

Special Article

Increasing diversity, equity, and inclusion in the fields of nutrition and obesity: A roadmap to equity in academia[☆]



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ABSTRACT

Research shows that a diverse faculty improves academic, clinical, and research outcomes in higher education. Despite that, persons in minority groups, usually categorized by race or ethnicity, are underrepresented in academia (URiA). The Nutrition Obesity Research Centers (NORCs), supported by the NIDDK, hosted workshops on five separate days in September and October 2020. NORCs convened these workshops to identify barriers and facilitators for diversity, equity, and inclusion (DEI) and provide specific recommendations to improve DEI within obesity and nutrition for individuals from URiA groups. Recognized experts on DEI presented each day, after which the NORCs conducted breakout sessions with key stakeholders who engage in nutrition and obesity research. The breakout session groups included early-career investigators, professional societies, and academic leadership. The consensus from the breakout sessions was that glaring inequities affect URiA in nutrition and obesity, particularly related to recruitment, retention, and advancement. Recommendations from the breakout sessions to improve DEI across the academe focused on six themes: (1) recruitment, (2) retention, (3) advancement, (4) intersectionality of multiple challenges (e.g., being Black and a woman), (5) funding agencies, and (6) implementation of strategies to address problems related to DEI.

Keywords: academic recruitment, and tenure, career development, diversity, equity, ethnicity, grant funding, inclusion, intersectionality, promotion, underrepresented in academia

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Study Importance Questions

What is already known? Achieving diversity, equity, and inclusion remains a significant challenge in academia.

What does this study add? This paper adds recommendations for academic universities, professional societies, and funding agencies to correct the underrepresentation in academia of marginalized or minority researchers and faculty.

How might these results change the direction of research? These recommendations could improve diversity, equality, and inclusion efforts in the fields of nutrition and obesity.

Introduction

Although there is a moral argument for diversity, equity, and inclusion (DEI), it also supports a pathway to improved team communication, problem-solving, and innovation [1,2]. Recent studies have found that increasing diversity in academia can benefit stakeholders at all levels [3–5]. Despite its well-known benefits, it remains a significant challenge to achieve DEI in academia. Traditionally, in the United States (US), the following racial/ethnic groups have been marginalized in the general culture of higher education: American Indian, Alaskan Native, Black/African American, Hispanic/LatinX, and Native Hawaiian/Pacific Islander populations. Subsequently, faculty and researchers from these groups are underrepresented in academia (URiA).

In 2019, non-White persons accounted for 39.9% of the US population [6]. Data from 2018 show that URiA faculty (URiAFAC) comprised 25% of full-time faculty but only 19% of professorships [7]. Considering medical school faculty alone, URiAFAC represented only 13%. The disparity trends are more significant as academic rank increases [8,9]. In addition, URiAFAC receives a lesser share of research funding. For example, in biomedical research, the National Institutes of Health (NIH) research funding is 10% higher for non-Hispanic White individuals than Black/African American individuals, even after controlling for all standard measures of academic and scientific achievement [10]. Furthermore, the probability of a URiAFAC receiving NIH career development funding is approximately half that of a non-Hispanic White person [11].

Barriers to DEI are both systemic and localized. Although some barriers like racism and implicit bias [12] may be broad in scope and challenging to quantify, the following barriers can be more readily quantified: disparities and inequities in promotion and funding, service assignment or requirements, and inadequate mentorship and training [13]. These barriers disadvantage URiAFAC and likely contribute to

decreased diversity [12]. Over time, minor variances in resource accessibility lead to significant inequities between faculty who are and are not underrepresented [14]. The fields of obesity and nutrition are no exception. Of the leading nutrition- and obesity-related national organizations, some did not track race/ethnicity of membership. Still, those that did had significant underrepresentation of Black/African American, Hispanic/LatinX, Native Hawaiian, Pacific Islander, American Indian, or Alaskan Native groups compared with their correlative percentages in the US population [15]. Additionally, only one of the organizations reported having a president within the previous decade who was a URiAFAC [15].

The Nutrition Obesity Research Centers (NORCS) initiative to advance the careers of URiAFAC

Given the evidence of problems facing URiAFAC in nutrition and obesity, the NORCs hosted an initiative comprising five virtual workshops spanning September and October in 2020 [16]. This initiative aimed to provide specific recommendations to improve DEI in nutrition and obesity. Each workshop focused on a different topic and consisted of a 1-h session of presentations by two experts in a specific area of DEI followed by workgroup discussions. Workgroups consisted of URiA trainees and faculty engaged in research related to or influenced by funding or strategic vision in nutrition and obesity. Each workgroup represented a unique sphere of academic experience. Early-career investigators mainly were attendees within 10 years of their terminal degree without a history of R-level NIH funding. NORC leadership and Directors and Program Directors of the NIH comprised the second workgroup. The final workgroup included leaders and representatives of nutrition and obesity-focused professional societies (i.e., executive directors and presidents).

TABLE 1
Topics presented at 2020 workshops on DEI and questions addressed after workshop presentations by workgroups tasked with providing specific recommendations to improve DEI for faculty and researchers from groups URiA in the fields of nutrition and obesity research

Underrepresentation in academia workshop topics	Questions addressed by workgroups after each workshop session	Emergent themes
Sept 11: Advancing (NIH) Funding Success Sept 25: Improving Promotion and Tenure Success Oct 9: Increasing Representation in Leadership Oct 23: Enhancing the Overall Academic Experience Oct 30: Addressing the Additional Challenges for Females	<ul style="list-style-type: none">What does equity and justice in the following areas look like to you for academic institutions, funding agencies, and professional societies:<ul style="list-style-type: none">Barriers to achieving equity and justice?Facilitators to achieve equity and justice?Successful strategy that you have seen implemented to improve equity and justice in this area?What is needed to test the effectiveness of implemented and proposed strategies?What future initiatives would you like to see in this domain discussed today?	Recruitment Retention Funding Advancement Intersectionality

Note: The workshops were sponsored by Nutrition Obesity Research Centers (NORCs) and supported by the NIDDK. Details about the workshops and videos of presentations are available here: <https://www.uab.edu/norc/education-enrichment/workshops/norc-minority-symposium/norc-minority-symposium-schedule>. Abbreviations: DEI, diversity, equity, and inclusion; URiA, underrepresented in academia.

TABLE 2

Recommendations for AI, PS, and FA to correct the underrepresentation in academia of marginalized or minority researchers and faculty (URiAFAC) and improve DEI in the fields of nutrition and obesity

Driver(s)	Key element	Ideas for developing and sustaining DEI in academia
AI	<i>Recruitment</i>	
	Outreach	Active and strategic outreach to communities and youth.
	Target	Implement annual recruitment targets nationwide.
	Announcements	<ul style="list-style-type: none"> • Develop position descriptions that communicate an institutional commitment to DEI. • Include a statement that URiAFAC candidates are encouraged to apply.
	Search committees	<ul style="list-style-type: none"> • Guide committee members on how to evaluate DEI in candidates. • Report efforts to recruit URiAFAC.
	Interviewing	<ul style="list-style-type: none"> • Interviews should not start until URiAFAC are in the applicant pool. • Criteria for selection should specify DEI and related language.
AI and Centers	Selection	Broaden the description of the desired experience, scholarship, and background.
		<ul style="list-style-type: none"> • Applicants should be able to describe their experience with diverse students, issues of diversity, and experience working in diverse settings [68]. • Applications should include a description of DEI efforts. • Guide how to review DEI efforts detailed in applications.
AI and Centers	Leadership	Leaders/members can serve as role models or mentors and engage in roundtables to discuss opportunities and connect with undergraduates.
	Pipeline	Implement pipeline programs to improve retention at all stages: college admission through senior faculty or executive boards.
AI	<i>Retention</i>	
	Tracking	Track data on retention of URiAFAC and evaluate to identify points of attrition contributing factors.
	Culture	<ul style="list-style-type: none"> • Implement an institutional-wide initiative to increase cultural competency and DEI sensitivity and awareness in faculty, staff, and students. • Provide URiAFAC with critical lifestyle information such as the diversity of surrounding geographical areas and related family and life resources.
	Mentoring	<ul style="list-style-type: none"> • Require training on how mentors can also serve as sponsors. • Develop or expand sustainable supports for URiAFAC in transitioning to new career stages. • Establish peer mentoring networks for URiAFAC to provide support; help navigate issues, barriers, and traumas of bias or racism; and identify mentors and sponsors.
AI	<i>Advancement</i>	
	Organization/culture	<ul style="list-style-type: none"> • Adjust infrastructure supports to remove obstacles to DEI in academic advancement. • Give equitable weight to DEI service. • Establish supportive programs and mechanisms for mid-career URiAFAC similar to those for early-career investigators.
	P&T	<ul style="list-style-type: none"> • Require departments/divisions to address DEI in the promotion. • Codify expectations to make explicit expectations regarding criteria to qualify for P&T. • Criteria <ul style="list-style-type: none"> o Account for additional service activities related to DEI that URiAFAC must engage in. o Account for different types of scholarship, such as community-based research, which requires a longer time to obtain products that are historical markers of success in academia [cites]. Involve senior URiAFAC in evaluations to assure such scholarship and methods are equally evaluated and relatively [42]. • Establish procedures to submit complaints with clear, equitably applied, and tracked over time.
	P&T	<ul style="list-style-type: none"> • Assure diverse representation on P&T committees for each academic rank. • NORCs should advocate for P&T for qualified URiAFAC by providing vital support and recommending URiAFAC to serve on P&T committees. • Create a P&T review committee to provide a pre-review of applications for NORC members and sources or opportunities to address any gaps before formal P&T submission. • Assist with the mid-career advancement of URiAFAC by establishing an across-NORC network to leverage increased opportunities.
AI/Centers	P&T	<ul style="list-style-type: none"> • Set targets for diversity in speakers at annual meetings representing society membership, which then increases the exposure of these scientists and increases the likelihood that they will be nominated for leadership positions later. • Create a list of qualified URiAFAC to serve as speakers.
PS	Portfolio building	<ul style="list-style-type: none"> • Set targets for diversity in speakers at annual meetings representing society membership, which then increases the exposure of these scientists and increases the likelihood that they will be nominated for leadership positions later. • Create a list of qualified URiAFAC to serve as speakers.
AI	<i>Funding</i>	
	Review panels	Sponsor or recommend URiAFAC for study sections at appropriate career points.
AI/Centers	Policy	<ul style="list-style-type: none"> • Ensure equitable funding of pilot and feasibility awards for URiAFAC to support their future NIH applications. • Designate funding opportunities specifically for URiAFAC to increase the pool of URiAFAC applicants for internal pilot grants.
AI and FA	Partnership	Implement a matching funds program for career development awards to enable hiring more URiA postdocs; for example, research centers at AI could initially provide only 3–5 years
		(continued on next page)

TABLE 2 (continued)

Driver(s)	Key element	Ideas for developing and sustaining DEI in academia
FA	Policy	<p>of financing and provide space and related resources that, in turn enable tenure and advancement.</p> <p>Develop policies to correct the effect of bias in reviews and funding rates:</p> <ul style="list-style-type: none"> • Prioritize funding for URiAFAC like NIH policy that increases funding of early-career investigators. • Develop a type of affirmative action strategy such as a 15-year plan of 3-year incremental increases in the percentage of funding of URiAFAC for each academic institution. • To increase the number of URiAFAC serving on review panels, revise the criteria for serving as a panel reviewer, for example, the requirement that standing members must have obtained R01 funding.
	Training Tracking	<p>Implement implicit bias training for leadership, review officers, and reviewers.</p> <ul style="list-style-type: none"> • Develop a transparent system for tracking outcomes over time, for example, by race, gender, or career level over 20 years. • Track statistics related to diversity, such as differences in funding outcomes between predominantly White and historically Black colleges, universities, and other organizations. • Develop a system of quantified data on inequities in reviews to evaluate how best to assure DEI.
	Announcements	<ul style="list-style-type: none"> • Funding opportunity announcements for enrichment, pilot, and feasibility programs can include a health-disparities focus. • State that DEI efforts should be detailed in grant applications and will be considered during the grant review process.
	Funding	<ul style="list-style-type: none"> • Prioritize funding: <ul style="list-style-type: none"> o For URiAFAC with excellent scores. o For research focused on conditions that disproportionately impact underrepresented groups [69]. • Assign topic areas mainly studied by URiAFAC, such as prevention and health disparities vs. clinical trials, to a broader swath of Institutes and centers. • Develop a web page on funding opportunities and information on resources such as peers, mentors, sponsors, and counselors specifically for URiAFAC. Promote the Web page widely, for example, through a listserv.
	Reviews	<ul style="list-style-type: none"> • Implement blind reviews and anonymize proposals. • Require reviewers to sign a statement that they have provided an objective and unbiased review and understand that discovering discriminatory or biased language in a study will lead to loss of service in the future. • Develop procedures for addressing biased reviews. <ul style="list-style-type: none"> o Define biased reviews <ul style="list-style-type: none"> • Reviews with perceived or apparent discriminatory comments, such as reference to race or gender, when the grant is not specifically addressing these issues. • Reviews overlook an applicant's publications or demonstrated research expertise as listed in the biosketch. o Consider a bias reporting system where reviews undergo separate review by a designated panel with outcomes such as: <ul style="list-style-type: none"> • Discarding biased reviews as invalid and consider corrective actions such as: <ul style="list-style-type: none"> • They are barring reviewers with bias from serving on study sections, for example, for 3 years. • They require barred reviewers to have proof of DEI training within 6 months before again serving. • Grants not discussed or scored require some type of feedback.

Abbreviations: AI, academic institutions; DEI, diversity, equity, and inclusion; FA, funding agencies; NORC, Nutrition and Obesity Research Center; P&T, promotion and tenure; PS, professional societies; URiAFAC, underrepresented in academia faculty.

Each group addressed the same series of questions for each topic to provide structure and consistency to the results of the discussions (Table 1). The conversations were recorded and reviewed for themes. Five major themes were identified as follows: (1) recruitment, attracting diverse talent; (2) retention, sustaining diverse talent once recruited; (3) advancement, creating a pipeline conducive to upward mobility; (4) funding, ensuring that review processes and distribution of research funds and program/departamental resources are equitable; and (5) intersectionality, incorporating inclusionary tactics for persons with multiple identities, such as being both a member of a marginalized racial/ethnic group and a woman or also disabled. Although the unique

experiences of the three different workgroups were assured to address those thematic areas, the discussions of each workgroup were wide-ranging and not restricted solely to those perspectives. As such, we merged recommendations from the different groups.

Videos of the workshop presentations are available online at the following link (<https://www.uab.edu/norc/education-enrichment/workshops/norc-minority-symposium/norc-minority-symposium-schedule>). This paper reports the findings of the workshops on barriers to DEI, ideas to overcome those barriers, and examples of successfully implemented strategies and serves as a draft of a roadmap for addressing DEI in academia in nutrition and obesity-related research.

DEI in academia: barriers

All the workgroups in each workshop emphasized that improving DEI would require a broad cultural change and efforts that reach within and outside of the primary drivers of change, academic institutions, funding agencies, and professional societies. Within these primary drivers, DEI values should be embedded in the critical elements of the organizational mission and values of each academic organization and professional society. Dr. Joan Reede, a presenter at the workshop on promotion and tenure success, noted that barriers to DEI do not begin at the leadership, faculty, or trainee level but, instead, track from early education and even prenatally [16]. Thus, to drive change outside the primary drivers, they must provide resources and implement outreach programs for communities and youth during the full spectrum of K-12 education. Tracking is essential for efforts within and without K-12 education to quantify success and identify effective methods that maximize resources and optimize investments. These general efforts also apply to the problem areas identified through the themes that emerged during workshop discussions, as detailed below.

Recruitment

Recruitment and representation of URiAFAC is a problem long acknowledged [17–19]. Despite some studies reporting incremental improvements in the proportion of URiAFAC, others demonstrate it is mainly unchanged [20]. On the one hand, the perception that a lack of diversity in the recruitment pipelines perpetuates a myth that securing a diverse pool of applicants is impossible [21]. On the other hand, disparities in the educational system that begin in preschool have occurred across many cities in America [22]. More aggressive recruitment measures should target marginalized communities and youth, such as increasing resources for pipeline programs focused on elementary through high school students. For example, funding programs focusing on increasing the number of URiA high school students interested in science and prepared to pursue scientific careers will contribute to more candidates for academic positions. One barrier to hiring within academia is the lack of a recruitment policy familiar to many academic institutions. The lack of recruitment policies leaves much being determined randomly or subjectively by search committees [21]. These policies include targeted recruitment for URiAFAC, cluster hiring, and financial support among minority investigators. Additional strategies and policies are listed in Table 2. Another barrier to hiring within academia is the lack of diversity on search committees. Despite the proposition that there is a lack of minorities in the pipeline, a more significant proportion of females and minorities are recruited to search committees when the chair is either a woman or a URiAFAC. Likewise, females and minority chairs receive more external applications from URiAFAC [23]. Thus, institutions should intentionally place females and minorities as chairs to increase the number of females and minorities in the search committee and job application pools.

Retention

DEI efforts do not end once a URiAFAC has been recruited, as retention is also a significant problem. One barrier to the retention of URiAFAC is a need for more academic and financial support. During the NORC workshop on advancing funding success for URiAFAC [24], Dr. Dale Abel described it as “leakiness in the pipes” at all transition points. Dr. Joan Reede reiterated this point and characterized challenges at multiple levels, including the (1) individual, (2) organizational, and (3)

societal levels [25,26]. Early-career workgroup members identified the most problematic transition points as (1) getting from the level of the postdoctoral *trainee* to a tenured assistant faculty appointment and (2) moving up to full professor. Dr. Reede described this phenomenon as “a lack of continuity,” where abundant resources are given during the graduate and postdoctoral levels, and almost no resources are dedicated to developing junior investigators at the faculty level. Many early-career workgroup members stated, “though we felt supported during our postdoctoral tenures, the experience during our faculty appointments has been quite the opposite. We’ve observed a significant resource reduction, which translates to fewer development opportunities, resulting in a premature departure from the academe. Thus, providing the same level of support during our early faculty appointments could ensure that academic institutions, professional societies, and funding institutions achieve their long-term goals of DEI within the academe.”

Without the adequate and likely substantial provision of resources to disrupt current trajectories that lead to a fall-off phenomenon for URiAFAC, the promise that *education is a pathway to success* will continue to fail most URiAFAC. Academia must facilitate the success of URiAFAC once hired, including consideration of individual and societal needs surrounding professional life. Several early-career workgroup members shared unfortunate experiences. “The responses we get from the people in positions of leadership who are supposed to support us through challenges and incidents of injustice and discrimination are so anemic—sometimes because they do not know how to manage the situations.”

Despite similar or better rates of progress in academia, lower promotion rates and compensation inequities impact the retention of URiAFAC. Unfortunately, secondary to the limited representation of URiAFAC at the highest ranks in academia, there needs to be more vital mentorship for early- to mid-stage URiAFAC, which can be critical to navigating academia successfully. Lack of this support can lead to challenges in obtaining promotion or tenure, leading to a departure from the academe. The lack of mentors for URiA students and faculty is dually problematic secondary to (1) available mentors may lack understanding of the unique challenges facing URiA students and trainees, and (2) URiAFAC then find themselves overburdened trying to serve as official and unofficial mentors and advisers of an excessive number of URiA trainees. Juxtaposed with problems of mentorship is sponsorship. Whereas mentorship is essential for developing individual skills, sponsorship assists trainees in progressing to the next level. Sponsors are influential advocates who have decision-making power within an organization. Sponsorship requires more than just mentoring; only some with resources understand the difference. Sponsors must be well connected and in a high-level position, as sponsorship requires unequivocal support to mentees during transitional career periods. URiAFAC faces unique challenges as they take on myriad duties related to DEI [27,28]. They must take on DEI work such as spearheading related committees, addressing racism, inequality, and inequity throughout institutions, and mentoring minority students within the institution and in surrounding communities. This work, however, is unfortunately devalued in that it is usually not considered in promotion criteria [29]. The time-consuming DEI efforts of URiAFAC throughout academic institutions nationwide highlight the importance of retaining URiAFAC for the success of this vital work. In summary, many URiAFAC feel that they must fix the inequities in academia that they shoulder and attempt to overcome as real barriers to their success.

In part, poor retention may be due to a lack of cultural competency, sensitivity, and awareness. Most of those in the early-career workgroup reported feeling excluded within their departments and institutions, an

experience documented by others [30–32]. Isolation is a common experience for URiAFAC, both at work and in the community, and feelings of isolation and exclusion can significantly impact positive mental health status and productivity [33]. Because the social connection with colleagues is a critical component of satisfaction with life, it is not surprising that a qualitative examination of Black faculty reported that they were more likely to consider a White academic institution for their academic home if it was located within or near a racially diverse community [34].

Advancement, promotion, and tenure (APT)

Equitable access to various ranks and positions for all faculty would be symbolic of having DEI in place; however, that has yet to be achieved [8]. In a nationwide study investigating the association of URiAFAC development with representation, recruitment, and promotion, URiAFAC were most often at the junior level [35], and other data document lower promotion rates than non-minority counterparts [36–38]. According to the National Center for Education Statistics, Black and Hispanic faculty accounted for 2% and 1% of full professors, respectively [39]. URiAFAC are often less happy than non-minority faculty, and many consider it challenging to advance [40,41] and consequently often transfer to another institution to seek advancement.

In a survey of non-tenured and tenured faculty in the University of North Carolina System (encompassing the state's 16 public universities), early-career URiAFAC indicated there was a lack of clarity in APT criteria, a lack of response when APT information was requested, and variable expectations at the department and university levels; also, tenure was described as a “moving target” [42]. On the other hand, clear tenure expectations and processes, clear guidance from the department head, and tenure progress reflected in annual reviews were satisfaction areas for other faculty that do not identify as URiA [42]. Data show that a lack of senior-level URiAFAC creates difficulty for early-career URiAFAC in navigating the complexities of APT [43–45]. One early-career workgroup member stated, “Tenure and promotion metrics are often *slid* to one side (of leniency) to benefit some (non-URiA) and *slid* to the opposite/most stringent side to disadvantage others (URiA).” Last, implicit biases of those in senior-level positions can impede URiAFAC's advancement. Thus, the path to APT can change shape while URiAFAC actively engage in the process.

Adverse tenure outcomes can also occur to URiAFAC who pursue different types of research than others within their department [46]. For example, Dr. Paul Harris of the University of Virginia was denied tenure due to publishing in journals with a low impact factor [47]. Although Dr. Harris had citation counts five times higher than what was required, many DEI-focused publications were not counted due to the low impact factor of many diversities focused journals. Although institutions may verbally espouse the value of diversity in scholarship, the APT process may not. Another example is community-engaged research. Building meaningful relationships for research rooted within a community takes considerable time. To increase equity in APT, academia must allocate time to build engagement and essential research foundations that foster or re-establish trust. APT committees must properly assess research methods, which should reflect in the evaluations for APT. Academia must take steps to re-evaluate how publications and research methods are evaluated. Journals focusing on disparities or qualitative methods may not be considered “top of the field” in a specific discipline. Furthermore, URiAFAC often have limited venues to disseminate their scholarship. Often, top-tier journals are not interested in disparities and community-based participatory research, yet another reflection of the implicit bias in the APT processes, which

worsens retention of URiAFAC. Furthermore, the increased demand for service activities often experienced by URiAFAC, defined as the “minority tax,” is likely to diminish productivity in other metrics currently deemed more valuable in promotion and tenure, such as grants and a high number of publications.

Like other sectors, the burden to improve DEI within societies disproportionately falls on URiA members. URiA members and leaders reportedly bear greater responsibility to update bylaws to reflect the need for diversity, recruit URiA students and faculty, and advance into leadership roles. Elected positions within societies depend on nominations by existing leaders, which include few, if any, URiAFAC. Furthermore, non-leadership members require a majority vote from the membership to be accepted as nominees.

Grant funding

Contrary to popular belief, applications that URiAFAC submit to the NIH are not of poor quality nor submitted at a proportionally lower rate. Rather, applications that address health disparities, which URiAFAC more frequently examines, are either not discussed or receive an unfavorable review [10,48,49]. Furthermore, there is gross underrepresentation of funding for URiAFAC. For example, in one study, NIH funding was 13.2% less likely for Black/African American individuals [10]. Another study found that URiA females were less likely to receive NIH R01 funding than White males and females across US institutions [50]. Statistics from the NIH Scientific Workforce Diversity Office show that approximately 94% of R01 awards and a similar proportion of K-level awards were granted to non-URiAFAC. However, the funding gap between Hispanic/LatinX and White/Asian faculty has closed since 2013 [51].

One variable that affects the advancement of URiAFAC and their grant funding is differential funding rates by type of research. The research studies supported by NIH and other funding bodies should be equitable across topic types. A 2019 analysis of NIH R01 awards being lower among Black/African American investigators determined that topic choice accounted for 21% of the funding gap [48]. Black/African American applicants were likelier to submit proposals focused on health disparities and community and population health topics, including proposals involving human participants, funded less often than animal and basic science research [48]. Proposals in these topic areas are also disproportionately assigned to NIH Institutes and Centers with lower award rates, such as Minority Health and Health Disparities, Complementary and Integrative Health, and Nursing Research [52]. Efforts to address hierarchical funding of certain research areas over others are crucial. One professional society workgroup member suggested that a “hidden curriculum” exists in NIH funding. The NIH should disseminate critical information about their funding and the formula to produce a competitive application and how to navigate the NIH system of grantsmanship, funding rates, and award mechanisms, all essential factors that can impact success.

Barriers to funding for URiAFAC occur at the individual and the system levels. URiAFAC submits fewer grant applications at the individual level, reflecting a need for more institutional support, mentorship, and network. Experiences indicated by members of the early-career workgroup included receiving statements with negative comments about race and gender, participating in URiA service, and receiving URiA awards. Consistent with these experiences, a review of more than 18,000 R01 applications revealed significant reviewer bias [53]. Only 1.4% of NIH R01 applicants were Black/African American [35,36]. Thus, an institutional environment that supports diverse scientists and research topics in grant submission is needed. Potential

TABLE 3

Examples of programs implemented by AI, PS, or FA to correct specific obstacles causing underrepresentation in academia of marginalized or minority researchers and faculty (URiAFAC) and to improve DEI in the fields of nutrition and obesity

Driver(s)	Summary	Example strategies and programs
AI	<i>Recruitment</i> Formally embed DEI criteria, input, and guidance in each step of the recruitment process	University of California Berkeley toolkit for recruiting diverse faculty: http://diversity.berkeley.edu/sites/default/files/recruiting_a_more_diverse_workforce_uhs.pdf
	Cluster hiring can increase faculty diversity	Urban Universities for Health Faculty <i>Cluster Hiring for Diversity and Institutional Climate</i> : https://www.aplu.org/members/commissions/urban-serving-universities/student-success/cluster.html
FA	Support promising candidates from middle school through junior investigator levels with a continuum of competitive funding opportunities	National Cancer Institute's Continuing Umbrella of Research Experiences (CURE): https://www.cancer.gov/about-nci/organization/crchd/diversity-training/cure
AI	<i>Retention</i> Formally embed DEI criteria and guidance in	<ul style="list-style-type: none"> Duke University School of Medicine, Office of Research mentoring, has an established Mentor Training Program https://medschool.duke.edu/about-us/faculty-resources/research-mentoring/mentor-resources/mentor-training-program Small wins model of organizational change: https://journals.sagepub.com/doi/full/10.1177/0891243217738518?journalCode=gasa
	<ul style="list-style-type: none"> Promotion and tenure process Service assignment/evaluation Cultural inclusion. 	
	Support early-career URiAFAC	Clinician-teacher development award https://www.massgeneral.org/cdi/programs/faculty/clinician-teacher-development-award-recipients
	Established in 2008, a program to intentionally cultivate an equity-minded and justice-oriented community to promote academic success for those historically excluded in STEM.	Physician/Scientist Development Award: https://ecor.mgh.harvard.edu/Default.aspx?node_id=232
	Increase leadership diversity by rotating department chiefs	Tufts University The Center for STEM Diversity: https://stemdiversity.tufts.edu/
FA	Fund alliances that implement comprehensive, evidence-based, innovative, and sustained strategies to promote graduation of highly qualified URiA students who pursue graduate studies or careers in STEM.	Stanford University posting – <i>Typology of Department Chairs: The Case of the Swivel Chair</i> : https://tomprof.stanford.edu/posting/1142
	<i>Advancement</i>	National Science Foundation Louis Stokes Alliances for Minority Participation (LSAMP) program: https://beta.nsf.gov/funding/opportunities/Louis-stokes-alliances-minority-participation
AI	Increasing the number of URiA medical, dental, and nursing faculty	Robert Wood Johnson Foundation, Harold Amos Medical Faculty Development Program: https://www.amfdp.org/
PS	Scholarship and funding programs for early-career URiAFAC training	American Heart Association https://www.heart.org/en/about-us/office-of-health-equity
		https://www.empoweredtoserve.org/en/capital-access-grant-funding/empowered-scholar
		https://www.heart.org/en/about-us/office-of-health-equity/hbcu-scholarship-program
		https://www.heart.org/en/about-us/office-of-health-equity/hsi-scholarship-program
	Certification program for physicians to improve their ability to lead large groups, manage budgets, address human resources challenges, and apply strategic business insights [70]	American College of Physicians and American Association for Physician Leadership: https://www.acponline.org/meetings-courses/acp-course-s-recordings/acp-leadership-academy/certificate-in-physician-leadership-program
	Provides basic science, clinical research trainees, and junior faculty from underrepresented minority communities with leadership training [71]	Endocrine Society – Future Leaders Advancing Research in Endocrinology (FLARE): https://www.endocrine.org/our-community/career-and-professional-development/future-leaders-in-endocrinology
	Leadership program for early-career URiAFAC	Society of Behavioral Medicine: https://www.sbm.org/training/diversity-institute-for-emerging-leaders
FA	<i>Funding</i> A program that serves as an avenue for NIH to develop research and research programs that reflect various issues and problems associated with disparities in health status.	NIH Extramural Loan Repayment Program for Health Disparities Research (LRP-HDR): https://grants.nih.gov/grants/guide/notice-files/NOT-OD-21-141.html
	All-expense-paid research education and mentoring initiative addressing difficulties faced by junior investigators and postdoctoral scientists transitioning to independent research careers and negotiating academic rank.	PRIDE Summer Institute Training: https://pridecc.wustl.edu/about
	This program aims to provide evidence-backed strategies that significantly impact inclusive excellence within research environments and ultimately diversify the biomedical research workforce.	NIH Common Fund's Faculty Institutional Recruitment for Sustainable Transformation (FIRST): https://commonfund.nih.gov/fIRST
	A research capacity building program to develop and sustain research excellence in US higher education institutions that receive limited NIH research support and serve students from groups underrepresented in biomedical research	NIH PACE / SuRE: https://www.pace.edu/office-of-research/funding-opportunities/external/nih-funding-opportunities

(continued on next page)

TABLE 3 (continued)

Driver(s)	Summary	Example strategies and programs
	Administrative supplemental funds to enhance the diversity of the research workforce by recruiting and supporting students, postdoctorates, and eligible investigators from diverse backgrounds, including those from underrepresented groups in health-related research. <i>Cross-cutting</i> Supports promising candidates from middle school through junior investigator levels with a continuum of competitive funding opportunities.	Research Supplements to Promote Diversity in Health-Related Research: https://grants.nih.gov/grants/guide/pa-files/PA-21-071.html National Cancer Institute Center to Reduce Cancer Health Disparities (CRCHD) Continuing Umbrella of Research Experiences (CURE): https://www.cancer.gov/about-nci/organization/crchd/diversity-training/cure National Institute of General Medical Sciences Maximizing Opportunities for Scientific and Academic Independent Careers (MOSAIC) (K99/R00 and UE5): https://www.nigms.nih.gov/training/careerdev/Pages/MOSAIC.aspx
	An institutionally focused research education cooperative agreement and individual postdoctoral career transition award enhance workforce diversity by facilitating the transition from mentored postdoctoral research to independent, tenure-track, or equivalent research-intensive faculty positions.	

Abbreviations: AI, academic institutions; DEI, diversity, equity, and inclusion; FA, funding agencies; PS, professional societies; STEM, science, technology, engineering, and math; URiA, underrepresented in academia; URiAFAC, underrepresented in academia faculty.

barriers in the scientific review process include implicit or unconscious bias among reviewers, as noted by data that reports that certain topic areas commonly researched by URiAFAC tend to have lower funding success [38]. Implicit biases associated with institutions are also a potential barrier. Historically Black colleges and universities may receive less favorable scores than predominantly White institutions. Another institutional barrier related to diversity supplements is the categorization of URiAFAC as a candidate rather than a Principal Investigator, even though the “candidate” is responsible for executing the proposed research. Designation of the URiA scholar as a candidate undercuts the development of independence and leadership, two critical components of career advancement; this is particularly damaging for supplement awards at the “Independent Researcher” level of funding through this mechanism.

A significant leap toward improved funding rates includes NIH and NORCs funding awards at equitable rates and opening doors to support research areas that are currently less funded. One workshop participant mentioned, “We want to study disparities because we have experienced them.” At the same time, *non*-URiA investigators also cite this focus as an essential part of their research programs. One workshop participant noted, “When I first came to my institution, I expressed an interest in disparities related to obesity, and my supervisor stated, ‘disparities exist, so what?’ The following year, a call went out providing \$10M to fund research related to disparities in obesity. This same person, who had no interest before, now wanted to apply for the grant and insisted I participate,” instead of being encouraged to submit a proposal as discussed the previous year. Funding institutions need to better observe trends and screen out applications by investigators looking to capitalize on resource availability and understand that funding is a revenue source for URiAFAC. While funding institutions aim to select, support, and fund scholarly work, one early-career attendee suggested that funding institutions track publication trends, especially among senior investigators, to filter out those looking to capitalize on resource availability. An additional screening layer could benefit minority and junior investigators alike, as funding is a direct pathway to DEI and success within the academe.

Intersectionality with disability, gender, LBGTQ+, and other marginalizing identities

Although there are increasing efforts to address DEI within academic institutions, intersectional identities are underacknowledged. The intersectionality of identities does not produce a sum of

independent effects but rather a compound of marginalized identities [54]. In addition to gender, sexual identity, and disability status, three marginalizing identities currently receiving much attention, are marginalizing experiences such as age, trauma, social isolation, language barrier, and caregiver burden. Obtaining equity for URiAFAC who face intersectionality challenges (URiAFACI), may seem daunting and insurmountable. However, meeting these challenges may clarify our understanding of how social constructs create oppression.

Equity enables URiAFACI to thrive in academic environments but will require foresight and strategies beginning at the graduate level. Workshop attendees recalled how opportunities for collaboration on grants resulted from peers with similar identities. Sharing identities and experiences often produces a favorable academic environment at the basic training level and positions URiAFACI persons to be highly competitive for funding and transition to a higher rank. If this can be problematic for URiAFAC, it is even more challenging for URiAFACI, which may represent a population of one within an academic institution. A network that spans both personal and professional dimensions can be essential to obtaining support and opportunities to mentor and be mentored. A program at Tufts to encourage females in science relates to curating people to be part of your *tribal community of support*. A participant of the Tufts program indicated that it “fostered a rich environment with no pressure and was a beneficial networking event.” Such programs illustrate the need for URiAFACI to engage in cohorts and people who are senior and junior within and beyond home institutions.

Structural changes are needed to produce equitable opportunity, a charge the academe must take up. Mentorship continues to be a consistent theme and pillar of success that is part of the structure and function of the academe. Structured mentorship and integration of mentorship into faculty evaluations and APT processes is a primary way to assess mentorship quality and effectiveness and may address opportunity gaps. As with all components of faculty effort, the assessment must be paired with reward and course correction processes that document, retain, and resolve for the benefit of a URiA mentee. This structured mentoring element requires the academe to produce mentors for URiAFAC, particularly those with intersectional identities, from graduate training through the faculty ranks. Specific mentorship training built to respond to the compound nature of intersectional URiA identities will be essential for maximum effectiveness. URiAFACI require mentors who understand the compound effect of being the “one and only” concerning opportunities for success.

Achieving DEI in academia: drivers and facilitators of change

Academic institutions

Traditionally, much programming and recommendations to improve academic success have placed the individual's onus or relied on the NIH. However, academic institutions play a vital role in providing investments and support and creating an environment for success along with the NIH. Representation from the top down is required for improvement to occur. Advocacy from chancellors, provosts, deans, and department chairs sets the tone for the institution. If leadership fails to take strong support positions for DEI, there is no power to implement real change. Advocacy at the executive level enables everyone to honestly acknowledge problems and identify solutions. Open town hall meetings to discuss DEI have been a helpful strategy in catalyzing cultural change. Academic institutions and NORCs can help facilitate DEI through four significant efforts: mentoring, funding support, creating a safer and more inclusive environment, and monitoring of outcomes of DEI policies. Strong policies within academic departments must require data on recruitment, retention, and reasons for discontinuing training and procedures for acting on these data.

Mentorship was repeatedly noted as a critical component to enhancing the likelihood of success in every aspect of academia. Scholarship program directors may be able to provide vital mentorship for students as it relates to securing initial funding sources. Postgraduate association offices serve this role for postdoctoral fellows and can be mainly instrumental in assisting with navigating the transition into a junior faculty position. Leadership is responsible for establishing direct relationships with constituents of their programs to identify career goals and advance in a manner that reflects the institutional mission and the investment made to these programs. Leadership should also track progress as evidence-based proof of program sustainability.

Pilot and bridge funds must be designated and explicitly invested in support of URiAFAC early on, such as for postdoctoral fellows and continuing throughout the career trajectory, including senior levels for sustainability. For early-career investigators, an example is the clinician-teacher development award at Massachusetts General Hospital. The physician-scientist development award provides 4 years of funding to support a research coordinator and up to \$60,000 to repay student loans. Candidates selected for this Massachusetts General Hospital award had better success obtaining NIH funding and promotion [55]. For such programs, language should specifically refer to minority candidates. NORCs can also provide pre-submission support for extramural grant submissions by URiAFAC by providing internal and external reviews, facilitating mentorship and collaboration, and providing personnel to assist with grant preparation URiAFAC may not have administrative support.

NIH reviewers give preference to investigators with current funding. Thus, linking unfunded URiAFAC with senior, well-funded investigators could significantly increase funding rates among early-career minority investigators. These well-funded senior faculty often have name recognition and a track record of funding that assures review panels that they can complete the proposed work. Academic institutions should facilitate partnerships and mentoring relationships between well-funded, senior, and early-career faculty to increase the potential for funding success. Thus, it can be helpful to encourage grant submissions with co- or multiple principal investigators to navigate documented bias in funding institutions [10,49,50,56–58].

Furthermore, having a senior investigator serve as a sponsor or mentor on an application can ensure that the early-career faculty does not lose their early state investigator role with the NIH. In the absence of a sufficient pool of mentors, another option is institutional mandates, where mentoring is part of the APT criteria for full professors. Peer group and near-peer mentoring models, which are typically informal, can also help.

Academia must establish a formal and safe process to report experiences of racism and other forms of discrimination and provide appropriate support, guidance, and resources to address these experiences and their impacts. This effort should include guidelines for reporting and documenting events, leadership training on recognizing racism especially, and guidelines for referrals to further expertise or support for mental or emotional health, such as through an employee assistance program. When DEI policies fail, one resource is the Equal Opportunity and Compliance (EOC) offices within or beyond the institution. Several institutions have recently implemented awareness training within the past year, which enforces long-established rules and policies on the bias, harassment, and discrimination, especially in the APT process, that has not always been practiced [59,60]. The EOC office and website at every institution are federally mandated to maintain a record of guidelines to mitigate discriminatory practices and ensure adherence to policies. URiAFAC must be proactive in using this resource to facilitate DEI and prevent the burden, trauma, and potential career damage caused by filing lawsuits [61]. EOC offices within academic institutions must do a better job of advocating for those victimized rather than engaging in a “circle the wagon” culture that ultimately only protects the interests of institutions.

Professional societies

Professional scientific societies can be a pathway to advancement. Still, there is a lack of URiAFAC in leadership being recommended for and receiving awards, invitations to be podium presenters, and serving on editorial boards. As part of career promotion considerations, lack of leadership positions or invited presentations often negatively impacts URiAFAC [62–65]. According to members of the professional society workgroup, DEI data collection systems are underdeveloped or nonexistent; some do not collect membership demographics or track representation data for leadership roles. Furthermore, society boards often do not reflect the diversity of the membership or the population of health professionals at large. The volunteer nature of many administrative and leadership positions within these societies is a barrier to implementing changes to improve DEI, such as changing bylaws or administrative systems and affects the continuity of efforts to make changes due to regular elections of new leadership.

Through society networking, URiAFAC may gain advocates and sponsors who actively support their career advancement [66]. However, as with academic institutions, URiAFAC peers are often lacking within professional societies. Benchmarking from membership data or other external standards can help establish equity within societies. A frequently cited reason for the lack of URiAFAC in society leadership is the lack of qualified candidates. Peer mentorship programs that train URiAFAC have been successful in academic settings [67]. Anecdotal evidence suggests that decision-makers identify speakers from a limited network of persons “at the table.” However, a systematic process with a broader reach can facilitate increased identification of URiAFAC who can serve as qualified speakers. For example, societies can generate a repository of URiAFAC speakers from their respective members. Sources for identifying potential speakers should also

include establishing or using an existing committee focused on minority affairs or other diversity groups within the society and external networks and resources connected to URiAFAC. The repository, however, should be large enough to ensure variety and avoid burnout on the part of the few, who then may be repeatedly asked to serve. Frequent evaluation of the impact of change initiatives can help guide strategies and support accountability.

Professional societies that have succeeded in improving diversity and representation, such as the Society of Behavioral Medicine, have noted a few key facilitators in this effort. A first step is tracking and proactively using data to systematically evaluate systems and programs developed or improved with DEI in mind. Due to the transient nature of leadership, implementing changes to organization bylaws on representation is essential, such as mandating that speakers at annual meetings or other events represent the membership at large or that nominees to leadership positions represent the profession at large.

Other facilitators to improve DEI include professional development opportunities, formal mentorship programs for trainees and early-career faculty, leadership programs, travel awards, and additional funding for URiAFAC to disseminate research. Furthermore, pipeline programs could also benefit students through early-career faculty to increase the exposure of URiA leaders to the professional membership. A policy to prevent the same speakers from presenting in consecutive years would encourage diversity overall, as would term limits for executive positions. Society opportunities for grants, scholarships, and other awards for which eligibility criteria are transparent and that reflect the interests of URiA scholars could increase DEI in societies. Fellowships that involve partnerships between academic institutions and professional societies could support DEI efforts in both settings.

Funding agencies

For those taxpayer-funded agencies, the rates of funding, the administration, and policies and practices should reflect national population demographics. However, whether the agency is public or private, directors, boards, and senior-level administrators should provide strong leadership in communicating the value of DEI in missions, values, and programs throughout the agency. One fundamental change would be to increase URiAFAC representation on review panels and leadership; this could have a two-fold impact: ensuring diversity among the reviewer pool and exposing URiAFAC to the grant review process to enhance the competitiveness of their grant writing. A key point regarding the leadership of professional societies is to improve equity of study section reviews, especially in facilitating the *conflict-of-interest* clause. Training and adherence to existing policies can mitigate against biases or potential discriminatory preference(s), including special notices or alerts before discussion phases begin and during final grant reviews.

Although the NIH has established mentorship groups, dissemination is needed to alert URiAFAC that these groups support underrepresented communities and foster access to funding. These programs help alleviate isolation in the workplace, often experienced by URiAFAC. Networking and connection to fellow URiAFAC are critical elements of successful programming to provide camaraderie and a platform where experiences are shared and opportunities for scholarly output increase.

What DEI in academia can look like: recommendations and examples

A key objective of the URiA workshop was to identify barriers to success for URiA members and identify actionable items to overcome

such challenges. Members and non-members of URiA groups highly attended the workshop. Following each keynote speaker, junior and senior-level investigators and NORC and funding agencies directors attended breakout groups to discuss topics addressed by keynote speakers. We recorded the breakout groups forming a URiA task force and recommendations to improve the academe's DEI. Members of the task force proposed specific recommendations for recruitment, retention, advancement, and funding. We tailored recommendations for academic institutions, funding agencies, and professional societies in the obesity and nutrition fields.

Overall, there was a consensus from junior and senior-level investigators that prioritizing URiA groups during all aspects of the recruitment, hiring, and retention process could improve equity and inclusion efforts for URiA NORC members. Taskforce members also noted that extending efforts to prioritize URiA members could translate to long-lasting changes within the academe. Targeted recruitment and retention efforts, cluster hiring, strategic investments, financial support for doctoral students, and solid senior mentorship are examples of successful programs. Early pipeline programs, setting realistic diversity targets, and accountable methods to address barriers in each aspect and driver of academic success are also greatly warranted (Tables 2 and 3).

Conclusion

Achieving equity for URiA groups will require a multipronged, strategic, and purposeful effort. Academic institutions, funding agencies, and professional societies should evaluate current practices to determine the nature and depth of the change necessary to retain and support DEI. URiAFAC can progress equally toward independent scholarship success. A clear and consistent message from this NORC initiative was that, within academic institutions, effective mentorship is a critical need. Although tailored to each institution, mentoring programs must also be highly structured and evidence-based, including accountability for mentors and mentees alike. Mentor training is needed to address intersectional needs specific to URiAFAC effectively.

Furthermore, to support this cultural shift, mentorship should be codified into APT processes to recognize the value of taking on this work collectively because of the time, effort, consistency, and relationship building that this type of mentorship requires. Funding opportunities dependent on mentorship are a starting point for equity and rehearsal for independent scholarship. The candidate is mentored as a Principal Investigator, even though it is fundamentally a training mechanism. Indeed, we propose suggestions specific to URiAFAC groups. Still, such programs may also benefit all trainees and junior faculty alike, supporting broader research and invaluable disciplines that address a diverse population and modern health challenges.

Our work is limited by recommendations received only from members of the NORC centers. Future workshops should include other national research centers (e.g., Diabetes Research Centers). The low attendance of non-URiA participants also limited this work. Given that this was the first workshop of its kind, future organizers should stress the importance of attendance for both URiA and non-URiA individuals. As one early-career investigator noted: "When we have our allies, being people who don't look like us, fighting as fiercely as we are, then we can get groups of people that may not have been listening to take note and start listening to exactly what we have been saying our entire lives. Getting those allies willing to stand up, speak up, and fight fiercely the way we would - I think that is something we can lean on." Despite the many challenges we have all faced through the COVID-19 pandemic, we cannot reiterate enough the overall concept of how

important community is to academicians. The importance of community is particularly true for URiAFAC. They almost always find themselves in the minority and potentially isolated based on sheer numbers and sometimes because of their chosen area of research scholarship. DEI efforts present a path toward diminishing the detrimental impacts of isolation and fostering a sense of belonging and community with a mantra that states, “we are all important to the success of this work, and diversity truly matters!”

Conflict of interest

The authors declared no conflict of interest.

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