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In this perspective, we describe our experience as women of color scientists from diverse backgrounds and similar struggles embarking upon the National Heart, Lung and Blood Institute-funded program called PRIDE (Programs to Increase Diversity among Underrepresented Minorities Engaged in Health-Related Research). Under the leadership of our mentor and friend, Betty Pace, MD, a renowned and successful African American physician-scientist, the PRIDE Program was designed to address the difficulties experienced by junior-level minority investigators in establishing independent research programs and negotiating tenure and full professor status at academic institutions. The strength of PRIDE's innovative formula was pairing us with external senior mentors and, importantly, allowing us to serve as peer mentors to each other. We believe this "Sister's Keeper" paradigm is one solution for women to overcome their limitations and extend understandings and best practices worldwide for science, medicine, and global health. *Ethn Dis.* 2018;28(4):575-578; doi:10.18865/ed.28.4.575.

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HISTORY

In 1961, a group of brilliant African American women made history by using their mathematical and computer programming genius to launch NASA astronaut John Glenn into orbit.¹ Through the film industry, the world saw a glimpse of the racial prejudice these women endured while pursuing their career goals. Over five decades later, underrepresented minority (URM) women continue to face the same barriers that hinder career advancement.²

This perspective illustrates how a group of nine URM women scientists (Table 1) from varied ethnic/racial, educational and personal back-

grounds, arrived in Augusta, Georgia during summer 2016, with the goal of advancing their careers through the Programs to Increase Diversity Among Individuals Engaged in Health-Related Research-Functional and Translational Genomics of Blood Disorders (FTG-PRIDE). The FTG-PRIDE program,³ led by Betty Pace, MD, is one of eight summer institutes sponsored by the National Heart, Lung and Blood Institute, designed to address challenges experienced by URM investigators pursuing independent research programs.³ We emerged from the FTG-PRIDE program transformed into a sisterhood of scientists with a common goal of academic excellence facilitated

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by mentorship, competitive grant writing techniques, strategies for promotion and tenure and a voice in our chosen career paths. Out of this invaluable experience, the Sistas in Science (SIS) group was established.

ADVANCING URM WOMEN IN STEM FIELDS

Less than 25% of individuals pursuing careers in science, technology, engineering, and math (STEM) fields are URM women.⁴ As URM women, we aspire to successful careers as doctors and biomedical researchers and a desire to give back

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to our communities. The social history of members in SIS ranges from affluent two-parent homes to single-parent households requiring financial aid and immigrants from low-resource countries. One member, a single mother of Native American heritage, arrived late to academia due to family demands. Regardless of our backgrounds, we have experienced the common obstacles produced by racial discrimination and exclusion from career advancement opportunities. For example, a division head told one SIS that she should “never have a Black woman as her mentor but that she needed a White male to advance her career.” Fortunately, there exist

Table 1. Summary of training and current faculty positions of Sistas in Science (SIS) members

Name	Institution of Terminal Degree	Current Position
Athena Starlard-Davenport, PhD	University of Arkansas for Medical Sciences, Little Rock, AR	Assistant Professor; Department of Genetics, Genomics and Informatics; University of Tennessee Health Science Center; Memphis, TN
Titilope Fasipe, MD, PhD	University of Texas Medical Branch; Galveston, TX	Assistant Professor, Department of Pediatrics, Section Hematology, Baylor College of Medicine; Staff Physician; Texas Children’s Cancer & Hematology Centers, Houston, TX
Alisa Rich, PhD, MPH	University of Texas at Arlington, Arlington, TX	Assistant Professor, Graduate School Biomedical Sciences, Department of Anatomy & Physiology, School of Public Health, Department of Biostatistics and Epidemiology (Joint Appointment), University of North Texas Health Science Center, Fort Worth, TX
Mesia Steed, PhD	University of Louisville, Louisville, KY	Assistant Professor, Department of Biological Sciences, Winston-Salem State University, Winston-Salem, NC
Ashley Fitzgerald, PhD	University of North Texas Health Science Center, Fort Worth, TX	Instructor, Department of Biological Sciences, Louisiana State University, Shreveport, LA
Kehinde Adekola, MD, MS	College of Medicine, University of Lagos, Lagos, Nigeria	Assistant Professor of Hematology Oncology, Department of Medicine, Feinberg School of Medicine, Northwestern University, Chicago, IL
Eboni Lance, MD, PhD	MD: Medical University of South Carolina Charleston, SC; PhD: Johns Hopkins Bloomberg School of Public Health, Baltimore, MD	Assistant Professor, Department of Neurology, Johns Hopkins University School of Medicine, Baltimore, MD
Ariadna Forray, MD	Harvard Medical School, Boston, MA	Assistant Professor, Department of Psychiatry, Yale School of Medicine; Psychiatry Director, Adult Sickle Cell Program, Yale New Haven Hospital; New Haven, CT
Scharri Walker, PhD	University of Alabama at Birmingham, AL	Assistant Professor and Chair, Department of Biology, Tougaloo College, Tougaloo, MS

men and women in senior leadership within and outside our institutions who provide mentorship, guidance on promotion, and protected time to conduct competitive research. Two SIS have competed successfully for intramural and extramural grant funding; unfortunately, this has not been the experience for the majority.

As the PRIDE program continues to collect important measures of success of SIS members, including career advancement and progression measures, it is anticipated that the PRIDE program can become a useful mentorship model for other institutions.

It is evident that well-designed junior faculty training programs within academic institutions that provide protected time, seed funding initiatives and mentorship by senior faculty are critical to ensure the success of early-stage investigators. The most compelling data demonstrate that only 4.5% of National Institutes of Health (NIH) research program grants are awarded to URM investi-

gators.⁵ Major efforts led by the NIH are underway to overcome barriers and address the challenges of increasing diversity in the United States biomedical research workforce. The NIH Common Fund was established to support the Building Infrastructure Leading to Diversity (BUILD) Initiative⁶ and National Research Mentoring Network (NRMN)⁷ to increase the number and success of URM entering STEM fields. These programs support a pipeline of training opportunities for undergraduate, pre-doctoral, and medical students to improve diversity in the medical field and biomedical research. Recent findings of the FTG-PRIDE program demonstrated that, with intensive mentoring, 74% of trainees submitted competitive grant applications within 2 years following training and 47% achieved NIH funding.³

BENEFITS OF SISTAS IN SCIENCE AND SIMILAR PRIDE PROGRAMS

The SIS group calls for expansion of innovative high-impact junior faculty mentoring initiatives similar to the PRIDE Program to enhance traditional dyadic mentor-mentee experiences. Studies also show that faculty with peer mentoring relationships perceived these interactions as beneficial for career success.⁸ For instance, Lewis et al showed that graduate students, fellows, and junior faculty in behavioral and biomedical research with mentor and/or peer mentoring training were more likely than those without these trainings to have discussed teaching and work-life balance

and clinical care and career plans.⁸ Likewise, groups of women junior faculty with similar interests increased their ability to accomplish career goals and academic advancement.^{9,10} Specifically, Fleming et al showed that implementation of a faculty development program that met monthly for 1.5 hours to review a modular curriculum significantly improved the knowledge, skills, and attitudes, and the ability to write career goals and align activities with those goals especially among female faculty members.⁹ The SIS members have experienced similar benefits from the peer mentoring network established during the FTG-PRIDE Program that continue to provide a safe haven of support and friendship and exchange of ideas for research collaboration. As the PRIDE program continues to collect important measures of success of SIS members, including career advancement and progression measures, it is anticipated that the PRIDE program can become a useful mentorship model for other institutions.

CALL TO ACTION

Expansion of creative training programs similar to PRIDE³ could become the prototype for epicenters of scientific excellence to embrace the development of early-stage investigators regardless of race/ethnicity, gender, or socioeconomic status. The struggles of junior faculty, especially women, are common and would benefit from structured mentor-mentee and peer mentoring relationships to break the glass ceiling and achieve success in STEM careers.

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CONFLICT OF INTEREST

TF is a consultant for Novartis Hematology. We declare no other competing interests. All other co-authors have no conflicts to declare.

AUTHOR CONTRIBUTIONS:

Research concept and design: Starlard-Davenport, Rich, Fasipe, Lance, Adekola, Forray, Steed, Fitzgerald, Walker, Pace; Acquisition of data: Pace; Data analysis and interpretation: Starlard-Davenport, Rich, Fasipe, Forray, Pace; Manuscript draft: Starlard-Davenport, Rich, Fasipe, Lance, Adekola, Forray, Steed, Fitzgerald, Walker, Pace; Administrative: Starlard-Davenport, Rich, Fasipe, Lance, Adekola, Forray, Steed, Fitzgerald, Walker, Pace; Supervision: Pace

REFERENCES

1. Lee Shetterly M. *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians who Helped Win the Space Race*. New York, NY: William Morrow, an imprint of HarperCollinsPublishers; 2016.
2. Carr PL, Raj A, Kaplan SE, Terrin N, Breeze JL, Freund KM. Gender differences in academic medicine: retention, rank, and leadership comparisons from the national faculty survey. *Acad Med*. 2018;1. <https://doi.org/10.1097/ACM.0000000000002146> PMID:29384751
3. Pace BS, Makala LH, Liu L, et al. Enhancing diversity in the hematology biomedical research workforce: A mentoring program to improve the odds of career success for early career investigators. *Am J Hematol*.

- 2017;92:1275-1279. <https://doi.org/10.1002/ajh.24899> PMID:28857249
4. National Science Foundation, National Center for Science and Engineering Statistics. *Women, Minorities and Persons with Disabilities in Science and Engineering*. 2017. NSF Special Report 17-310: Arlington, VA. Last accessed Aug 29, 2018 from www.nsf.gov/statistics/wmpd/
5. Ginther DK, Schaffer WT, Schnell J, et al. Race, ethnicity, and NIH research awards. *Science*. 2011;333(6045):1015-1019. <https://doi.org/10.1126/science.1196783> PMID:21852498
6. NIH Building Infrastructure Leading to Diversity (BUILD) Initiative. Last accessed August 22, 2018 from <https://www.nigms.nih.gov/training/dpc/Pages/build.aspx>
7. NIH National Research Mentoring Network (NRMN). Last access August 22, 2018 from <https://nrmnet.net>
8. Lewis V, Martina CA, McDermott MP, et al. Mentoring interventions for underrepresented scholars in biomedical and behavioral sciences: effects on quality of mentoring interactions and discussions. *CBE Life Sci Educ*. 2017;16(3):1-11. <https://doi.org/10.1187/cbe.16-07-0215> PMID:28747354
9. Fleming GM, Simmons JH, Xu M, et al. A facilitated peer mentoring program for junior faculty to promote professional development and peer networking. *Acad Med*. 2015;90(6):819-826. <https://doi.org/10.1097/ACM.0000000000000705> PMID:25830537
10. Varkey P, Jatou A, Williams A, et al. The positive impact of a facilitated peer mentoring program on academic skills of women faculty. *BMC Med Educ*. 2012;12(1):14. <https://doi.org/10.1186/1472-6920-12-14> PMID:22439908