Title

Mentoring, Training, and Scholarly Productivity Experiences of Cancer-Related Health Disparities Research Trainees: Do Outcomes Differ for Underrepresented Scientists?

Journal

Journal of Cancer Education, 34(3)

Authors

Felder, Tisha

Braun, Kathryn

Wigfall, Lisa

et al.

Publication Date

2019-06-01

DOI

10.1007/s13187-018-1322-z

Peer reviewed

HHS Public Access

Author manuscript

J Cancer Educ. Author manuscript; available in PMC 2020 June 01.

Published in final edited form as:

J Cancer Educ. 2019 June ; 34(3): 446–454. doi:10.1007/s13187-018-1322-z.

Mentoring, Training, and Scholarly Productivity Experiences of Cancer-Related Health Disparities Research Trainees: Do Outcomes Differ for Underrepresented Scientists?

Tisha M. Felder, Ph.D., MSW[1,2,3], **Kathryn L. Braun, DrPH.**[4,5], **Lisa Wigfall, Ph.D.**[6], **Maria Sevoyan**[3,7], **Shraddha Vyas**[3,7], **Samira Khan, MSW**[3], **Heather M. Brandt, Ph.D.**[1,3,8], **Charles Rogers, Ph.D.**[9,10], **Sora Tanjasiri, DrPH, MPH**[11,12], **Cheryl A. Armstead, Ph.D.**[1,3,13], and **James R. Hébert, Sc.D.**[1,3,7]

[1]South Carolina Cancer Disparities Community Network, University of South Carolina, Columbia, South Carolina

[2]College of Nursing, University of South Carolina, Columbia, South Carolina

[3]Cancer Prevention and Control Program, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina

[4]ʻImi Hale - Native Hawaiian Cancer Network, Papa Ola Lokahi, Honolulu, Hawaii

[5]Office of Public Health Studies, University of Hawaii, Honolulu, Hawaii

[6]College of Education and Human Development, Department of Health and Kinesiology, Division of Health Education, Texas A&M University, College Station, Texas

[7]Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina

[8]Department of Health Promotion, Education, and Behavior, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina

[9]Minnesota Community Networks Center for Eliminating Cancer Disparities

[10]University of Minnesota Medical School, Minneapolis, Minnesota

[11]WINCART: Weaving an Islander Network for Cancer Awareness, Research and Training

[12]Department of Health Science, California State University-Fullerton, Fullerton, California

[13]Department of Psychology, University of South Carolina, Columbia, South Carolina

Keywords

Cancer-Related Health Disparities; Mentoring; Underrepresented Scientists

Corresponding author: Tisha M. Felder, Ph.D., MSW., College of Nursing; and Cancer Prevention and Control Program, Arnold School of Public Health, University of South Carolina, 1601 Greene Street, Room 620, Columbia, South Carolina 29208, Phone: 803-777-9830, Fax: 803-777-3771, feldert@mailbox.sc.edu.

Introduction

> "Who ought to receive the benefits of research?…and who ought to bear its burdens?"
>
> -The Belmont Report

An ethical response to this question posed in the Belmont Report would be that both the benefits and burdens of research should be shared by all those who are potentially affected by it. In the 45+ years since the War on Cancer was declared, striking similarities in the burden of cancer still exist by race, ethnicity, and socioeconomic status [1, 2]. Racial/ethnic minorities and other underserved populations (e.g., persons with disabilities, rural populations) are underrepresented in clinical cancer research [3], but overrepresented among those who die from these diseases [4]. This inequality in cancer research cuts two ways. First, there are too few studies that identify effective strategies for reducing disparities in cancer incidence, virulence (e.g., cancer stage, grade), and mortality among underrepresented populations [5]. Second, there are insufficient numbers of well-trained, competitive investigators from population groups experiencing these extreme cancer outcomes [6]. Multicultural learning increases awareness of underlying connections in addition to facilitating the ability to solve problems in multiple ways [7]. Therefore, enhancing the training of investigators from underrepresented groups who are committed to improving the health of their communities is a key strategy for reducing cancer health disparities.

The National Institutes of Health (NIH) [8] defines specific groups traditionally underrepresented in the biomedical, behavioral, and social sciences as: *racial/ethnic minorities*, namely African Americans, Hispanic Americans, Native Americans, Alaskan Natives, Hawaiian Natives, natives of the U.S. Pacific Islands; *individuals with mental/physical disabilities*; and/or *individuals from socially/economically/educationally disadvantaged backgrounds* (e.g., low-income, rural, or inner city). National data show that only 7% of doctoral degrees were awarded to individuals with disabilities, and less than 1% to American Indians or Alaska Natives [9]. Further, individuals from underrepresented backgrounds who achieve doctoral training and become researchers face additional challenges as they work toward scientific independence. As late as 2011, an analysis of NIH funding revealed that even when other research accomplishments (e.g., publications, NIH training) were equivalent, African Americans were significantly less likely than Whites to obtain NIH R01 funding—a key marker of scientific success and independence [10]. Consequently, the authors stressed the need to explore how mentoring and other training-related experiences may account for racial/ethnic differences in this specific form of scholarly productivity. To this end, this study aimed to explore potential differences in the personal characteristics, mentoring, training, and scholarly productivity of a diverse sample of trainees in the U.S. by NIH underrepresented status.

Methods

Study Population

We used data from the Community Networks Program Centers (CNPCs) Mentoring and Training survey. The CNPC survey is a web-based questionnaire completed by students, postdoctoral fellows, faculty affiliated with the 23 National Cancer Institute (NCI)/NIH-funded (2010–2016) CNPCs in the U.S. The CNPCs employed community-based participatory research (CBPR) methods to address cancer health disparities and other co-morbid conditions among specific racial/ethnic and other underserved populations. The CNPCs incorporated training components that engaged senior researchers in mentoring and training new and early-stage investigators, including those from diverse backgrounds [6]. The CNPC initiative was an expansion of the NCI's Community Networks Program (2005–2010) and Special Populations Network (2000–2005), both of which emphasized training.

The questionnaire collected personal, academic, mentoring, training, and work–life balance experience information from participants. The questionnaire was administered to 269 eligible participants, of which 189 (144 trainees, 45 mentors) responded (70% response rate). We restricted our analysis to 144 of the 189 respondents classified as *trainees*. The research team defined *trainees* as participants who reported that they had: 1) not yet completed a terminal degree, but were interested in a research career (e.g., doctoral students); 2) completed a terminal degree less than 10 years ago and were engaged in research (e.g., early-stage investigators); *or* 3) completed a terminal degree more than 10 but less than 15 years ago and were engaged in research (e.g., mid-career investigators). More information regarding questionnaire development and administration is provided elsewhere [11].

Study Variables

Outcome variables—Outcome variables were self-reported information about scholarly productivity in the previous five years: 1) number of first-authored peer-reviewed publications; 2) total number of peer-reviewed publications (total sum of first-, co- and senior-author position publications); 3) number of NIH-funded grants as PI; and 4) total number of any funded grants as a PI (total sum of NIH- and non NIH-funded grants as PI). We created binary outcomes for first-authored and total publications variables using medians as cut points. We created binary outcomes for grants (NIH and total grants) as any vs. none. Thus, binary outcome variables were coded as follows: (1) > 4 first-authored peer-reviewed publications (vs. ≤ 4); 2) > 9 total number of peer-reviewed publications (vs. ≤ 9); 3) having any NIH grant as PI (yes/no); and 4) having any funded grant as a PI (yes/no).

Independent variables

Personal and academic characteristics: The key independent variable of interest was NIH underrepresented status. We defined NIH underrepresented status as being a member of one or more of the aforementioned groups that are underrepresented in the scientific workforce [8]. Personal characteristics included gender, age, ethnicity, and race. Due to small sample sizes of some racial subgroups (e.g., Native American, more than one race), we collapsed race into four categories: White, African American, Asian, and Other. Academic

characteristics included level of education, first-generation college graduate status, academic discipline(s), academic title, and tenure-track status. We categorized education as Master's degree or less versus doctoral/postdoctoral training. First generation college graduate status was defined as self-reporting being the first in their immediate family to graduate from a 4-year college or university. We dichotomized academic discipline(s) Public Health or Health Sciences versus all other disciplines (i.e., Medicine, Nursing). We categorized academic title as PhD/other doctoral student/Postdoc/Research Associate, Assistant Professor, Associate Professor, Full Professor/Endowed Chair/other. We categorized tenure-track status as non-tenure track, tenure track and tenured.

Mentoring and training experiences: We obtained information about the number of mentors with whom each trainee worked (including their CNPC mentor): no mentor, 1 mentor, 2 or more mentors. We categorized their level of satisfaction with their CNPC mentor as very satisfied/satisfied versus dissatisfied/very dissatisfied. Amount of time spent with their CNPC mentor was categorized as more than once per month versus less than once per month. We collapsed challenges with their CNPC mentor into no challenges versus one or more challenges (e.g., not enough time, does not understand my needs). We categorized trainees' self-reported shared personal or cultural characteristics with their CNPC mentor as none versus one or more characteristics (e.g., race, ethnicity, sexual orientation), and the importance of those shared characteristics as extremely important/important versus unimportant/not at all important.

Training-related factors: We obtained data on the trainees' experience with postdoctoral training (yes/no), and their professional development activities and competencies in CBPR. We analyzed their level of confidence in performing ten knowledge- and skills-based CBPR competencies [12], and five academic and research-related professional competencies [13]. For both CBPR and professional competencies, trainees rated their level of confidence on a scale of 1 (not at all confident) to 4 (very confident). We calculated a total sum score for each trainee, and then dichotomized the competency variables based on the following median values for our sample: CBPR competencies, low (<28) versus high confidence (≥ 28); professional competencies, low (<12) versus high confidence (≥12).

Work-life balance and job satisfaction: We obtained information about each trainee's primary care responsibilities, coded as none versus one or more responsibilities (e.g., spouse/partner, child/children, elderly parent(s), multiple responsibilities. We categorized both the trainees' level of satisfaction with work-life balance and current job as extremely/quite satisfied versus not very/not at all satisfied.

Data Analysis

Our final analytic sample consisted of 141 trainees, as three trainees did not respond to the NIH underrepresented status question. We compared all independent and outcome variables by NIH underrepresented status using the chi-squared test or Fisher's exact test. We then estimated the effect of each independent variable on the odds of each of the four scholarly productivity outcomes using separate multiple logistic regression models. Odds Ratios (OR) and associated 95% confidence intervals (CIs) were obtained. As appropriate for exploratory

research [14], we used a stepwise backward elimination approach to identify the subset of factors most strongly associated with each outcome. Independent variables were entered into the initial model if their p-value was ≤ 0.20 [15] in the bivariate analyses. NIH underrepresented status was included in all models regardless of the p-value. From the initial model, covariates were manually removed one at a time. The final model consisted of NIH underrepresented status and covariates that: 1) led to a 10% change in the beta coefficient for NIH underrepresented status; and/or 2) were statistically significant at $p \leq 0.05$. We performed this procedure separately on each of the four scholarly productivity outcomes. All quantitative analyses were conducted in SAS® version 9.3 (Cary, NC, USA), and a significance level of $\alpha<0.05$ (two-tailed) was considered statistically significant.

Results

Sixty-five percent (n=92) of our sample self-identified as NIH underrepresented trainees (Table 1). NIH underrepresented trainees were significantly more likely to be first-generation college graduates (51.7% vs. 12.2%, p<0.001) and report that sharing personal or cultural characteristics with their CNPC mentor was extremely important/important (56.0%) to them; versus NIH non-underrepresented trainees (23.3%, p<0.001). There were no statistically significant differences by NIH underrepresented status in CBPR or professional development competencies or work/life balance factors. NIH underrepresented trainees were significantly more likely to report being at or below the median number of total publications (57.6% vs. 38.8%, p=0.03) and to have no grant funding (43.5% vs. 18.4%, p=0.003) compared to NIH non-underrepresented trainees.

Scholarly productivity in the previous five years

Tables 2 and 3 present data on the relationship between the scholarly productivity outcomes and independent variables, controlling for NIH underrepresented status.

First-authored publications—In the final adjusted model, there was an increased odds of reporting being above the median number (>4) of first-authored publications among trainees who were Assistant or Associate Professors (vs. PhD/other doctoral student/Postdoc) with OR=8.47, 95% CI: 2.02–35.60, p=0.004; and OR=24.15, 95% CI: 4.05–143.94, p=0.0005, respectively. NIH underrepresented status was not independently associated with first-authorship (p=0.08).

Total publications—The final adjusted model showed a significantly increased odds of reporting being above the median number of publications (> 9) for trainees who indicated NIH non-underrepresented status (vs. underrepresented, OR=3.50, 95% CI: 1.29–9.86, p=0.002). Trainees who had academic training in public health/health sciences (OR=2.98, 95% CI: 1.11–7.96, p=0.03), were tenure-track/tenured (OR=13.52, 95% CI: 4.69–38.93, p<0.0001), had ≥ 1 mentors (OR=5.73, 95% CI: 2.02–16.27, p=0.001), and did not report having challenges with their mentor (vs. any, OR=3.09, 95% CI: 1.15–8.32, p=0.03) also had significantly increased odds of a greater total number of publications, compared to the referent category.

Any NIH grant funding—Based on the final adjusted model, NIH underrepresented status was not independently associated with reporting any NIH grant funding (p=0.39). There was an increased odds of reporting any NIH grant funding for trainees who reported having ≥1 mentor (vs. no mentor, OR=2.40, 95% CI: 1.10–5.23, p=0.03) but a decreased odds of NIH funding for those who reported being extremely/quite satisfied with their academic work/life balance (vs. not very/not at all satisfied, OR=0.38, 95% CI:0.18–0.82, p=0.01).

Any grant funding (NIH and non-NIH)—After controlling for other factors, NIH underrepresented status remained an independent predictor, with non-underrepresented trainees reporting increased odds of having any grant funding (OR=4.75, 95% CI: 1.70–13.22, p=0.003) versus underrepresented trainees. Reporting 1 or ≥ 2 mentors (vs. no mentor, OR=3.91, 95% CI: 1.62–9.43, p=0.002) and being an Associate Professor (vs. PhD/other doctoral student/Postdoc; OR=7.43, 95% CI: 1.20–45.86, p=0.03) were also significantly associated with increased odds of having any grant funding. Conversely, reporting being satisfied with current work was associated with decreased odds of any grant funding. (vs. not satisfied, OR=0.28, 95% CI:0.09–0.86, p=0.03).

Discussion

The NCI/NIH CNPCs were successful at achieving the goal of identifying, attracting, and training health disparities researchers from NIH underrepresented backgrounds in CBPR [6]. Nearly two-thirds of trainees in the CNPCs were from a racial, ethnic or socioeconomic background the NIH has defined as underrepresented. NIH underrepresented trainees were also found to be equally as successful as their NIH non-underrepresented trainee counterparts in obtaining competitive research grants as a PI from the NIH, (e.g., R01s, K-awards). However, we did not observe this equity for the overall number of grants received. This result may reflect the NIH's openness to support CBPR-focused research [17, 18]. As often is the case for scientific innovation and social change, intra-institutional and other sources of funding may be lagging the commitment of the NIH to support CBPR [19, 20]. Interestingly, we also found that trainees who reported higher levels of satisfaction with work/life balance and their current position were less likely to report NIH or any grant funding, respectively. Given that 52% of our participants were non-tenure track, this could mean that their appointment expectations are varied and may demand less focus on research and grant activity compared to their tenure-track counterparts. Others have found inconsistent findings related to work/life balance and career satisfaction among clinical versus research faculty and suggest further research to clarify the breadth of predictors related to these concepts to best prepare trainees for long-term academic success [21].

In contrast to grant funding, NIH underrepresented trainees were, on average, publishing two or fewer total manuscripts per year—significantly fewer than their counterparts. This finding concurs with the findings from our previous work [18]. While this seems relatively low, it is important to note that more than 60% of all trainees reported being Postdocs or Assistant Professors at the time of study, but their publications estimates were based on the previous five years. Because many of them may have been in graduate or post-doctoral programs and the normal lag observed in productivity in publishing research findings could be even longer for early-stage CBPR-dedicated researchers [17, 20], these realities should be considered.

Nevertheless, this finding highlights that trainees could benefit greatly from more focused mentoring on how to enhance their publication records overall.

Differences we found in publication and grant funding record may be related, in part, to NIH underrepresented trainees' differential experiences in mentoring and professional development during graduate and/or post-graduate training [22]. Having ≥ 1 mentors remained a statistically significant predictor for three of the four examined scholarly productivity outcomes. Individuals from underrepresented minority groups often receive less mentoring support than their counterparts [23]. We also found that NIH underrepresented trainees were significantly more likely to be first-generation college graduates compared to their counterparts. First-generation students often experience unique challenges, such as dissonance between their familial roots and academic experiences that often continues, even after earning their doctorate [24]. Mentoring should be adjusted and customized to take this into account. The fact that 38% of the CNPC mentors also were first-generation college graduates [11] may have contributed to NIH underrepresented trainees reporting high satisfaction with their CNPC mentors despite racial or gender discordance.

While our findings make important contributions to the literature about diversity in research training programs, our study has limitations. Findings from this cross-sectional analysis represent a specific point in time and do not take into account the cumulative, changing nature of mentoring and training-related factors. The mentoring and training factors assessed in this study focused only on current experiences within the CNPC, which did not take into account previous experiences. Our results also are not generalizable beyond the trainees who participated in this survey, as well as not being representative of study-eligible CNPC trainees who did not respond and/or those with disabilities.

Conclusions

Our study found that the CNPCs mentoring and training infrastructure was very successful in attracting diverse students and early-stage/midcareer investigators, and supporting their health disparities-focused research careers. As NCI/NIH funding for the CNPCs phases out, the NIH Diversity Program Consortium's initiatives will continue to train and mentor individuals from underrepresented backgrounds (e.g., National Research Mentoring Network) across the lifecycle of their research careers [23]. Providing these types of professional development and mentoring resources are critical for recruiting and retaining diverse students and faculty in their long-term careers. Mentors should particularly assist underrepresented trainees with building their programs of research and their professional advancement. Efforts aimed at understanding the relationship between NIH underrepresented trainee mentoring and effects on cancer-related health disparities should also be undertaken and sustained.

References

1. Adams SA, Choi SK, Khang L, Campbell DA, Friedman DB, Eberth JM, … Young VM. Aug; 2015 Decreased Cancer Mortality-to-Incidence Ratios with Increased Accessibility of Federally Qualified Health Centers. J Community Health. 40(4):633–641. [PubMed: 25634545]
2. Kato I, Booza J, Quarshie WO, Schwartz K. 2012; Persistent socioeconomic inequalities in cancer survival in the United States: 1973–2007 surveillance, epidemiology and end results (SEER) data

for breast cancer and non-Hodgkin's lymphoma. Journal of registry management. 39(4):158–166. [PubMed: 23493021]

3. Chen MS, Lara PN, Dang JHT, Paterniti DA, Kelly K. Apr.2014 Twenty years post-NIH Revitalization Act: Enhancing minority participation in clinical trials (EMPaCT): Laying the groundwork for improving minority clinical trial accrual. Cancer. 120:1091–1096. [PubMed: 24643646]
4. American Cancer Society. Cancer Facts and Figures 2017. 2017.
5. Elk, R, Landrine, H. Cancer disparities: Causes and evidence-based solutions. Springer Publishing Company; 2012.
6. National Cancer Institute. Community Network Program Centers. 2015. Available: http://www.cancer.gov/about-nci/organization/crchd/disparities-research/cnpc
7. Maddux WW, Adam H, Galinsky AD. Jun; 2010 When in Rome … Learn Why the Romans Do What They Do: How Multicultural Learning Experiences Facilitate Creativity. Personal Soc Psychol Bull. 36(6):731–741.
8. National Institutes of Health. Notice of NIH's interest in diversity. 2015. Available: https://grants.nih.gov/grants/guide/notice-files/NOT-OD-15-053.html
9. National Science Foundation. Doctorate Recipients from U.S. Universities: 2014. 2016. National Center for Science and Engineering Statistics.
10. Ginther DK, Schaffer WT, Schnell J, Masimore B, Liu F, Haak LL, Kington R. Aug; 2011 Race, Ethnicity, and NIH Research Awards. Science (80-). 333(6045):1015–1019.
11. Felder TM, Braun KL, Brandt HM, Khan S, Tanjasiri S, Friedman DB, … Hébert JR. 2015; Mentoring and Training of Cancer-Related Health Disparities Researchers Committed to Community-Based Participatory Research. Prog Community Heal Partnerships Res Educ Action. 9(S):97–108.
12. Kellogg Health Scholars. Community track competencies. 2016. Available: http://www.kellogghealthscholars.org/about/community.php#competencies
13. Thorndyke LE, Gusic ME, George JH, Quillen DA, Milner RJ. Jul; 2006 Empowering Junior Faculty: Penn States Faculty Development and Mentoring Program. Acad Med. 81(7):668–673. [PubMed: 16799296]
14. Menard, S. Applied logistic regression analysis. Sage; 2002.
15. Hosmer, DW, Lemeshow, S. Special Topics. Applied Logistic Regression. 2. New York: Wiley; 2000.
16. Greiner KA, Friedman DB, Adams SA, Gwede CK, Cupertino P, Engelman KK, … Hébert JR. Mar; 2014 Effective Recruitment Strategies and Community-Based Participatory Research: Community Networks Program Centers' Recruitment in Cancer Prevention Studies. Cancer Epidemiol Biomarkers Prev. 23(3):416–423. [PubMed: 24609851]
17. Braun KL, Nguyen TT, Tanjasiri SP, Campbell J, Heiney SP, Brandt HM, … Ma GX. Jun; 2012 Operationalization of Community-Based Participatory Research Principles: Assessment of the National Cancer Institute's Community Network Programs. Am J Public Health. 102(6):1195–1203. [PubMed: 22095340]
18. Felder TM, Brandt HM, Armstead CA, Cavicchia PP, Braun KL, Adams SA, … Daguisé VG. Jun; 2012 Creating a Cadre of Junior Investigators to Address the Challenges of Cancer-Related Health Disparities: Lessons Learned from the Community Networks Program. J Cancer Educ. 27(3):409–417. [PubMed: 22528636]
19. Braun KL, Tsark JU, Santos L, Aitaoto N, Chong C. Oct; 2006 Building Native Hawaiian capacity in cancer research and programming. Cancer. 107(S8):2082–2090. [PubMed: 16977599]
20. Hébert JR, Braun KL, Meade CD, Bloom J, Kobetz E. 2015; Community-Based Participatory Research Adds Value to the National Cancer Institute's Research Portfolio. Prog Community Heal Partnerships Res Educ Action. 9(S):1–4.
21. Beckett L, Nettiksimmons J, Howell LP, Villablanca AC. 2015; Do Family Responsibilities and a Clinical Versus Research Faculty Position Affect Satisfaction with Career and Work-Life Balance for Medical School Faculty?. 2015. Journal of Women's Health. 24(6):471–480.

22. Beech BM, Calles-Escandon J, Hairston KG, Langdon SE, Latham-Sadler BA, Bell RA. Apr; 2013 Mentoring Programs for Underrepresented Minority Faculty in Academic Medical Centers. Acad Med. 88(4):541–549. [PubMed: 23425989]

23. Pfund C, Byars-Winston A, Branchaw J, Hurtado S, Eagan K. Sep; 2016 Defining Attributes and Metrics of Effective Research Mentoring Relationships. AIDS Behav. 20(S2):238–248. [PubMed: 27062425]

24. Kniffin K. 2007; Accessibility to the PhD and professoriate for first-generation college graduates: review and implications for students, faculty, and campus policies. Am Acad. 3:49–79.

J Cancer Educ. Author manuscript; available in PMC 2020 June 01.

Table 1

Community Networks Program Centers trainees' characteristics by NIH underrepresented status (n=141)

Characteristics	NIH Underrepresented N=92 (65%)	NIH Non-underrepresented N=49 (35%)	p-value
Personal factors			
Gender			
Male	21 (22.8)	8 (16.7)	0.393
Female	71 (77.2)	40 (83.3)	
Missing		1	
Age			
≤ 34	27 (29.4)	14 (28.6)	0.783
35 to 44	42 (45.7)	25 (51.0)	
45 and older	23 (25.0)	10 (20.4)	
Ethnicity*			
Hispanic	24 (26.1)	1 (2.0)	**<0.0004**
Non-Hispanic	68 (73.9)	48 (98.0)	
Race*			
White	28 (30.8)	37 (77.1)	**<0.0001**
African American	32 (35.1)	0 (0.0)	
Asian	9 (9.9)	10 (20.8)	
Other	22 (24.2)	1 (2.1)	
Missing	**1**	**1**	
First generation college graduate*			
Yes	47 (51.7)	6 (12.2)	**<0.0001**
No	44 (48.4)	43 (87.8)	
Missing	1		
Education			
Doctoral/post-doctoral training	83 (90.2)	47 (95.9)	0.2294
Master's degree or less/others	9 (9.8)	2 (4.1)	
Academic characteristics			
Academic discipline			0.1492
Public Health or Health Sciences	45 (49.5)	18 (36.7)	

Characteristics	NIH Underrepresented N=92 (65%)	NIH Non-underrepresented N=49 (35%)	p-value
Other	46 (50.5)	31 (63.3)	
Missing	1		
Academic title/status			0.906
PhD/Post-doc/Assoc/Research Associate	19 (20.6)	8 (16.3)	
Assistant Professor	40 (43.5)	21 (42.9)	
Associate Professor	14 (15.2)	9 (18.4)	
Full Prof/Endowed Chair/Other/Multiple	19 (20.7)	11 (22.5)	
Years tenure track			
Non-tenure track	51 (56.7)	25 (51.0)	0.512
Tenure track	23 (25.5)	17 (34.7)	
Tenured	16 (17.8)	7 (14.3)	
Missing	2		
Mentoring factors			
Mentoring team (no. of mentors)			
No mentor	38 (45.8)	14 (31.8)	0.232
1 mentor	20 (24.1)	16 (36.4)	
2 or more mentors	25 (30.1)	14 (31.8)	
Missing	9	5	
Satisfaction with mentor			
Very dissatisfied/dissatisfied	11 (12.9)	3 (7.3)	0.546
Satisfied/very satisfied	74 (87.1)	38 (92.7)	
Missing	7	8	
Time spent with mentor			
More than once/month	36 (43.4)	16 (35.6)	0.3899
Once or Less than once a month	47 (56.6)	29 (64.4)	
Missing	9	4	
Challenges with mentor			0.7168
No challenges	46 (54.8)	25 (58.1)	
Any challenges	38 (45.2)	18 (41.9)	
Missing	8	6	
Sharing at least one characteristic with mentor (i.e. gender, race, language etc.)			

Characteristics	NIH Underrepresented N=92 (65%)	NIH Non-underrepresented N=49 (35%)	p-value
No	19 (22.9)	6 (14.3)	0.256
Yes	64 (77.1)	36 (85.7)	
Missing	9	7	
Importance of shared characteristics*			
Extremely important/important	47 (56.0)	10 (23.3)	**0.0005**
Unimportant/Not at all important	37 (44.0)	33 (76.7)	
Missing	8	6	
Training related factors			
Post-doc training			
Not applicable/No	19 (20.7)	10 (20.4)	0.973
Yes	73 (79.4)	39 (79.6)	
CBPR competency score (130–400)			
Lower confidence (<280)	35 (41.2)	26 (56.5)	0.093
Higher confidence (≥280)	50 (58.8)	20 (43.5)	
Missing	7	3	
Professional development competency score (50–200)			0.574
Lower confidence (<120)	40 (46.0)	24 (51.1)	
Higher confidence (≥120)	47 (54.0)	23 (48.9)	
Missing	5	2	
Work/Life balance factors			
Primary care responsibilities (child, spouse, elderly parent, etc.)			0.1683
None	22 (24.4)	6 (12.5)	
Any single responsibility	35 (38.9)	18 (37.5)	
Multiple	33 (36.7)	24 (50.0)	
Missing	2	1	
Work/Life balance satisfaction			
Extremely/quite satisfied	49 (53.9)	30 (61.2)	0.401
Not very satisfied/Not at all satisfied	42 (46.2)	19 (38.8)	
Work satisfaction			
Extremely/quite satisfied	70 (76.9)	39 (79.6)	0.717
Not very satisfied/Not at all satisfied	21 (23.1)	10 (20.4)	

J Cancer Educ. Author manuscript; available in PMC 2020 June 01.

Characteristics	NIH Underrepresented N=92 (65%)	NIH Non-underrepresented N=49 (35%)	p-value
Scholarly activities in the previous five years			
Number of first-authored publications			0.0715
At or below median (≤ 4)	59 (64.8)	23 (48.9)	
Above median (> 4)	32 (35.2)	24 (51.1)	
Missing	1	2	
Total number of publications*			
At or below the median (≤ 9)	53 (57.6)	19 (38.8)	**0.0331**
Above the median (> 9)	39 (42.4)	30 (61.2)	
NIH grant funding			0.5321
Any	40 (43.5)	24 (49.0)	
None	52 (56.5)	25 (51.0)	
Any grant funding (NIH & non-NIH) *			
Any	52 (56.5)	40 (81.6)	**0.0029**
None	40 (43.5)	9 (18.4)	

Table 2

Final multivariate logistic regression models by scholarly productivity outcomes of interest, CNPC Mentoring and Training Survey, 2012–3.

Outcome	Factors in final model	Adjusted OR (95% CI)	p-value
First author publications	NIH Underrepresented Status (No vs Yes)	2.36 (0.90–6.15)	0.08
	Gender (Female vs Male)	2.41 (0.76–7.72)	0.14
	Hispanic (No vs Yes)	1.78 (0.49–6.45)	0.38
	Number of mentors (1 Mentor vs No mentor)	2.86 (0.93–8.83)	0.07
	Number of mentors (≥2 Mentors vs No mentor)	1.75 (0.64–4.83)	0.28
	Academic Title (Assistant professor vs PhD stud/Postdoctoral fellow or associate/Research Associate)	8.47 (2.02–35.60)	0.004
	Academic Title (Associate professor vs PhD stud/Postdoctoral fellow or associate/Research Associate)	24.15 (4.05–143.94)	0.0005
	Academic Title (Full Prof/Endowed Chair/Prof Emeritus/Other/Multiple vs PhD stud/Postdoctoral fellow or associate/Research Associate)	1.36 (0.27–6.84)	0.71
Total publications	NIH Underrepresented Status (No vs Yes)	3.50 (1.24–9.86)	0.02
	Academic Discipline (Public health/health sciences vs Others)	2.98 (1.11–7.96)	0.03
	Tenure track status (Tenure track/tenured vs Non-tenure track)	13.52 (4.69–38.93)	<.0001
	Number of mentors (≥1 Mentor vs No mentor)	5.73 (2.02–16.27)	0.001
	Meetings with mentor (≤ once/month vs >once/month)	1.68 (0.64–4.45)	0.29
	Challenges with mentors (No vs Any)	3.09 (1.15–8.32)	0.03
Any NIH grant funding	NIH Underrepresented Status (No vs Yes)	1.44 (0.63–3.31)	0.39
	Number of mentors (≥1 Mentor vs No mentor)	2.40 (1.10–5.23)	0.03
	Importance of shared characteristics (Important vs Unimportant)	1.78 (0.80–3.99)	0.16
	Work life balance (extremely satisfied/quite satisfied vs not very satisfied/not at all satisfied	0.38 (0.18–0.82)	0.01
Any grant funding	NIH Underrepresented Status (No vs Yes)	4.75 (1.70–13.22)	0.003
	Number of mentors (1 Mentor vs No mentor)	3.91 (1.62–9.43)	0.002
	Satisfaction with current work (Satisfied vs Not satisfied)	0.28 (0.09–0.86)	0.03
	Academic Title (Assistant professor vs PhD stud/Postdoctoral fellow or associate/Research Associate)	2.85 (0.96–8.48)	0.06
	Academic Title (Associate professor vs PhD stud/Postdoctoral fellow or associate/Research Associate)	7.43 (1.20–45.86)	0.03
	Academic Title (Full Prof/Endowed Chair/Prof Emeritus/Other/Multiple vs PhD stud/Postdoctoral fellow or associate/Research Associate)	0.77 (0.22–2.67)	0.68

Table 3

Association of NIH Underrepresented Status with Scholarly Productivity Outcomes among Trainees, CNPC Mentoring and Training Survey, 2012–3.

	First author publications[a]		Total publications[b]		NIH grant funding[c]		Any grant funding[d]	
Reported Regression Estimate	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**
Unadjusted	**138**		**141**		**141**		**141**	
NIH Underrepresented Status	1.92 (0.94–3.94)	0.07	2.15 (1.06–4.36)	0.04	1.25 (0.62–2.50)	0.53	3.42 (1.49–7.86)	<0.01
Adjusted initial model	**122**		**118**		**122**		**119**	
NIH Underrepresented Status	2.42 (0.88–6.61)	0.09	4.21 (1.24–14.34)	0.02	1.41 (0.60–3.32)	0.43	6.25 (1.88–20.81)	<0.01
Adjusted final model	**125**		**120**		**125**		**127**	
NIH Underrepresented Status	2.36 (0.90–6.15)	0.08	3.50 (1.24–9.86)	0.02	1.44 (0.63–3.31)	0.39	4.75 (1.70–13.22)	<0.01

[a] Adjusted initial model – adjusted for gender, age, ethnicity, tenure track status, number of mentors and meetings with mentor and academic title
Adjusted final model – adjusted for gender, ethnicity, number of mentors and academic title

[b] Adjusted initial model – adjusted for age, academic discipline, tenure track status, number of mentors, meetings with mentor, challenges with mentor, confidence in professional activities and academic title
Adjusted final model – adjusted for academic discipline, tenure track status, number of mentors, meetings with mentor and challenges with mentor

[c] Adjusted initial model – adjusted for age, tenure track status, number of mentors, challenges with mentor, importance of shared characteristics with the mentors, confidence in professional activities, work and life balance and satisfaction with current work and academic title
Adjusted final model –number of mentors, importance of shared characteristics and work/life balance

[d] Adjusted initial model – adjusted for age, tenure track status, number of mentors, challenges with mentor, importance of shared characteristics with mentor, confidence in professional activities, work and life balance, satisfaction with current work and academic title
Adjusted final model – adjusted for number of mentors, satisfaction with current work and academic title