linked with a research associate who described the study in more detail. Additionally, we made announcements at events that were largely attended by our population of interest and distributed flyers with contact information for our study staff. If interested, participants scheduled a time for the interview. Participants were given $10.00 in cash as compensation for participation. All study procedures were approved by the study site's institutional review board, as recorded in application IRB-18-0268.

Interview protocol and procedures

Interviews lasted approximately 1 hour and occurred between September and October 2018. We conducted interviews using a predetermined, semistructured interview protocol that was developed after a review of the available literature and related work.[23,24] In line with the social ecological framework, our interview guide included questions around individual, interpersonal, organizational, and societal levels of influence. Questions included prompts about family, mentorship, organizational climate, and individual characteristics. (See Table 1 for a summary of our interview questions; see Supplemental Digital Appendix 1 at http://links.lww.com/ACADMED/B57 for the complete script.) To finalize our protocol, we consulted the vice provost of the Office to Advance Women, Equity and Diversity who provided feedback for protocol refinement. We conducted the interviews in the private offices of participants or study staff, depending on participant preference. We employed investigator triangulation, by having 2 researchers conduct the interviews to minimize potential researcher bias. Interviews were digitally recorded, transcribed verbatim to written form, and deidentified in preparation for analysis. Transcriptions were then randomly checked against audiorecordings for accuracy.

Analysis

Using techniques of thematic analysis, the primary researcher (S.B.F.) read through all the transcripts and highlighted significant statements related to our research questions to create a preliminary codebook.[25] Consistent with the social ecological framework used to create the interview guide, the codebook was organized around levels of influence. During analysis, descriptive codes were organized under respective levels. Two coders (S.B.F. and R.D.C.) tested the preliminary codebook by coding 2 interviews independently, adding descriptive codes as needed, and then met to discuss code definitions before coding the remaining transcripts independently. Next, the coders met to discuss assigned codes and explore larger themes.[25] Because we were less interested in generating in-depth descriptions of unique experiences and more interested in describing shared

Table 1

Interview Questions From a Qualitative Study With Female Early Stage Investigators in Health Sciences to Explore Facilitators for and Barriers to Career Progression Among Women, 2018[a]

Level of influence	Areas for exploration
Individual	1. What internal factors support your productivity toward research independence, if any? 2. What internal factors hinder your productivity toward research independence, if any?
Interpersonal	1. Family: What attitudes do your parents, siblings, and important extended family members have about women in science? [Explore] What kinds of support do you get from your family in your career (parents, partners, siblings, and important extended family members)? In what ways have they hindered you in your research career? 2. Mentors: Please tell me about your key mentors. [Explore] How would you describe their style of mentorship? How has the fact that you are different or similar in gender played a role in your relationship? How has it helped? How has it inhibited your relationship?
Organizational	1. How does your department support you along the path to becoming an independent researcher? 2. How does your department promote women, specifically? 3. How do gender, race, and ethnicity play a role in the perceptions of the capabilities of faculty in your department? 4. How equitable is your department? What is your level of compensation [workload/expectations/service] compared with other women and men at your level?
Societal	1. How do you balance the demands of your work and family life? 2. What values do you hold to make this balance possible? How are these shaped by your ethnicity, race, and gender? 3. Are there any misperceptions and miscommunication about your needs as a female early career investigator involved in health research? If so, what are they?

[a]Participants were 15 female early stage investigators pursuing careers in health sciences research at a large minority-serving institution in Florida.

or common experiences, we developed broader themes from the descriptive codes. We grouped the codes into larger categories where possible by collapsing codes into larger themes. To resolve discrepancies in the development of these larger themes, coders reviewed the related transcripts and discussed differences in interpretations until a consensus was reached. We used NVivo 11 software (QSR International, Burlington, Massachusetts) to store, code, and organize the interview data for analysis.

Results

We interviewed each of the 15 participants individually during one 1-hour session. Participants ranged in age from 27 to 48 years (mean = 37; SD = 5.7). On average, participants had completed 4 years of research since receiving their terminal degree. Over half of the participants were assistant professors (60%); 33% were postdoctoral fellows. Eight (53%)

participants were from underrepresented racial/ethnic minority groups, which included Hispanic, Black/African American, and Asian backgrounds. See Table 2 for more background information. Results focus on the following primary influences on career progression: at the individual level, internal feelings and attributes; at the interpersonal level, familial support and relationships with mentors; at the organizational/institutional level, distribution of work and resources; and at the societal level, values and norms. We present here the salient barriers and facilitators and illustrative quotes by level. Table 3 provides additional illustrative quotations.

Individual level—Internal feelings and attributes

Participants were asked to describe characteristics that helped or hindered them in their career advancement. Participants repeatedly cited perseverance and determination

as helpful characteristics, while perceived hindrances included feeling overwhelmed. Several participants described feeling drained or guilty when dealing with real or perceived expectations to fulfill additional roles outside of work, which presented as a barrier in their career advancement.

> It kind of wears on me a little bit … the having to be at work sometimes and then stop what I'm doing to think about what groceries I'm going to pick up before I get home. Or you have a child whose birthday party is coming up, and so you feel compelled to plan it. And maybe it would get done if you didn't, but I would have to ask for the help, rather than just have the other person think that they're going to do it. So, I think that those things are kind of a little draining to kind of be in that position to always have those things on your mind, plus your work. (P06)

Participants attributed working during the weekend or extra hours outside of typical work hours as a source of internal guilt.

> It's always something that we're dealing with, and I just try not to feel guilt that I work longer days than [other] people some days. I work weekends sometimes. I try to remember I need to have family time. I need to take this day off. Like tomorrow, for example, I'll be with our daughter and I need to not be stressed about that. (P10)

Participants described how expectations to fulfill additional roles outside of work came from both internal and external influences (i.e., their own feelings of guilt and caretaking or household roles others assumed they should take on). Participants also described how additional family responsibilities presented as both physical and mental effort.

> I think that in a good faith way, often, people assume, in childcare institutions and what not, that the mother is the one you should reach out to and not the father if the kid is sick or has an issue, or things are going on, or—you know—supplies are needed. And so, I think that women often bear if not the physical [effort] of responding to those things, but also the sort of like mental effort in responding to those things and balancing them out. And so, I think that as a woman, those work–life balance things are just worn differently. (P15)

Interpersonal level

Familial relationships. Participants described the kinds of support they received from their important family

Table 2

Characteristics of the 15 Participants in a Qualitative Study With Female Early Stage Investigators in Health Sciences to Explore Facilitators for and Barriers to Career Progression Among Women, 2018[a]

Characteristic	Value
Age, mean (SD)	37 (5.7)
Ethnicity, no. (%)	
Hispanic/Latino	5 (33)
Non–Hispanic/Latino	10 (67)
Underrepresented minority,[b] no. (%)	8 (53)
Marital status, no. (%)	
Single/never married	2 (13)
Married	10 (67)
Living with partner	2 (13)
Other	1 (7)
Primary caregiver, no. (%)	9 (60)
Number of children, mean (SD)	1 (0.7)
Years in research after receiving terminal degree, mean (SD)	4.4 (4)
Academic position, no. (%)	
Assistant professor	9 (60)
Postdoctoral fellow	5 (33)
Other	1 (7)
Applied for federal funding in the past	10 (67)
Received federal funding (excluding R01 funding[c]) in the past as a PI, no. (%)	6 (40)

Abbreviation: PI, principal investigator.

[a]Participants were pursuing careers in health sciences research at a large minority-serving institution in Florida.
[b]Because of the small sample size, some potentially identifiable demographic information was omitted to protect the privacy of research participants. The authors include Hispanic, Black/African American, and Asian women in the underrepresented minority category.
[c]An R01 is a grant offered by the National Institutes of Health that provides funding to independent investigators for up to 5 years of research and writing.

members (e.g., parents, siblings, partners) in their careers and attitudes that their families had about women pursuing careers in science. Many participants reflected that, while family members were generally encouraging and supportive of their career, there was a lack of understanding about the reasons for their career choice and the demands of a research career.

> Overall encouraging, but lack of understanding about the process. So, they're [family] very encouraging in terms of personal success and advancement, however, not necessarily supportive in terms of like the details of the process or the sacrifices that have to be made or the level of work that goes in. So, because of their lack of understanding—it could be interpreted as lack of support to a certain extent, but they are happy that I do this work. (P13)

Many participants shared similar sentiments about how their family members did not present as conscious obstacles in their careers but rather that responsibilities in their families presented as a significant hindrance to their careers.

> They [family] don't consciously do blocking or [present as] obstacles. Again, going back, it's just a lack of understanding. So, if I say, "I can't do anything this weekend because I have to write a grant," they consider that as I'm being disloyal to my family or I'm not meeting my responsibilities. (P13)

Participants also commented how their family did not hinder their career advancement but that there was just not enough time to do everything they needed to do.

> I don't think family hinders you. I think having a career in research if you want to do research, if you want to also teach and be in academia, it is a 24/7 career. It is very demanding. So, I think the hindrance is just a lack of time; there are not enough hours in the day to do everything you need to do. (P08)

Relationships with mentors. Participants described their relationships with their mentors and reflected on how ethnic, racial, or gender differences from or similarities with their mentor played a role in their mentoring relationship. While participants had a range of mentors that were of different genders, races, and ethnicities, with a mix of both positive and negative aspects, several participants noted how having female mentors was beneficial to them. Participants identified having female mentors as a facilitator to career advancement because they

served as role models. Some described how having a female mentor allowed for validation and increased authenticity with respect to navigating academic politics such as dealing with institutional norms, promotions, and so on.

> I'm always worried about being judged or … being weak or emotional or dramatic. So, I'm always concerned about who I can let know—the extent to which I can let people know about my personal problems because I don't want it to count against me. If I have someone who went through something similar to me but is credible in that world, then I feel more comfortable. I feel more of a sense of trust too. (P13)

Some participants also noted interpersonal benefits of having female mentors who had a family.

> I feel that, now that I'm a mother, maybe there's a little bit more understanding. I don't think that that's going to help me get tenure in any way. If I failed at the job, I failed, but I feel that when I express things about, "Oh, I didn't sleep last night," or this or that, it's not like, "Oh well, too bad, get to work." I'm met with compassion. My workload hasn't changed because of that. (P04)

A few participants described when mentors or supervisors "carved out a piece of the pie" for them, situations which they described as facilitators of career success. Examples included involving early career faculty in manuscripts and giving them a unique role in existing projects.

> I feel like she, unlike some of the other people I work with, sort of carves out for you a piece of the pie. She knows that in order for her to succeed, she can't do it all and she needs the help of other people, but also that she's already so established and already has so much going on in this game that it's okay for her to be like, "So, here's this piece; that's yours." … I think that she's helped me get opportunities and apply for certain grants in a collaborative way with her that I probably wouldn't have gotten or may not have applied for without her. (P01)

Organizational/structural level— Distribution of work and resources

Participants described the distribution of tasks and responsibilities among individuals in their department at their level. Several participants noted discrepancies in expectations and/or work distribution compared with that of other women and men at both the postdoctoral and faculty levels. Other participants described discrepancies of service load compared with that of male faculty at their level.

> When I started my postdoc, immediately my supervisor started giving me very administrative type work. It was not, [it was] very loosely related to anything research oriented. Had me doing all kinds of busy work that I think … [neither] a postdoc or me should be doing, and so I had to resist. I had to fight; there was bad blood for a little bit, but eventually I got what I wanted, which was protected time to do my research work. But they made an assumption when I first started there that I was going to be doing secretary [work]—nothing wrong with secretary work—but that would be the whole thing that I would be doing. (P13)

Participants identified helpful practices at the institutional level that aid women in their career advancements. In general, participants were unable to identify institutional practices that support women specifically in their career progression. When asked about practices that had helped them in general, participants' responses included receiving administrative support and startup funds and having access to assistants or students to help in carrying out research projects.

> I think that there are resources that the department offers in terms of things like shared personnel and shared space that probably helped me reach some of my research goals. (P01)

Societal level—Values and norms

Finally, participants described how they managed the demands of work and the values they held to facilitate their progression. Participants described values and norms that influenced their ability to balance the demands of family and work. While a few participants reflected that maintaining a work–family balance made them a better researcher, others attributed striving for the work–family balance because of obligation or responsibility.

> I feel like it's a responsibility. Like I have to make it work. I have to be a good employee. When you come into [a university], they let you know, "We put all this money into you. We give you all these resources." So, you're expected to meet this standard: You have to. Then I also don't want to let people down. So, it's like a moral thing, and then with my girls it's also a moral thing. I have to be a good mom; I have to be there and educate them and all these things. I have to. (P04)

Another participant described:

> I love seeing my kids thrive and being with them and spending time with them. I think that thinking and interacting and having a life outside of [work] makes

you a better researcher. It's not that it's different from being a researcher; it makes me a better researcher. It means we think differently and approach the world differently and emotion regulate. That's what I do because it's who I am. It makes me happy. The reason I do it is because I love it. (P15)

Discussion

The goal of this study was to explore the perceptual individual-, interpersonal-, organizational-, and societal-level barriers to and facilitators for career advancement among a group of female early stage investigators pursuing careers in health sciences research. We conducted this study to identify the less obvious, yet shared, influences that play a role in career advancement. We used the social ecological framework as a way to consider different aspects of women's lives that influence their ability to succeed in research advancement and as a platform to identify potential points of intervention that more adequately address the needs of women as they exist in systems.

Taken together, our findings highlight subtle nuances of how women perceived barriers or did not perceive barriers to their career advancement, such as family members' lack of knowledge about work demands or the time required for a woman to fulfill all the roles she and/or her family perceive as hers. Other work, such as that by Britton,[26] has shed light on the phenomenon of women not viewing their individual experiences as influenced by their gender. However, when their experiences are analyzed collectively, the findings reveal systematic and shared experiences that reflect the influence of gender on career progression among women. Britton's finding is consistent with theories of gender bias in medicine that include assuming sameness or equality between women and men when there are genuine differences in conditions and experiences to be considered.[27] Understanding and explaining women's experiences of gender bias as something else, for example, individual choices or constraints, help maintain existing structures that perpetuate discrimination and effectively mask how these experiences reflect forms of structural sexism and oppression.[27]

Our findings confirm the burden of additional roles that women face, particularly related to home and family

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Table 3

Illustrative Quotations From Participants Reflecting Perceptual Facilitators for and Barriers to Career Progression From a Qualitative Study With Female Early Stage Investigators in Health Sciences, 2018[a]

Levels of influence	Additional illustrative quotations
Individual	
Feelings	Sometimes I feel like the burden of other things outside of academia kind of rest on my shoulders. And [my partner] does a lot. It's not like he doesn't. It's not like there isn't equal time with the kids. It's just the other things. Just this week, for instance, I could tell that he was upset because I hadn't done the laundry because I was busy. Or I could tell that he was upset because, last night, my [child] woke up and wanted some milk, and we didn't have any milk because I already had given him the last of it because this week has been crazy. I could tell that he was irritated because he sees buying the groceries as my job. Doing the laundry is my job. (P06)
Attributes	I'm a very stubborn person, and so, there is also a sense of, "Well, I'm going to keep doing this to prove I can do it to myself and to other people." I work really hard and I think that I persevere a lot. (P02)
Interpersonal	
Familial support	Not much [support]. I'm thinking it stems from they don't understand what I do. They don't understand tenure. They've seen me my whole life working hard and just achieving goals. So, they think, "Oh, she's doing fine. She's just stressing out. She's just being [name]." But that's not the case. So, my family, they don't support me. And my husband, he doesn't get it either. He doesn't get academia. He thinks, "Just put more time into it and you're going to be fine or write better and your paper's going to be accepted." He doesn't understand. (P04)
Mentor relationships	We have a lot of junior faculty. Many of them are women. We are a cohesive group amongst us, but we have few women examples at the full professor level and that means something to us here. In fact, the last person who, I wouldn't really say she's a direct mentor—I have conversations with her, she's a colleague, works with me—had a lot of difficulty getting that promotion, and we saw that happen. We saw the struggle. There's a very real concern being a woman and having all-male senior leadership. (P10)
Organizational	
Workload distributions	As much as I say no to service and my director is reasonable, the fact that we have low faculty just makes it that I am more likely to serve on the committees. But I tend not to say no because, as long as [the director] tells me that it comes from a struggle with lack of manpower, I say I will be happy to contribute and to work on that. (P09)
Expectations	There's an automatic assumption that a man is going to be writing grants, writing papers, going to do presentations, have a very active role almost as like a full faculty member, whereas that was not the assumption for me. I eventually got it, but I had to ask and beg and plead for that. (P13)
Societal	
Values	Take me for example. I've been taking care of my parents. I take care of my mom. I think I have a moral obligation to take care of my mom. I think I have a moral obligation to take care of my son, and to help people in my family, if I can. I think those values shape my philosophy. You know I think that a lot of those values of who I am and how I navigate the professional arena are grounded in my roots. You know, you have to do the best that you can do. (P08)
Norms	They just want me to be the perfect family member [laughs] and the perfect working person. They want me to do it all. (P13)

[a]Participants were 15 female early stage investigators pursuing careers in health sciences research at a large minority-serving institution in Florida.

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care. Women tend to disproportionately provide the family care and domestic labor in households.[28] These roles typically are unaccounted for in the workplace and are often unnoticed by families and women themselves. Our findings suggest that the numerous roles that women play limit their time and their mental/emotional capacity; together these limitations can present as a hindrance to career advancement. While participants repeatedly identified perseverance and determination as attributes that allowed them to progress in their careers, they also identified as a barrier the feeling of being overwhelmed by the need to fulfill all expectations. Moreover, family members' lack of understanding about the required roles and responsibilities necessary to succeed and progress in a research career could negatively affect a woman's ability to meet the demands of an academic research career. Thus, findings suggest diversification of the health sciences research community will require informal cultural changes within families and institutions. For example, we suggest the need for innovative strategies such as institutions providing family orientation for all new faculty to address interpersonal barriers and to educate families about the demands of academic research careers as a potential opportunity to bridge existing gaps between work and family life.

Additionally, universities should recognize and accommodate the responsibilities that childcare adds outside of the workplace for men and women. In 2018, NIH updated their extension policy to approve a 1-year extension of early stage investigator status for childbirth, recognizing that nearly 50% of the extension requests were related to childbirth.[29] In light of the 2020 COVID-19 pandemic, some universities have offered to temporarily stop the tenure clock for junior faculty due to circumstances related to the pandemic, such as added childcare responsibilities.[30] These accommodations have the potential to support female early stage researchers who are likely to be disproportionately affected by childbirth and childcare.

Our findings also reflect that having women in leadership and mentoring roles is beneficial to other women who are in early stages of career advancement. These female mentors can serve as role models and provide both formal and informal

support and guidance in navigating the challenges of academic careers. Conversely, the absence of women in leadership positions may present as a barrier to navigating and balancing the demands that are required to be retained and advance to higher positions of leadership. This finding is consistent with previous literature that asserts that when women are in the minority in the workplace, they are negatively affected. Previous research suggests that a lack of female leadership can result in increased pressure and bias in performance assessment, making it difficult for women to be retained and rise to higher-level positions.[31] While we acknowledge that some institutions may not have a large pool of senior mentors who are women, our findings underscore the importance of having mentors that share characteristics with junior faculty. We also suggest that, in addition to having mentors help navigate the identified individual characteristics and barriers, mentors and mentees can be paired on the basis of outside life experiences, such as having children or sharing similar roles outside of work, such as being caretakers.

Participants also described a lack of awareness about institutional support and policies specifically in place to support women. They described explicit inequities in the distribution of work among faculty. Findings suggest institutions need to be more proactive about gender equity in the enforcement of rules and promotion of faculty. Attentiveness to gender equity should include tenure and promotion committee policies and the distribution of departmental service and administrative tasks. Other suggestions include training mentors to be more aware of equity issues concerning service, pay, and opportunities so that they are better able to identify and address bias. This training can be particularly relevant in growing research institutions where there are limited numbers of research faculty and where women may agree to take on additional service or administrative duties that will hinder their own independent career progression. Universities can also uphold requirements such as reviews of faculty assessments (e.g., service assignments) to objectively identify workload inequities. Imposing specific policies to reduce bias within departments is a necessary step, as research shows that several institutions have no formal programs focused on

reducing bias and recruiting, promoting, and retaining women.[17]

Several women described a desire for success as an independent health sciences researcher and a sense of responsibility as a facilitator for career advancement. Many also expressed appreciation for how their roles, outside and inside the work environment, together, made them a better researcher and how this value—having meaningful roles outside of their research careers—helped them persist. This last point is important to note and, indeed, an underlying argument for the utility of a diverse workforce in which people of various backgrounds, conditions, and experiences can contribute to increased innovation and more meaningful research to meet the needs of diverse populations.[32]

Much of the research around promoting women in academic medicine focuses on strategies at the individual and interpersonal levels to advance women.[17] Our findings identified barriers at all 4 ecological levels explored; thus, targeting larger influences at the societal and structural levels, in addition to influences at the individual and interpersonal levels, is critical to the achievement and sustainability of a diverse workforce. We believe providing strategies to mitigate individual and interpersonal barriers (i.e., family support, mentoring) without shifting normative systems will do little to move the needle forward over the long term. More of a focus on shifting existing societal, structural, and institutional norms is required to achieve sustainable diversification in the workforce. Multilevel, multipronged interventions will be necessary to address not only institutional policies but also normative values, roles, and perceptions that infuse institutional systems and which subtly work to oppress women and hinder progress. As a promising example, a study showed that a multilevel intervention that addressed individual, interpersonal, and societal stereotypes and assumptions about women reduced gender bias among faculty and resulted in gains in leadership self-efficacy for women participants in an institutional setting.[33]

On the basis of our findings, we suggest that targeting societal and structural influences that hinder women's career progression includes recognizing and rewarding women for their numerous

roles both inside (e.g., service, teaching, mentorship, committee roles) and outside (e.g., family, childcare, household roles) the workplace and accommodating these realities in expectations of career progression. For example, instead of minimizing or ignoring these additional roles, we should give them more attention and value them and women's societal contributions. As Britton[26] noted, "Universities are gendered organizations nested within a gendered hierarchy." The embeddedness of gender within the workplace structure makes it difficult for women to see gender as part of a pervasive organizational norm that restricts their opportunities and devalues their work.[26] Yet, as long as existing structures are maintained, the sustainable diversification of a leadership workforce will be severely challenged.

A key proposition of the social ecological framework is to provide interconnections for systems previously isolated from each other.[12] Together with this framework and a phenomenological orientation, our findings shed light on shared experiences that suggest instances of systemic, implicit, internalized, and multilevel gender bias. While a component in isolation may seem insubstantial, taken together, the compounded influences of hindrances become clearer and the implications for required change more compelling. To continue to identify and combat experiences of implicit and explicit bias hindering women's progress in science, universities must conduct institutional climate assessments. Responses from large numbers of individuals can highlight salient experiences of bias and discrimination that are part of the realities of women. As long as women continue to experience discrimination and bias in isolation, inequities will persist.

This study had limitations. Because of our small sample size, we were not able to describe the unique experiences of female early stage investigators belonging to different racial and ethnic minority groups. It is important to acknowledge that women from racial and ethnic minorities, such as Black/African American women, may face barriers and challenges different from those identified in this study. Furthermore, our study was limited to one institution. Still, we believe our findings provide valuable insight into the realities facing female early stage

investigators and can be useful for other institutions.

In sum, this work sheds light on the current context of experiences in career advancement among a group of female early stage investigators and provides suggestions for multilevel changes needed to move the needle forward. Much work remains to achieve gender equity in senior investigator roles in the health sciences workforce. Ongoing efforts should address the multilevel barriers and facilitators identified; such work requires focusing on shifting pervasive societal and institutional norms and systems that implicitly and explicitly hinder women's advancement in the scientific workforce.

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